15,009

BACWA EXECUTIVE BOARD MEETING
Thursday, September 27, 2012, 9:00 a.m. – 12:00 p.m.

HANDOUTS

Handout Packet is available on the BACWA website (www.BACWA.org).

Executive Board Meeting Agenda

Thursday, September 27, 2012, 9:00 a.m. – 12:00 p.m.
EBMUD Lab Library, 2020 Wake Ave., Oakland, CA

ROLL CALL AND INTRODUCTIONS (9:00 a.m. – 9:05 a.m.)

PUBLIC COMMENT (9:05 a.m. – 9:10 a.m.)

CONSIDERATION TO TAKE AGENDA ITEMS OUT OF ORDER (9:10 a.m. – 9:15 a.m.)

CONSENT CALENDAR (9:15 a.m. – 9:20 a.m.)

1. August 23, 2012 BACWA Executive Board Meeting minutes
2. July 2012 Treasurer's Report
3. Amendment 1 to Jim Kelly agreement for Interim Executive Director services to extend termination date to December 31, 2012; File 12,689.
4. Contract with Avila for Prop 84 Grant Administration services, not to exceed $50,000; File 12,803.

REPORTS (9:20 a.m. – 10:10 a.m.)

5. Committee Reports
6. Executive Board Reports
7. Executive Director Report
8. Regulatory Program Manager Report
9. Chair & Executive Director Authorized Actions
    a. Chair authorization of agreement with O'Rorke for BAPPG Pharmaceutical and P2 Week Outreach support, not to exceed $6,499 in FY 2012-13; File 12,789.
    b. Executive Director authorization of agreement with Prodigy Press for BAPPG Pharmaceutical Outreach support, not to exceed $2,500 in FY 2012-13; File 12,802.
    c. Executive Director authorization of agreement with Norcal Printing for BAPPG Copper Outreach support, not to exceed $4,850 in FY 2012-13; File 12,786.
    d. Executive Director authorization of agreement with Jen Jackson for BAPPG Baywise.org and Steering Committee support, not to exceed $4,999 in FY 2012-13; File 12,811.

OTHER BUSINESS (10:10 a.m. – 11:45 a.m.)

10. Authorization: Designate BACWA Representatives for Aquatic Science Center Board.
11. Authorization: Continue funding of existing contract with SFEI for Nutrient Strategy Development, not to exceed $175,000 from FY 2012-13 BACWA/CBC budget; File 12,680.
12. Discussion: Nutrients
    a. Update on Governance Development Facilitation
    b. SFEI Project Status

c. Draft Nutrient Watershed Permit Concept Paper

13. Discussion: Mercury and PCB's Risk Reduction
14. Discussion: CEC State-Wide Monitoring
15. Discussion: BACWA 2013 Calendar and Remaining 2012 Dates
16. Discussion: Remembering Arleen Navarret

PRESENTATIONS (11:45 a.m. – 12:00 p.m.)

17. Isle Technologies' TAG Program

NEXT REGULAR MEETING

The next regular meeting of the Board is tentatively scheduled for October 25, 2012 at the EBMUD Treatment Plant Lab Library.

ADJOURNMENT (12:00 p.m.)

Executive Board Meeting Minutes

Thursday, August 23, 2012, 9:00 a.m. – 12:00 p.m.
EBMUD Treatment Plant Lab Library
2020 Wake Avenue, Oakland, CA

ROLL CALL AND INTRODUCTIONS
Executive Board Representatives: Ben Horenstein, Chair (East Bay Municipal Utility District); Laura Pagano (San Francisco Public Utilities Commission); Ann Farrell (Central Contra Costa Sanitary District); Mike Connor (East Bay Dischargers Authority); Joanna DeSa (City of San Jose).

Other Attendees: Amanda Roa (Delta Diablo Sanitation District); Tom Hall (Sunnyvale/EOA); Georg Krammer (Koff & Associates); Lorien Fono (Patricia McGovern Engineers); Jim Kelly (BACWA); Alexandra Gunnell (BACWA).

PUBLIC COMMENT
There were no public comments.

CONSENT CALENDAR
*Consent calendar **agenda items 1 – 4** were approved in a motion made by Mike Connor and seconded by Laura Pagano. The motion carried unanimously.*

1. July 26, 2012 BACWA Executive Board Meeting minutes
2. June 2012 Treasurer's Report
3. Contribution to Tri-TAC Pyrethroid Working Group (PWG); $15,000
4. Contribution to Support Layperson's Guide to Wastewater; $6,000

Mike Connor reported that he and Melody LaBella of Central Contra Costa Sanitary District participate in the Pyrethroid Working Group and praised the work being carried out by the group.

The Board inquired about the distribution process and timeline for the Layperson's Guide to Wastewater. The Executive Director (ED) will follow up and also consider whether portions of the guide could be extracted for BACWA to use in outreach materials.

REPORTS

BACWA Executive Board members were invited to share any items of interest under **agenda item 5**, **Executive Board Reports.**

Laura Pagano notified attendees that Harlan Kelly has been named as the new SFPUC General Manager. He previously served as the Assistant General Manager of the Infrastructure Division and his wife Naomi is the City Administrator.

Ann Farrell updated the Board that she has been responding to press inquiries regarding Central Contra Costa's pension plan and public scrutiny surrounding pension spiking.

Mike Connor explained that Karl Royer is retiring in the next month and Dave Stoops will be taking his place at EBDA. He also noted that the City of Hayward is implementing a plan to provide recycled water to Calpine.

Ben Horenstein notified the Board that EBMUD is developing a two-year budget plan and is investigating different rate structures, less dependent on direct consumption, to address their infrastructure gap. EBMUD is also considering bringing the City of Richmond into their service area

and will be reviewing a study that should be completed in January 2013. It was noted that Vivian Housen is working with the City of Richmond.

The ED noted that he has been communicating with Paul Causey about creating repository of 218 notices. The Board requested that Paul provide an update to the Board on his sewer rate database work at an upcoming BACWA meeting this fall.

For **agenda item 6**, the **Executive Director's Report** was included in the meeting handout packet and reviewed by the Executive Director. Meeting attendees were given the opportunity to discuss the contents of the report. The ED also highlighted the following issues and activities:

- The Nutrient 13267 Letter was discussed at the August 20th joint meeting with the San Francisco Regional Water Quality Control Board (RWQCB).
- The agenda for the SWAMP meeting scheduled for August 27th has been released. It was noted that the spiking study is proceeding.
- An update on nutrients strategy development will be covered later in the agenda.
- Rescheduling Pardee continues to be a challenge. The Board agreed to have the ED contact Bruce Wolfe to consider holding the technical seminar on November 5 – 7, even if Bruce will not be able to attend.
- In response to a request from the AIR committee, the ED will work with committee Chair and Vice Chair to review their fee structure and services provided, and potentially develop a recommendation for financial restructuring.
- The Board confirmed that the ED should proceed with scheduling a presentation from Isle Technologies lasting approximately 30 minutes for the September 27th BACWA Board meeting.
- The ED explained that he has been communicating with Alex Parker regarding his request for POTW's to collaborate on an effluent/receiving water toxicity study proposal that he has submitted to the Interagency Ecological Program (IEP). The ED and Mike Connor plan to continue discussions at a meeting on August 29th with Sacramento Regional County Sanitation District, City of Stockton and Alex Parker. Then next steps will be determined and BACWA may want to consider reviewing the proposal and providing input.

The **Regulatory Program Manager** (RPM) **Report** for **agenda item 7** was included in the handout packet and reviewed by Lorien Fono. Lorien noted that Jim Kelly e-mailed a summary of the August 21st state toxicity workshop to the Board. The ED will contact Bobbi Larson to inquire about CASA's continued efforts and will also continue discussions with the RWQCB. Laura Pagano will continue to participate in the toxicity workgroup on behalf of SFPUC.

The RPM distributed the Preliminary Results of the PCB Data Analysis. It suggests a possible cost savings could be achieved if monitoring requirements were changed to reduce the number of congeners and testing frequency. Lorien will send an e-mail inviting agencies to participate in the workgroup.

The Board agreed to continue discussions with the RWQCB regarding dilution policy for ocean dischargers. Tom Hall noted that the RWQCB has been receptive to discussing allowing shallow water dilution for chronic toxicity with Sunnyvale during recent meetings.

No **Chair & Executive Director Authorized Actions** (**agenda item 8**) had been made since the July 26, 2012 BACWA Board Meeting, at the time this agenda was finalized. Last week, the ED

authorized utilization of the of the agreement with RMC for as needed technical support to obtain assistance with state water Board proposed changes to the Monitoring and Reporting Program (MRP) of the Sanitary Sewer System (SSS) Waste Discharge Requirements (WDR). Documentation for this task authorization will be included in the September Board meeting handout packet.

OTHER BUSINESS

For **agenda item 9**, **Designation of BACWA Representatives for Aquatic Science Center Board**, the Board agreed to postpone discussion of this topic for a future meeting when Dave Williams could be present. The topic will be added to a future board meeting along with a discussion of current BACWA representation for SFEI/RMP groups and consideration of other organizations where BACWA representation could be beneficial.

For **agenda item 10a, Nutrients**, *in a motion made by Ben Horenstein and seconded by Mike Connor the Board unanimously approved to* ***grant the Executive Board Chair authority to execute an agreement with Leapfrog for assistance with governance development***. The ED will work to finalize the scope and ensure that RWQCB suggestions are addressed. The Board suggested that notes from Joint meetings with the RWQCB should be circulated.

Under **agenda item 10b**, the ED proposed scheduling the next **Nutrients Orinda Special Meeting** in October and will consider having Naomi Feger and Kayla Kirsch of Leapfrog attend.

The **SFEI Nutrients Strategy Development Progress Report** was included in the handout packet for **agenda item 10c**. Approval of further funding for this project will be included on the agenda for the September BACWA Board meeting.

Mike Connor reported that he has completed a presentation for the upcoming Bay Delta Workshops. He is scheduled to participate on a panel for "In Delta Water Interests" on Day 2 of the September 5 – 6 workshop entitled "Ecosystem Changes and the Low Salinity Zone". Workshop 2 and 3 are tentatively scheduled for October 1 – 3 and November 13 – 14, respectively. The series of workshops are focused on setting flow standards for the Bay. So far over 500 pages of material have been submitted by presenters for Workshop 1 and Mike has forwarded these materials to Dave Senn. Mike's presentation emphasizes 1) the need for better coordination in the Bay and Delta NNE development process, and 2) that this complex issue can only be solved by complex water quality modeling. The presentation has been distributed to the Board and feedback should be directed to Mike Connor.

The ED has forwarded correspondence from Bobbi Larson regarding an August 30th Nutrient Summit that is being convened by Tri-TAC and CASA to discuss a proposed approach to influencing the State Water Board's Nutrient Policy. The ED plans to attend on behalf of BACWA and will report back to the Board.

Agenda items 11, Dilution Policy, and 12, Rescheduling Pardee were discussed earlier in the meeting under the Regulatory Program Manager Report and Executive Director's Report.

Agenda item 13, ReNUWIt meeting, October 25 – 26, was not discussed due to time constraints.

For **agenda item 14**, the Board discussed their most recent **Joint BACWA/RWQCB Meeting on August 20th**. The ED will review the HDR contract to develop a recommendation for utilizing their support. Ben Horenstein will work with Mike Connor, Laura Pagano and the ED to draft a one-page white paper exploring development of a regional approach to address nutrients that includes

consideration of capital planning. Ann Farrell suggested that CCCSD's Facilities Plan may be a useful reference for this effort.

It was mentioned that the State Water Resources Control Board will hold a workshop on August 28th to discuss proposed changes to the Monitoring and Reporting Program (MRP) of the Sanitary Sewer System (SSS) Waste Discharge Requirements (WDR). The ED is utilizing the as needed support agreement with RMC to have Monica Oakley investigate possible implications, and will update the Board on this matter next week.

CLOSED SESSION
The Board met in Closed Session to discuss personnel matters pursuant to California Government Code section 54957.

REPORT OUT FROM CLOSED SESSION
No formal actions were taken by the Board during closed session.

The next regular BACWA Board meeting is tentatively scheduled for September 27, 2012 at the EBMUD Treatment Plant Lab Library from 9 a.m. – 12 p.m.

The meeting adjourned at 12:00 p.m.

BACWA EXECUTIVE BOARD ACTION REQUEST

AGENDA NO.: 3
FILE NO.: 12,689
MEETING DATE: September 27, 2012

TITLE: Interim Executive Director Amendment 1

☒ **MOTION** ☐ **RESOLUTION** ☐ **DISCUSSION**

ACTION UNDER CONSIDERATION

Authorize Amendment 1 to the agreement with J.M. Kelly Engineering for Interim Executive Director services to extend the contract on a month-to-month basis through December 31, 2012.

SUMMARY

The current contract with James Kelly for Interim Executive Director services has a termination date of September 30, 2012. This action will authorize James Kelly to continue to serve as BACWA's Interim Executive Director on a month-to-month basis through December 31, 2012. The compensation and services detailed in the original agreement and scope of work will remain the same. The "termination for convenience" condition remains in effect as stated in the original agreement:

> *Either party may also terminate this Contract in whole or in part at any time for its convenience. For a termination for convenience, the termination will be effective thirty (30) days following receipt of a written notice of termination by one party from the other.*

FISCAL IMPACT

Funds are available for this contract in the Fiscal Year 2012-13 BACWA Budget. The monthly rate for this agreement is $11,646. If the agreement remains in place through December 31, 2012, it would result in total encumbrance of $69,876 for the FY 2012-13 BACWA Executive Director budget line item and the unobligated balance remaining for the fiscal year would be $90,124.

ALTERNATIVES

This action does not require consideration of any alternatives because BACWA's contracting policy does not apply to the Executive Director position.

ATTACHMENTS

1. JKelly Amendment 1 FY11-13

AMENDMENT NO. 1
TO
AGREEMENT BETWEEN
BAY AREA CLEAN WATER AGENCIES
AND
J.M. Kelly Engineering, Inc.
FOR
Interim Executive Director Services

This Amendment No. 1 is made this 27th day of September, 2012, in the City of Oakland, County of Alameda, State of California, to that certain agreement File 12,689 of April 9th , 2012 by and between J.M. Kelly Engineering, Inc. (James Kelly) and Bay Area Clean Water Agencies, (BACWA) (the "Agreement") in consideration of the covenants hereinafter set forth.

1. BACWA and James Kelly agree to extend the term of the contract to continue through December 31, 2012, on a month-to-month basis;

2. The "termination for convenience" condition remains in effect as stated in the original agreement:

   > Either party may also terminate this Contract in whole or in part at any time for its convenience. For a termination for convenience, the termination will be effective thirty (30) days following receipt of a written notice of termination by one party from the other.

3. Except as herein expressly modified, the Agreement remains in full force and effect.

BAY AREA CLEAN WATER AGENCIES

By _____ Dated _____
Ben Horenstein, Chair Executive Board

J.M. KELLY ENGINEERING, INC

By _____ Dated _____
James M. Kelly

BACWA EIN: 94-3389334

BACWA EXECUTIVE BOARD ACTION REQUEST

AGENDA NO.: 4
FILE NO.: 12,803
MEETING DATE: September 27, 2012

TITLE: Proposition 84 Grant Administration Support

☒ **MOTION** ☐ **RESOLUTION** ☐ **DISCUSSION**

ACTION UNDER CONSIDERATION

Execute an agreement with Avila & Associates Consulting Engineers, Inc. to provide administrative support for the Proposition 84 round 1 IRWM grant in an amount not to exceed $50,000 for the period September 27, 2012 through September 30, 2016.

SUMMARY

BACWA, in its role as grantee for the Bay Area Integrated Regional Water Management (IRWM) Implementation grant, is proposing to enter into a contract for support services to administer the Bay Area Prop 84, round 1 IRWM grant. The work of the consultant will be overseen by the participants in the IRWM grant.

BACWA's standard contract template is used as the basis for this contract, with only two differences:

- The insertion of a new paragraph 6, requiring the consultant to complete all work consistent with the "Standard Conditions" provided in the Prop 84 grant language. A copy of the grant language conditions is provided as Exhibit D to the contract.
- Additional sentences inserted into paragraph 7 that limit the initial work to $25,000 and specify that at no time will the authorized work exceed the funding available in the Prop 84 account. This language is consistent with the approach taken for the Prop 50 administrative assistance grant.

FISCAL IMPACT

Funding for this contract is available in the Proposition 84 account, which is funded by the grant participants. These administrative costs are eligible for reimbursement from DWR.

ALTERNATIVES

On August 1st, 2012, a request for proposals was mailed to consultants on the BACWA consultant list, as well as others. By the established deadline of noon, August 17th, three proposals were received (Avila and Associates, Causey Consulting, and Kennedy/Jenks Consultants). One additional proposal was received after the deadline (C. Jennifer Jackson), for a total of four proposals. A subgroup of IRWM grant participants, including one representative from each functional area, participated in a review of the proposals. The subgroup discussed the merits of each proposal and conducted reference checks. Based on a number of different factors, including timeliness in submittals, hourly rate structures, familiarity with the grant process, and availability of personnel, the subgroup unanimously chose Avila and Associates as their first choice.

Attachments:

1. Scope of Work and Rate Sheet

EXHIBIT A

SCOPE OF WORK

Task 1 – Support for Reporting

1) Quarterly Progress Reports will cover key milestones achieved, percent completion on each task, and budget information as required by the DWR Grant Agreement. The current method is to prepare the information manually using Microsoft Office and/or Adobe Acrobat and store the information electronically at bairwmp.org. A web template may be used in the future and is subject to development through a separate contract.
    a. Assistance is required to prepare an overall summary report by compiling information submitted for each project.
    b. A draft quarterly report shall be provided to the Oversight and Coordination Committee for review and comment prior to finalization.
    c. Follow up with staff from DWR and the participants may be needed to address questions or comments.
    d. Records must be maintained, including any submittals to DWR, and related correspondence with participants. Consultant electronic records shall be backed up not less frequently than weekly, preferably daily. Consultant records for this project shall be made available to BACWA upon request and upon termination of the contract.
    e. Consultant must be competent in Adobe Acrobat and Microsoft Word and Excel.
2) Assistance with other project reports (project completion reports, annual post project reports, grant completion report) may be needed, subject to authorization from the Project Manager.

Task 2 – Support to Review Compliance with Grant Conditions

1) Assistance may be needed to help BACWA review compliance with grant conditions, as outlined in the grant guidelines, including but not limited to the following items[1]:
    a. Labor compliance documentation for construction projects.
    b. Project completion, including final inspections by a registered civil engineer.
    c. Equipment inventory lists for equipment purchased with grant funds.
    d. Signage providing appropriate credit to DWR.
    e. Financial records required by the grant.
    f. Other files and records for each project.
    g. Follow up on project specific issues arising during the grant period.
2) Records related to this task must be maintained. Consultant records for this project shall be made available to BACWA upon request and upon termination of the contract. Electronic records are being used to the maximum extent possible and a website is available to upload documents.

[1] The Consultant will not be asked to assess these records rather the intent is to verify their existence and location.

EXHIBIT B

HOURLY RATES/REIMBURSABLE EXPENSES

Kate Bode, Deputy Project Manager: $135/hour
Steven Jones, Engineering/Technical Support: $150/hour
Ernie Avila, Project Manager: $165/hour.

EXHIBIT C

SCHEDULE

The length of service covered by this Agreement will last as long as funding is available. If and when available funding is exhausted the participants and BACWA will decide how to proceed.

EXHIBIT D

Standard Conditions of the
Grant Agreement between the State of California (Department of Water Resources) and
Bay Area Clean Water Agencies
Agreement Number 4600009715,
pages 135-140 of 151.

EXHIBIT D
STANDARD CONDITIONS

D.1 ACCOUNTING AND DEPOSIT OF GRANT DISBURSEMENT:

a) **SEPARATE ACCOUNTING OF GRANT DISBURSEMENT AND INTEREST RECORDS**: Grantee shall account for the money disbursed pursuant to this Grant Agreement separately from all other Grantee funds. Grantee shall maintain audit and accounting procedures that are in accordance with generally accepted accounting principles and practices, consistently applied. Grantee shall keep complete and accurate records of all receipts, disbursements, and interest earned on expenditures of such funds. Grantee shall require its contractors or subcontractors to maintain books, records, and other documents pertinent to their work in accordance with generally accepted accounting principles and practices. Records are subject to inspection by State at any and all reasonable times.

b) **FISCAL MANAGEMENT SYSTEMS AND ACCOUNTING STANDARDS:** The Grantee agrees that, at a minimum, its fiscal control and accounting procedures will be sufficient to permit tracing of grant funds to a level of expenditure adequate to establish that such funds have not been used in violation of state law or this Grant Agreement.

c) **REMITTANCE OF UNEXPENDED FUNDS:** Grantee, within a period of sixty (60) calendar days from the final disbursement from State to Grantee of grant funds, shall remit to State any unexpended funds that were disbursed to Grantee under this Grant Agreement and were not needed to pay Eligible Project Costs.

D.2 ACKNOWLEDGEMENT OF CREDIT: Grantee shall include appropriate acknowledgement of credit to the State and to all cost-sharing partners for their support when promoting the Project or using any data and/or information developed under this Grant Agreement. During construction of the Project, Grantee shall install a sign at a prominent location which shall include a statement that the Project is financed under the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006, administered by State of California, Department of Water Resources. Grantee shall notify State that the sign has been erected by providing them with a site map with the sign location noted and a photograph of the sign.

D.3 AMENDMENT: No amendment or variation of the terms of this Grant Agreement shall be valid unless made in writing, signed by the parties and approved as required. No oral understanding or agreement not incorporated in the Grant Agreement is binding on any of the parties. For guidance on the Amendment Requirements see Exhibit H.

D.4 AMERICANS WITH DISABILITIES ACT: By signing this Grant Agreement, Grantee assures State that it complies with the Americans with Disabilities Act (ADA) of 1990, (42 U.S.C., 12101 *et seq.*), which prohibits discrimination on the basis of disability, as well as all applicable regulations and guidelines issued pursuant to the ADA.

D.5 AUDITS: State reserves the right to conduct an audit at any time between the execution of this Grant Agreement and the completion of the Project, with the costs of such audit borne by State. After completion of the Project, State may require Grantee to conduct a final audit, at Grantee's expense, such audit to be conducted by and a report prepared by an independent Certified Public Accountant. Failure or refusal by Grantee to comply with this provision shall be considered a breach of this Grant Agreement, and State may take any action it deems necessary to protect its interests.

Pursuant to Government Code Section 8546.7, the parties shall be subject to the examination and audit of State for a period of three years after final payment under this Grant Agreement with respect of all matters connected with this Grant Agreement, including but not limited to, the cost of administering this Grant Agreement. All records of Grantee or subcontractors shall be preserved for this purpose for at least three (3)

years after Project completion. See Exhibit H for a listing of documents/records that State Auditors would need to review in the event of a grant being audited.

D.6 BUDGET CONTINGENCY: LIMIT ON STATE FUNDS. Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006 is subject to the availability of funds including any mandates from the Department of Finance, the Pooled Money Investment Board or any other state authority. The State will not make payments of any kind, including advances or reimbursements, until funding is made available by the State Treasurer.

D.7 CHILD SUPPORT COMPLIANCE ACT: For any Grant Agreement in excess of $100,000, the Grantee acknowledges in accordance with Public Contract Code 7110, that:

a) The Grantee recognizes the importance of child and family support obligations and shall fully comply with all applicable state and federal laws relating to child and family support enforcement, including, but not limited to, disclosure of information and compliance with earnings assignment orders, as provided in Chapter 8 (commencing with section 5200) of Part 5 of Division 9 of the Family Code; and
b) The Grantee, to the best of its knowledge is fully complying with the earnings assignment orders of all employees and is providing the names of all new employees to the New Hire Registry maintained by the California Employment Development Department.

D.8 COMPETITIVE BIDDING AND PROCUREMENTS: Grantee shall comply with all applicable laws and regulations regarding securing competitive bids and undertaking competitive negotiations in Grantee's contracts with other entities for acquisition of goods and services and construction of public works with funds provided by State under this Grant Agreement.

D.9 COMPUTER SOFTWARE: The Grantee certifies that it has appropriate systems and controls in place to ensure that state funds will not be used in the performance of this Grant Agreement for the acquisition, operation, or maintenance of computer software in violation of copyright laws.

D.10 CONFLICT OF INTEREST

a) **Current State Employees**: No State officer or employee shall engage in any employment, activity, or enterprise from which the officer or employee receives compensation or has a financial interest and which is sponsored or funded by any State agency, unless the employment, activity, or enterprise is required as a condition of regular State employment. No State officer or employee shall contract on his or her own behalf as an independent contractor with any State agency to provide goods or services.
b) **Former State Employee:** For the two-year period from the date he or she left State employment, no former State officer or employee may enter into a contract in which he or she engaged in any of the negotiations, transactions, planning, arrangements, or any part of the decision-making process relevant to the contract while employed in any capacity by any State agency. For the twelve-month period from the date he or she left State employment, no former State officer or employee may enter into a contract with any State agency if he or she was employed by that State agency in a policy-making position in the same general subject area as the proposed contract within the twelve-month period prior to his or her leaving State service.

D.11 DELIVERY OF INFORMATION, REPORTS, AND DATA: The Grantee agrees to expeditiously provide, during work on the Project and throughout the term of this Grant Agreement, such reports, data, information, and certifications as may be reasonably required by the State.

D.12 DISPOSITION OF EQUIPMENT: Grantee shall provide to State, not less than 30 days prior to submission of the final project invoice, a final inventory list of equipment purchased with grant funds provided by State. Grantee shall consult with State on the scope of the inventory not less than 60 days prior to the submission of the final project invoice. The inventory shall include all items with a current estimated fair market value of more than $5,000 per item. Within 60 days of receipt of such inventory, State shall provide Grantee with a list of the items on the inventory that State will take title to. All other items shall become the property of Grantee. State shall arrange for delivery from Grantee of items that it takes title to. Cost of transportation, if any, shall be borne by State.

D.13 DISPUTES: In the event of an invoice dispute, payment will not be made until the dispute is resolved and a corrected invoice submitted. Failure to use the address exactly as provided may result in return of the invoice to the Grantee. Payment shall be deemed complete upon deposit of the payment, properly addressed, postage prepaid, in the United States mail. Any claim that Grantee may have regarding the performance of this Grant Agreement including, but not limited to claims for additional compensation or extension of time, shall be submitted to the Director, Department of Water Resources, within thirty (30) calendar days of Grantee's knowledge of the claim. State and Grantee shall then attempt to negotiate a resolution of such claim and process an amendment to the Grant Agreement to implement the terms of any such resolution.

D.14 DRUG-FREE WORKPLACE CERTIFICATION

Certification of Compliance: By signing this Grant Agreement, Grantee, its contractors or subcontractors hereby certify, under penalty of perjury under the laws of State of California, compliance with the requirements of the Drug-Free Workplace Act of 1990 (Government Code 8350 *et seq.*) and have or will provide a drug-free workplace by taking the following actions:

a) Publish a statement notifying employees, contractors, and subcontractors that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees, contractors, or subcontractors for violations, as required by Government Code Section 8355(a).

b) Establish a Drug-Free Awareness Program, as required by Government Code Section 8355(b) to inform employees, contractors, or subcontractors about all of the following:
   1. The dangers of drug abuse in the workplace,
   2. Grantee's policy of maintaining a drug-free workplace,
   3. Any available counseling, rehabilitation, and employee assistance programs, and
   4. Penalties that may be imposed upon employees, contractors, and subcontractors for drug abuse violations.

c) Provide as required by Government Code Sections 8355(c), that every employee, contractor, and/or subcontractor who works under this Grant Agreement:
   1. Will receive a copy of Grantee's drug-free policy statement, and
   2. Will agree to abide by terms of Grantee's condition of employment, contract or subcontract.

D.15 FINAL INSPECTIONS AND CERTIFICATION OF REGISTERED CIVIL ENGINEER: Upon completion of a construction project and as determined by State, Grantee shall provide for a final inspection and certification by a California Registered Civil Engineer that the project has been completed in accordance with submitted final plans and specifications and any modifications thereto and in accordance with this Grant Agreement and to the State's satisfaction.

D.16 GOVERNING LAW: This Grant Agreement is governed by and shall be interpreted in accordance with the laws of the State of California.

D.17 GRANTEE COMMITMENTS: Grantee accepts and agrees to comply with all terms, provisions, conditions, and commitments of this Funding Agreement, including all incorporated documents, and to fulfill all assurances, declarations, representations, and statements made by Funding Recipient in the application, documents, amendments, and communications filed in support of its request for California Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Act of 2006 financing.

D.18 INCOME RESTRICTIONS: The Grantee agrees that any refunds, rebates, credits, or other amounts (including any interest thereon, accruing to or received by the Grantee under this Grant Agreement shall be paid by the Grantee to the State, to the extent that they are properly allocable to costs for which the Grantee has been reimbursed by the State under this Grant Agreement.

D.19 INDEPENDENT CAPACITY: Grantee, and the agents and employees of Grantee, if any, in the performance of the Grant Agreement, shall act in an independent capacity and not as officers, employees, or agents of the State.

D.20 INSPECTIONS: State shall have the right to inspect the work being performed at any and all reasonable times, providing a minimum of a 24-hour notice, during the term of the Grant Agreement. This right shall extend to any local project sponsor, subagreements, and Grantee shall include provisions ensuring such access in all its contracts or sub-contractors entered into pursuant to its Grant Agreement with State. Grantee acknowledges that Project documents may be subject to the Public Records Act (California Government Code Section 6250 et. seq.). State shall have the right to inspect these documents at any and all reasonable times after completion of the Project to ensure compliance with the terms and conditions of this Grant Agreement. During regular office hours, State shall have the right to inspect and to make copies of any books, records, or reports of the Grantee relating to this Grant Agreement. Grantee shall maintain and shall make available at all times for such inspection accurate records of its costs, disbursements, and receipts with respect to its activities under this Grant Agreement. Failure or refusal by Grantee to comply with this provision shall be considered a breach of this Grant Agreement, and State may withhold disbursements to Grantee or take any other action it deems necessary to protect its interests.

D.21 NONDISCRIMINATION: During the performance of this Grant Agreement, Grantee and its contractors shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS), mental disability, medical condition (cancer), age (over 40), marital status, and denial of family care leave. Grantee and contractors shall ensure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. Grantee and contractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code Section 12990 (a-f) *et seq.*) and the applicable regulations promulgated there under (California Code of Regulations, Title 2, Section 7285 *et seq.*). The applicable regulations of the Fair Employment and Housing Commission implementing Government Code Section 12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations, are incorporated into this Grant Agreement by reference and made a part hereof as if set forth in full. Grantee and its contractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement. Grantee shall include the nondiscrimination and compliance provisions of this clause in all contracts to perform work under the Grant Agreement.

D.22 NO THIRD PARTY RIGHTS: The parties to this Grant Agreement do not intend to create rights in, or grant remedies to, any third party as a beneficiary of this Grant Agreement, or of any duty, covenant, obligation or undertaking established herein.

D.23 OPINIONS AND DETERMINATIONS: The parties agree that review or approval of any IRWM Program applications, documents, permits, plans and specifications or other program information by the State is for administrative purposes only and does not relieve the Grantee of its responsibility to properly plan, design, construct, operate, maintain, implement, or otherwise carry out the IRWM Program.

D.24 PERMITS, LICENSES, APPROVALS, AND LEGAL OBLIGATIONS. Grantee shall be responsible for obtaining any and all permits, licenses, and approvals required for performing its obligations under this Grant Agreement. Grantee shall comply with the California Environmental Quality Act (PRC Section 21000 *et seq.*) and other applicable federal, State, and local laws, rules, and regulations, guidelines, and requirements prior to disbursement of funds under this Grant Agreement.

Without limiting the foregoing, Funding Recipient shall keep informed of and take all measures necessary to ensure compliance with California Labor Code requirements, including but not limited to Section 1720 *et seq.* of the California Labor Code regarding public works, limitations on use of volunteer labor (California Labor Code Section 1720.4), labor compliance programs (California Labor Code Section 1771.5), and payment of prevailing wages for work done under this Funding Agreement. Pursuant to the provisions of Proposition 84, the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006, Cal. Pub. Res. Code § 75076 *et seq.*, the Local Project Sponsor shall require that the body awarding a contract for any public works project funded by the State Grant must have a labor compliance program that meets the requirements of California Labor Code Section 1771.5must have a labor compliance program that meets the requirements of California Labor Code Section 1771.5.

D.25 PROHIBITION AGAINST DISPOSAL OF PROJECT WITHOUT STATE PERMISSION: Grantee and Local Project Sponsors shall not sell, abandon, lease, transfer, exchange, mortgage, hypothecate, or encumber in any manner whatsoever all or any portion of any real or other property necessarily connected or used in conjunction with the IRWM Program acquired with funds under this Grant Agreement without prior permission of State. Grantee and Local Project Sponsors shall not take any action concerning the performance of this Grant Agreement, including but not limited to actions relating to user fees, charges, and assessments that could adversely affect the ability of Grantee to meet its obligations under this Grant Agreement, without prior written permission of State. State may require that the proceeds from the disposition of any real or personal property acquired with funds disbursed under this Grant Agreement be remitted to State.

D.26 REMEDIES, COSTS, AND ATTORNEY FEES: The Grantee agrees that any remedy provided in this Grant Agreement is in addition to and not in derogation of any other legal or equitable remedy available to the State as a result of breach of this Grant Agreement by the Grantee, whether such breach occurs before or after completion of the Project, and exercise of any remedy provided by this Grant Agreement by the State shall not preclude the State from pursuing any legal remedy or right which would otherwise be available. In the event of litigation between the parties hereto arising from this Grant Agreement, it is agreed that the prevailing party shall be entitled to such reasonable costs and/or attorney fees as may be ordered by the court entertaining such litigation.

D.27 RETENTION: Notwithstanding any other provision of this Grant Agreement, State shall, for each project, withhold five percent (5.0%) until January 1, 2016 and ten percent (10.0%), thereafter, of the funds requested by Grantee for reimbursement of Eligible Costs. Each project in this Grant Agreement will be eligible to release its respective retention when that project is completed and Grantee has met requirements of Paragraph 17, "Submissions of Reports" as follows. At such time as the "Project Completion Report" required under Paragraph 17 is submitted to and approved by State, State shall disburse the retained funds as to that project to Grantee, except in the case of the last project to be completed under this Grant Agreement, in which case retention for such project will not be disbursed until the "Grant Completion Report" is submitted to and approved by State.

D.28 RIGHTS IN DATA: To the extent permitted by law, the Grantee agrees that all data, plans, drawings, specifications, reports, computer programs, operating manuals, notes, and other written or graphic work produced in the performance of this Grant Agreement shall be in the public domain. The Grantee may disclose, disseminate and use in whole or in part, any final form data and information received, collected, and developed under this Grant Agreement, subject to appropriate acknowledgement of credit to the State for financial support. The Grantee shall not utilize the materials for any profit-making venture or sell or grant rights to a third party who intends to do so.

D.29 SEVERABILITY OF UNENFORCEABLE PROVISION: If any provision of this Grant Agreement is held invalid or unenforceable by a court of final jurisdiction, all other provisions of this Grant Agreement shall be construed to remain fully valid, enforceable, and binding on the parties.

D.30 STATE REVIEWS AND INDEMNIFICATION: The parties agree that review or approval of Project applications, documents, permits, plans and specifications or other Project information by the State is for administrative purposes only and does not relieve the Grantee or Local Project Sponsors of their responsibility to properly plan, design, construct, operate, maintain, implement, or otherwise carry out the Project. To the extent permitted by law, the Grantee and Local Project Sponsors agree to indemnify, defend and hold harmless the State and the State against any loss or liability arising out of any claim or action brought against the State from and against any and all losses, claims, damages, liabilities or expenses, of every conceivable kind, character and nature whatsoever arising out of, resulting from, or in any way connected with:

a) The Project or the conditions, occupancy, use, possession, conduct or management of, work done in or about, or the planning, design, acquisition, installation, or construction, of the Project or any part thereof;
b) Performing any of the terms contained in this Grant Agreement or any related document;
c) Any violation of any applicable law, rule or regulation, any environmental law (including, without limitation, the Federal Comprehensive Environmental Response, Compensation and Liability Act, the

Resource Conservation and Recovery Act, the California Hazardous Substance Account Act, the Federal Water Pollution Control Act, the Clean Air Act, the California Hazardous Waste Control Law and CWC Section 13304, and any successors to said laws), rule or regulation or the release of any toxic substance on or near the natural water system; or

d) Any untrue statement or alleged untrue statement of any material fact or omission or alleged omission to state a material fact necessary to make the statements required to be stated therein, in light of the circumstances under which they were made, not misleading with respect to any information provided by the Grantee for use in any disclosure document utilized in connection with any of the transactions contemplated by this Grant Agreement. Grantee agrees to pay and discharge any judgment or award entered or made against the State with respect to any such claim or action, and any settlement, compromise or other voluntary resolution. The provisions of this section shall survive the term of the Grant Agreement.

D.31 SUCCESSORS AND ASSIGNS: This Grant Agreement and all of its provisions shall apply to and bind the successors and assigns of the parties. No assignment or transfer of this Grant Agreement or any part thereof, rights hereunder, or interest herein by the Grantee shall be valid unless and until it is approved by State and made subject to such reasonable terms and conditions as State may impose.

D.32 TIMELINESS: Time is of the essence in this Grant Agreement.

D.33 TRAVEL: Grantee agrees that travel and per diem costs shall NOT be eligible for reimbursement with State funds, and shall NOT be eligible for computing Grantee cost match. Travel includes the costs of transportation, subsistence, and other associated costs incurred by personnel during the term of this Grant Agreement.

D.34 WAIVER OF RIGHTS: None of the provisions of this Grant Agreement shall be deemed waived unless expressly waived in writing. It is the intention of the parties here to that from time to time either party may waive any of its rights under this Grant Agreement unless contrary to law. Any waiver by either party of rights arising in connection with the Grant Agreement shall not be deemed to be a waiver with respect to any other rights or matters, and such provisions shall continue in full force and effect.

Report to BACWA Board from AIR Committee (September 2012)

Document Control	Prepared by Divya Bhargava (Project Engineer) and Randy Schmidt (Committee Co-Chair) Reviewed by Nohemy Revilla (Committee Co-Chair) and Jim Sandoval (Project Manager)
Committee Request for Board Action	None at this time.
Committee Agenda Items	None at this time.

Recent Committee Actions:

Recent Committee Actions	• BACWA AIR Committee Meeting was held on August 15th 2012 at the CH2M HILL Office in Oakland • Meeting highlights are available on the website following is a list of decisions and action items discussed at the Committee meeting: - Given this year's $5K budget short fall over last year's, the AIR Committee decided to eliminate the newsletter and have as many bi-monthly meetings as the budget will support - Tentative schedule would be to conduct meetings in October, January, March and May (depending on the budget). We'll monitor the budget and make a determination in January about this meeting schedule and the newsletter • CH2M HILL prepared a document summarizing the AIR Committee's activities and accomplishments in the past 2-3 years, as well as the current & pending issues for the AIR Committee. This document is attached at the bottom of the report • AIR members have expressed concerns during that the BAAQMD's level of service has diminished while fees continue to rise annually - To address this issue, the Committee brainstormed the approach to improve service to members from BAAQMD - CH2M HILL drafted talking points for the BACWA Executive Director Jim Kelly to present to the BAAQMD Director to express specific concerns of the AIR members and help improve the service from the District. These talking points are attached at the bottom of the report.
AIR Website	http://bacwa.org/Committees/AirIssuesRegulations.aspx

News and Updates:

Report to BACWA Board from AIR Committee (September 2012)

BAAQMD's Workshop on Particulate Matter (PM)	• BAAQMD conducted a Workshop on September 14th 2012 for PM Planning in the San Francisco Bay Area • The San Francisco Bay Area did not meet one of the federal air quality standards for $PM_{2.5}$ during the three-year period from 2006 to 2008. The United State Environmental Protection Agency (EPA) therefore designated the Bay Area as "non-attainment" for the 24-hour $PM_{2.5}$ national ambient air quality standard in December 2009. Since then, Bay Area $PM_{2.5}$ pollution levels have decreased. Air quality monitoring data show that the Bay Area attained the national 24-hour $PM_{2.5}$ standard during the three-year period from 2008 through 2010 and again for the 2009 through 2011 period. • The potential impacts to BACWA POTWs: - The incorporation of new U.S. EPA requirements for particulate matter less than 2.5 micrometers ($PM_{2.5}$) and Greenhouse Gases (GHG) in New Source Review (NSR) and Title V permits issued by BAAQMD. - The implementation of Best Available Control Technology requirements for $PM_{2.5}$, as necessary • Please see the attached memo written by AIR Chair Nohemy Revilla that provides a summary of BAAQMD's Workshop.
For more information	http://www.baaqmd.gov/Divisions/Planning-and-Research/Particulate-Matter.aspx

Next AIR Committee Meeting: **Wednesday, October 17th , 2012**
Venue: SFPUC's Southeast wastewater treatment plant

TALKING POINTS FOR JIM KELLY TO BAAQMD DIRECTOR

AIR members have expressed concerns during that the BAAQMD's level of service has diminished while fees continue to rise annually

- BAAQMD is having a difficult time following their own permit review timeline rules (e.g., Regulation 2 Rule 6: Major Facility Review, sections 2-6-408, 2-6-410, 2-6-413, 2-6-414, 2-6-423). This can make it challenging for POTWs to schedule and carry out operational plans that are on the critical path.
- Backlog of permit reviews:
    - The San Jose/Santa Clara Water Pollution Control Plant filed an application for Administrative Change of Condition in May 2011 and they have not received a draft copy from District staff to date.
        1. Impact – lack of flexibility on which engines can be operated
        2. Badi Mouderres said a backlog of 10 permits is normal, but BAAQMD's backlog is 70 permits
    - East Bay MUD filed a Title V application in December 2009 and has not received any response from the District. They should have received a draft permit in May 2010.
    - The BAAQMD has not assigned a permit engineer to EBMUD's General Permit at its Main WWTP (ROBERT, SINCE WHAT DATE?)
    - Union Sanitary District filed for a synthetic minor operating permit in December 2008, which was not fully completed until March 2012.
    - Central Contra Costa Sanitary District submitted Title V renewal package in June of 2011 and is operating under Title V permit issued in 2006.
- Lack of communication from District staff
    - Lack of feedback from staff about the status of permit reviews, etc.
    - No solutions offered by the District on how to improve the response time of staff

BACWA understands the challenges that the BAAQMD and all public agencies are facing in the midst of the current economic downturn. Accordingly, BACWA wants to partner with BAAQMD to develop solutions that can mutually benefit the permitting assistance needed by Bay Area POTWs and the resource needs of the District.

Proposed solutions:

- An information exchange session with potential BAAQMD permitting staff and supervisors to allow better understanding, share information, brainstorm ideas, and form points of contacts for each group.
- A dedicated permit engineer for POTWs (like they used to have when Randy Frazier served in this role at the District)
    - Ask the District if having one engineer to cover all the needs of a POTW is realistic in today's heavily regulated era
- Improved electronic permitting system
    - Improved automation on the District website for permit applications, status reviews, updating the emissions data base, etc.
    - Another option may be implementation of the Certified Permitting Professional Program that South Coast and San Joaquin AQMDs have that allow permit applicants to become certified and generate their own permits using the District's network and database

1. This was Badi's idea that he said operated successfully when he worked at SCAQMD

SUMMARY OF BAAQMD's WEBCAST ON PARTICULATE MATTER PLANNING IN THE SAN FRANCISCO BAY AREA
(September 14, 2012)
By Nohemy Revilla

BAAQMD's webcast was divided in the following two parts:

- During **Part 1** they gave a description about particulate matter (PM), PM impact on pollution, health effects related to PM in the Bay Area. They also described control strategies to reduce PM emissions that were included in the Clean Air Plan 2010. New Control Measures in CAP 2010 that are **under development** include Stationary Source Measures: 1, 6, 7, 9, 16.
  - SSM6: General PM: Amend Regulation 6-1 to reduce allowable PM emission rate from all sources
  - SSM 16: New Source Review amendments for $PM_{2.5}$ (Nov 2012)
  - Reductions in primary PM & PM precursors from Mobile Source, Transportation Control and Land Use & Local Impacts Measures
  - SSMs 10, 11, 12, 13, 14 will reduce NOx; SSM 8 targets SO_x

Trends indicate that Bay Area PM concentration & related health effects have been reduced by 50% since 1990s.

- **Part 2**

EPA requires the preparation of a State Implementation Plan (SIP) for any area that is designated non-attainment to determine the reductions needed to meet the standards, and to set the control strategies to meet the standards by December 2014 for the $PM_{2.5}$ (24-hr standard).

BAAQMD monitoring data have shown that in periods 2008 – 2010 and 2009 – 2011 the Bay Area attained the standards. The BAAQMD will follow one of two guidelines that EPA has for area that have met the 24-hr standards since 2009:

- Submit "clean data finding" based on quality-assured monitoring data showing attainment for the most recent 3-year period & prepare an abbreviated "clean data" SIP. This request was submitted to EPA Region 9 by ARB in December 2011 on behalf of BAAQMD.

The Bay Area will continue to be a non-attainment area even when/if EPA approves the "clean data finding", and the following SIP requirements will be suspended as long as monitoring data continues to show attainment:

- Attainment Demonstration / AQ Modeling for $PM_{2.5}$
- Reasonably Available Control Measures (RACM) Analysis
- Reasonable Further Progress (make steady progress)
- Mid-Course Review
- Contingency Measures

But the following will still apply:

- Submit emissions inventory for direct $PM_{2.5}$ & $PM_{2.5}$ precursors for the "attainment year"

    - Includes peak (winter) season emissions by emission source category for 2010. This is include in Table 1 (primary PM and precursor pollutants) and Table 2 (NH_3 emissions) in the DRAFT Emissions Inventory (http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Plans/PM%20Planning/PMSIPTable2010WinterHB.ashx and http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Plans/PM%20Planning/PMSIPTableWinter2010NH3.ashx)

- Amend New Source Review (NSR) rule to address $PM_{2.5}$

    - Proposed amendments to Regulation 2. Comment period is from 9/7/12 to 10/22/12 (http://www.baaqmd.gov/Divisions/Engineering/Proposed-Reg-2-Changes.aspx). The amendments will affect major facilities, such as refineries and power plants, as well as smaller facilities such as gas stations and dry cleaners in the Bay Area when applying for new or modified permits.

BAAQMD has drafted a PM report "Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area". This document is not a SIP and it is not a formal PM control strategy, but it includes investigation about PM impacts, emission inventory from 2010 to 2030, trends, current control programs, etc. (http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Plans/PM%20Planning/UnderstandingPM_Draft_Aug%2023.ashx)

BAAQMD projections show that the PM precursors are going to continue decreasing up to 2030. $PM_{2.5}$ will continue decreasing up to 2020 but will increase after that

Next Steps:

- BAAQMD will present PM documents to Board Executive Committee on 10/15/12
- Board hearing November 7 to consider:
    - - Amendments to New Source Review rule & related CEQA doc (action item)
    - - $PM_{2.5}$ emissions inventory for 2010 attainment year (action item)
    - - PM report (informational item)
- ARB submits $PM_{2.5}$ SIP to US EPA by December 2012

AIR ISSUES & REGULATIONS COMMITTEE

A Committee of the Bay Area Clean Water Agencies

The AIR Committee's History

Over the years, the AIR Committee has updated Bay Area POTWs on important air quality and climate change regulatory information and worked with local and State regulatory agencies to ensure that the viewpoints of both large and small Bay Area POTWs are taken into account. We represent "one voice" to the regulatory agencies, speaking on behalf of the majority of the POTWs in the Bay Area, and public utilities statewide have benefited from our efforts.

Regulatory Advocacy

Together we have proactively assisted in the development of regulatory programs by ensuring that they are based on good science and are physically and financially feasible for our public utilities. We have also shared information, developed comprehensive compliance programs, and formed solid relationships with each other and with our regulatory agencies. These relationships produce universally beneficial results: producing forward thinking input and strengthening our lobbying as regulations impacting Bay Area POTWs are constantly changing. Two of the AIR Committee's primary goals are to promote relationships with regulatory agencies, such as the Bay Area Air Quality Management District (BAAQMD), and to lead BACWA's initiative to monitor and influence climate adaptation policies in the Bay Area and California.

THE AIR COMMITTEE'S ACTIVITIES AND ACCOMPLISHMENTS IN THE PAST 2-3 YEARS INCLUDE:

- Sent the US Environmental Protection Agency (EPA) a letter and follow-up letter regarding the proposed National Emissions Standards for Hazardous Air Pollutants (NESHAP) for reciprocating internal combustion engines (RICE) in September 2009, specifically as it applies to digester gas fueled engines. The letters were based on the helpful feedback of committee members. EPA staff appreciated the feedback and we established an open dialogue with them.
- AIR Committee developed a new webpage on the BACWA website that includes grant tracking information for members. The website is updated regularly to include Committee meetings information, regulatory updates sent to members, newsletters, comment letters, etc.
- In the early fall of 2009, the BAAQMD published proposed new CEQA air quality thresholds of significance for greenhouse gas, criteria pollutants and precursors, risks and hazards, and odor. The AIR Committee and CWCCG researched the new thresholds and the CWCCG submitted a comment letter. The BAAQMD has incorporated comments in the revised guidelines.

- Sent comment letters to California Air Resources Board (CARB) summarizing member concerns regarding the revised California Mandatory Reporting Rule and Cap-and-Trade Rule for greenhouse gas (GHG) emissions in December 2010.
- The AIR Committee Annual Newsletter that has been published every year and appreciated by all members.
- Sponsored a successful BACWA workshop on the AB 32 Mandatory Reporting of Greenhouse Gases at San Francisco Public Utilities Commission (SFPUC) in 2010, which included attendance of approximately 50 participants representing 30 POTWs from around the state. The workshop was led by CH2M HILL and included invaluable participation of Renée Lawver of the CARB.
- Sent Renée Lawver/CARB a letter that summarized member comments regarding the Mandatory Reporting process which was well received and incorporated.
- An on-site meeting at SFPUC's Oceanside Wastewater Treatment Plant in July 2011 that included a presentation/tour of SFPUC's FOG and bio-energy/fuels renewable programs, which showed how they convert FOG from restaurants & households into biodiesel using a patented technology.
- Workshops attendance and comment letters to the California Bay Conservation Development Commission (BCDC) in 2011, regarding the Bay Plan Amendment that addresses climate change impacts to the Bay and surrounding communities, and the protection of critical infrastructure, such as POTWs.
- Workshop attendance on behalf of AIR to track the revisions to BAAQMD New Source Review and Title V Permitting Programs (i.e., amendments to District Regulation 2 – Rules 1, 2, 4 & 6) in 2011.
- In-person discussions with BAAQMD Director of Compliance & Enforcement, Brian Bateman at the January 2011 and the January 2012 Committee Meetings. The purpose of the meetings with Brian was to get an overview of proposed or existing BAAQMD regulations that may impact y POTW's in the Bay Area.
- An on-site meeting at the San Jose/Santa Clara Water Pollution Control Plant in May 2012 that included a presentation/tour of the new fuel cell facility installed at the plant by Scott Warfield of UTS Bioenergy.
- Development of the AIR issues matrix which summarizes all regulatory issues and updates relevant to the AIR members. The matrix is a living document and is updated every month with the current issues.
- Continuous tracking of regulatory issues affecting large and small POTWs through regular Committee-wide emails, keeping the AIR website updated, and the AIR Issues matrix.

CURRENT & PENDING REGULATORY ISSUES FOR THE AIR COMMITTEE:

- Revisions to BAAQMD New Source Review and Title V Permitting Programs (i.e., Regulation 2 – Rules 1, 2, 4 & 6) and potential future impacts of the Tailoring Rule, which regulates GHGs under the Clean Air Act
- CARB Mandatory GHG Reporting and Cap-and-Trade Programs, and their alignment with EPA
- Working with BAAQMD on GHG threshold for Title V applicability
- CARB's Statewide Portable Equipment Registration Program: (PERP) New Fleet Emission Requirements
- Final Federal air toxic standards for industrial, commercial, & institutional boilers & process heaters
- EPA's proposed revisions to the National Ambient Air Quality Standards for Particle Pollution and impacts from BAAQMD
- Changes to BAAQMD Rules regulating engines and boilers 9 (i.e, Regulation 9 – Rules 7 and 8)—maintaining emissions compliance for engines and boilers
- Applicability of EPA's new National emission standards for hazardous air pollutants for reciprocating internal combustion engines (RICE)
- CARB's Stationary Refrigeration Management Program Regulation
- Decreased support from BAAQMD during a time of expanding air quality and climate change regulations
- Rising energy costs - growing need for increased efficiency and incentivized energy production. Although, lack of incentives for increased biogas-to-energy production from RECs, Cap &Trade offsets, etc.

Thank you,

Nohemy Revilla
Air Committee Co-Chair

Randy Schmidt
AIR Committee Co- Chair

BAPPG Committee Report to BACWA Board

Meeting Date: September 27, 2012
Prepared By: Catherine Allin, City of Millbrae
BAPPG Committee Chair

Committee Request for Board Action

1. Welcome the following new BAPPG support team:
   Co-Chair, Dylan Garner (RWQCB)
   Co-Chair, Catherine L. Allin (City of Millbrae)
   Vice Chair, Karri Ving (SFPUC)
   Co-Secretary, Susan Hiestand (SBSA)
   Co-Secretary, Marie Kulka (EBMUD)
2. Ensure staff from your agencies are attending BAPPG meetings AND participating as project champions.

Successes

BAPPG Pollution Prevention Week-No Drugs Down the Drain Campaign

- *With an investment of $6500, we have realized a minimum of $20K return in media coverage.*
- *2 radio interviews and one in-studio interview with Melody LaBella.*
- *Facebook: 731,939 Impressions and 1,380 clicks.*
- *See attached Oakland Tribune Article and BAPPG Press Release.*

Discussions and Action Items

BAPPG Steering Meeting on August 1, 2012 (10 attendees)

Copper

- New OWOW fact sheets on Pools, Spas, and Fountain maintenance distributed by Dylan. Extras are being stored at USD, CMSA, CCCSD, and Palo Alto. Contact Mike Auer, Rob Cole, Melody LaBella, or Karin North if your agency would like copies.
- Meg Gale and Stephanie Hughes are developing an article for plumbing supply and hardware stores etc. to be inserted in industry newsletters.
- Meg Gale to reissue survey monkey to collect data from agencies regarding pool discharge permits for reference on baywise.

P2 Week

- Determined P2 Info Sharing as topic for September meeting.
- Determined P2 Week campaign to focus on No Drugs D own the Drain (NDDD).
- Mt. View Sanitary District planning a billboard in Martinez on 680 during month of September advertising NDDD and Baywise.org.
- Print run of NDDD tear-off sheets for pharmacies to be handled by Karin North of Palo Alto.

BAPPG Main Committee Meeting on August 1, 2012 (26 attendees)

- Requested members submit P2 outreach materials for September Info Share.
- Presentations provided on Mobile Cleaning of Parking Garages by Jim Gamble of Crystal Cleaning and Mobile Cleaning Regulations by Tim Potter of Central San.
- Project Champion (PC) overview provided by Meg Gale. (Attached)
- Announced Alameda County passed their drug take-back Ordinance.
- Discussed Regional Branding Campaign moving to next step in selecting a tagline and logo. Logos have been ranked and sent to Genius Rocket (GR) to be refined; then they will be sent on for focus group testing; and, the top 4 or 5 will be sent back to GR.
- Reminded that Dr. Teng-Chung Wu Annual P2 Award (aka wuhoo) nominations due 8/8.

BAPPG Committee Report to BACWA Board

BAPPG Steering Meeting on September 5, 2012 (12 attendees)

Regional Board

- Karin North to be liaison to RWQCB providing updates on toxicity issues discussed at BACWA.

Regional Campaign

- Athena Honore, will provide update on Campaign and provide logos for the group to assess and bring back to their specific agency for review and comments.
- Meg Gale to reissue survey monkey to collect data from agencies regarding pool discharge permits for reference on baywise.

Copper

- OWOW fact sheets on Pools, Spas, and Fountain maintenance need to be translated and Agency info to be included on baywise.org asap. Meg to provide Consultant, Jen Jackson the information collected to date. Catherine to contact BASMAA vendor regarding translation.

FOG

- Sharon Newton is exploring moving the FOG Holiday Campaign messaging from radio to social media. BAPPG has been using the radio as the main outlet for the FOG Holiday Campaign, primarily with the Spanish speaking audience. The approach seems quite successful, but due to costs, the number of radio announcements has decreased.

Baywise.org

- Consultant, Jen Jackson, needs to remove the existing contact sheet that is outdated and replace with 1-888-baywise number until agency contact list is updated.
- Requested and received volunteer to update contact list. Susan Hiestand to complete task.

P2

- Confirmed P2 Week campaign focus on No Drugs Down the Drain (NDDD).
- Confirmed Mt. View Sanitary District hosting billboard in Martinez on 680 during month of September advertising NDDD and Baywise.org.
- Print run of NDDD tear-off sheets for pharmacies ordered by Karin North of Palo Alto.
- Melody suggested adding pharmaceutical bags with P2 messages to the new project list and offered to be PC.

BAPPG Pollutant Prioritization Meeting on September 5, 2012 (22 attendees)

Regional Board

- Announcement by Dylan that the RWQCB had selected two recipients for the Dr. Teng-Chung Wu P2 Award. The first to Alameda County for their safe Drug Disposal Ordinance to be accepted by President of the Alameda County Board of Supervisors, Nate Miley. The second to Thomas Barron, an Environmental Consultant with 40 years of P2 experience for his lifetime achievements. All were encouraged to attend ceremony on 9/12.
- Announcement that the P2 Annual Report “guidelines” has been postponed to 2013-14; Board focusing energy on supporting the development of the Department of Toxic Substances, Safer Consumer Products Regs.

Copper

- Requested members complete survey on pool discharge permits asap.

BAPPG Committee Report to BACWA Board

BACWA

- Announced that all members should receive and review BACWA update packets. Contact Karin North and she'll provide Alexandra's email/contact info.

FOG

- Group agreed to keep radio ads and increase budget to maintain prior number of ads and to budget for social media outreach. Also determined to launch campaign earlier to account for cultural celebration of Dia de los Muertos holiday.
- Cassie announced turkey fryer stickers still available to interested parties.

Administration

- Determined presentations for October will be on San Francisco's Healthy Nail Salon Program, PCBs, and the Regional Campaign.
- Need to identify PC to transfer and organize the Yahoo Group files to dropbox.net.

P2 Week

- Mt. View Sanitary District's billboard is up along 680 during month of September promoting P2 Week, NDDD, and Baywise.org.
- NDDD tear off sheets are available. Interested members to contact Karin North.
- Karri, Karin, and Melody will be issuing press releases and Facebook ads for P2 Week.

Pollutant Prioritization and Project Planning

- Pollutant Priorities List attached.
- Project list to be finalized.

Other Issues of Note

- A LinkedIn account has been established by BAPPG by Catherine as approved by BACWA. All members requested to join.
- The Chair continues to participate in Product Stewardship Institute teleconferences and engage in Regional Branding and Got Ants Campaign communications.

Next BAPPG Meetings

October Steering Committee & Main Committee Meetings
Wednesday, October 3, 2012: 9:00 – 10:00 am and 10:00 am – noon
1515 Clay Street, Oakland, CA, Second Floor, Room 15

Press Release

OLD PILLS PILING UP?

Bay Area's September 17-23"No Drugs Down the Drain" campaign offers free, easy disposal options for unwanted meds

CALIFORNIA—Medicine cabinets across the Bay Area will have the opportunity for a makeover as a region-wide "No Drugs Down the Drain" campaign kicks off. This effort, spearheaded by the Bay Area Pollution Prevention Group (BAPPG), promotes proper disposal of unwanted medication to keep pharmaceuticals out of the sewer system, landfills and waterways. Residents can visit www.Baywise.org for local disposal options.

Pharmaceutical waste has emerged as a major issue for the environment. In 2010, 358 million prescriptions were filled in California pharmacies alone. With this increase, human disposal practices of flushing medicine down the toilet, pouring them in the drains or dumping them in the garbage may be a significant source of pharmaceuticals in the environment. In fact, before data began to show the presence of pharmaceuticals in waterways, it was commonplace for doctors and pharmacists to recommend that medication be flushed down the toilet.

Now, amid scientific research showing that pharmaceutical concentrations in the environment are having a negative impact on fish and wildlife, BAPPG and local water pollution prevention agencies are seeking to educate and thereby persuade residents to properly dispose of unwanted medication. Their efforts include outreach to pharmacies and online ads.

"Pharmaceutical products are entering our streams and water supply, and doing harm to the environment," said Jared Blumenfeld, EPA's Regional Administrator for the Pacific Southwest. "Our state and local partners are providing options for residents to properly dispose of unwanted medicines safely and not flush them down the drain."

With more advanced technology detecting the pharmaceutical compounds in the environment, wastewater treatment agencies have become increasingly concerned about proper medicine disposal, particularly after studies showed the presence of pharmaceuticals in waterways had been linked to the skewed gender ratios in fish populations off the coast of Orange County; other research showed male fish in the Potomac River and Boulder Creek displaying female traits.

Proper disposal can have a significant impact. In just three years, more than 18 tons of unwanted pharmaceuticals have been collected in Contra Costa County. Last month, Alameda County passed an ordinance requiring pharmaceutical manufacturers to set up and pay for collection and disposal of unwanted medication.

"Now that we are beginning to understand the negative impact pharmaceuticals can have on fish and wildlife, flushing is NOT considered to be proper disposal." said Melody LaBella, project manager of the Bay Area Pollution Prevention Group. "The No Drugs Down the Drain Campaign's goal is to build an awareness among Bay Area residents about this important issue and to provide proper disposal locations."

To find more information about local disposal options, visit Baywise.org.

Oakland Tribune Article

Bay Area residents have had options for getting rid of old pills piling up in their medicine cabinets. But the "No Drugs Down the Drain" campaign launched Monday wants to make sure consumers take their leftover pharmaceuticals to local law enforcement agencies, pharmacies, hospitals and other designated drop-off sites. The effort by the Bay Area Pollution Prevention Group is aimed at keeping unused medications from being flushed down toilets, poured into drains or dumped in the garbage. Instead residents can go to www.baywise.org or call 888-BAYWISE (888-229-9473) to find their nearest disposal site. "Now that we are beginning to understand the negative impact pharmaceuticals can have on fish and wildlife, flushing is not considered to be proper disposal," said Melody LaBella, the organization's project manager. California pharmacies filled 358 million prescriptions in 2010, according to the Bay Area Pollution Prevention Group. Some of those found their way into waterways, harming the environment and aquatic life, according to the organization, which is the public education arm of the Bay Area Clean Water Agencies. The East Bay Municipal Utility District, city of San Jose and Central Contra Costa Sanitary District are principal members. In Contra Costa County alone, 18 tons of unwanted pharmaceuticals have been collected over the past three years, according to the Bay Area Pollution Prevention Group. Increasingly, painkillers, antibiotics, anti-depressants and birth control are showing up in the waterways. By some estimates, up to 90 percent of a medicine dose can pass through a person and outdated treatment plants unchanged, going directly into the Bay. The treatment plants, built decades ago to handle pathogens, need to be upgraded to deal with those compounds, said Deb Self, executive director of the watchdog nonprofit San Francisco Baykeeper. Wastewater treatment agencies have become concerned especially because the drugs have been linked to abnormalities in aquatic creatures. Municipalities in the meantime have turned to a variety of laws to deal with the problem. Alameda County passed an ordinance this summer that makes drug manufacturers responsible for collecting the leftover medications, although it does not specify how the companies plan to dispose of them. Physicians, pharmacists and veterinarians still advise people to flush their leftover medications.

BAPPG Committee Report to BACWA Board

"You are the Champions!"

How to lead/contribute to BAPPG projects

Step 1.

Decide on a topic that is of interest to you or your agency.

Usually based on agency needs, Water Board suggestions, or effluent limitations. Beneficial to address issues through BAPPG because you get credit from the Water Board, funding is available and you'll often have a project partner to assist.

Step 2.

Volunteer at the September pollutant prioritization meeting.

The actual project may not be defined, but you'll know the issue is your responsibility. Steering Committee is good to visit for help with project ideas. Intermittent conference calls with project partners often allow projects to evolve based on research/limitations.

Step 3.

After project is defined, you must complete the Scope of Work and Board Authorization Request forms, along with a Professional Services Contract.

Often consultants will provide text detailing what they will assist with. You may need to edit or revise their proposal for the forms. The forms are submitted to the Chair, Vice-Chair and Alexandra Gunnell at BACWA.

Step 4.

Present briefly during the Project Updates section of BAPPG meetings when necessary, or to solicit opinions.

After the Contractor or project champions complete a draft, solicit opinions and advice by requesting that a small subcommittee of BAPPG members help you review the draft. You may also want to post it to the Yahoo group or ask for feedback at a BAPPG meeting. For technical review, consult BAPPG members for engineers or scientists that may be able to help.

Step 5.

When finalized, share with all members.

Do this via Yahoo group, printed copies, or a final project update. Keep in mind that there may need to be various versions of the final product to accommodate BAPPG or agency logos.

Step 6.

To pay consultant, send invoice to Alexandra Gunnell at BACWA, and she will mail the check to the consultant.

If there is excess funding, BAPPG can re-allocate it for another project. If there is not enough funding to complete your project, consult the Chair and Vice Chair early on to see if supplemental funding is an option.

Step 7.

Report your hard work in the P2 Annual report!

Pollutant Priorities

(In no particular order)

- **Mercury**
- **FOG**
- **Pharmaceutical**
- **Copper**
- **Pesticides**
- **SSO/Trash**
- **PCB's**
- **Dioxins**
- **Nutrients**
- **Multi-pollutants: partner Group/Neighborhood, Hospital audit, Professional Organizations, demolitions contractors.**
- **Emerging Contaminants—SF hosting a conference in April—DTSC organized—should be able to obtain lots of ideas.**
    - **Green Chemistry**
    - **Triclosan**
    - **Flame Retardants/DTSC conference**

Alexandra Gunnell

From: James Kelly [jkelly@bacwa.org]
Sent: Monday, September 17, 2012 2:38 PM
To: Alexandra Gunnell
Subject: FW: [CASA Biosolids] Release of proposed formal exclusion language for POTWs accepting hauled in organic waste

Follow Up Flag: Follow up
Flag Status: Flagged

We should add this to the packetŠ..I don't know if the Biosolids Committee will be including it or notŠ.

On 9/17/12 12:48 PM, "Greg Kester" <gkester@casaweb.org> wrote:

>Hello all - Since this is an issue we have discussed often over the
>past several years, I thought you would be interested in this update. I
>feel very good about the proposed language and am hopeful for its
>adoption. - Greg
>
>-----Original Message-----
>From: Greg Kester [mailto:gkester@casaweb.org]
>Sent: Monday, September 17, 2012 12:37 PM
>To: 'biosolids@lists.casaweb.org'
>Subject: RE: [CASA Biosolids] Release of proposed formal exclusion
>language for POTWs accepting hauled in organic waste
>
>Hello everyone - For your convenience I am attaching the link to the
>actual language here so you need not navigate the whole website (though
>there is a lot of good information there). Again don't hesitate to
>contact me with any questions or comments. Thanks - Greg
>
>http://www.calrecycle.ca.gov/Laws/Rulemaking/Compost/1stDiscDraft/Issue
>5.p
>df
>
>
>-----Original Message-----
>From: biosolids-bounces@lists.casaweb.org
>[mailto:biosolids-bounces@lists.casaweb.org] On Behalf Of Greg Kester
>Sent: Monday, September 17, 2012 12:32 PM
>To: biosolids@lists.casaweb.org
>Subject: [CASA Biosolids] Release of proposed formal exclusion language
>for POTWs accepting hauled in organic waste
>Importance: High
>
>Hello everyone - Please see attached the proposed language that will
>exclude POTWs from needing transfer station/process facility permits or
>from jurisdiction under proposed CalRecycle regulations for anaerobic
>digestion.
>This exclusion will apply if a POTW is accepting hauled in FOG, food
>waste (including source separated), or vegetative food waste (such as
>from food processing canneries etc.). This is the culmination of three
>years' worth of effort and thanks are due to many of you for your work,
>support, and perseverance! The exclusion also assumes the SWRCB will

>insert a standard provision in NPDES permits and WDRs which will
>require Standard Operating Procedures (SOPs) to be developed and
>implemented for receipt and management of the waste, and certain
>records to be retained. Included in the attached announcement is a link
>to the actual exclusion language, with comments due by October 12th and
>notice of two public hearings. One will be in Sacramento on September
>5th and the other in Baldwin Park on October 3rd. I will be at the
>hearing in Baldwin Park. We have actively worked with the SWRCB on
>acceptable permit language and will share that as soon as I can. Please
>let me know if you have any questions or comments. I will be drafting a
>comment letter and will share that as well. Thanks again - Greg
>http://www.calrecycle.ca.gov/Laws/Rulemaking/Compost/default.htm
>
>
>
>
>Calrecycle Compostable Materials, Transfer/Processing Rulemaking
>Listserv
>
>CalRecycle staff developed initial discussion draft regulatory text for
>Issues 5, 6, 7, and 12. The initial discussion draft regulatory text is
>located on the Compostable Materials, Transfer/Processing Home Page
>(http://www.calrecycle.ca.gov/Laws/Rulemaking/Compost/default.htm).
>Please
>send your initial comments on the informal draft text for these issues
>to compost.transfer.regs@calrecycle.ca.gov by October 12, 2012.
>
>CalRecycle will hold informal workshops on September 25, 2012 in
>Sacramento and October 3, 2012 in Baldwin Park to review draft
>regulatory issues and potential approaches for future revisions to
>Title 14 and Title 27.
>Additional workshop details will be posted at a later date.
>
>For further information, contact Ken Decio at (916) 341-6313 or
>Ken.Decio@CalRecycle.ca.gov
>
>
>To subscribe to or unsubscribe from the Compostable Materials,
>Transfer/Processing Rulemaking listserv or other listservs, please go
>to http://www.calrecycle.ca.gov/Listservs/.
>
>
>
>
>_____
>Biosolids mailing list
>Biosolids@lists.casaweb.org
>http://lists.casaweb.org/mailman/listinfo/biosolids
>
>

Alexandra Gunnell

From: Krupp, Matthew [Matthew.Krupp@CityofPaloAlto.org]
Sent: Thursday, September 20, 2012 10:11 AM
To: 'Alexandra Gunnell'
Subject: FW: [CASA Biosolids] FW: Informal Workshops on September 25 and October 3

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Alexandra,

This should be included as an attachment in the exec board packet.

Matt.
650.496.5958

-----Original Message-----
From: biosolids-bounces@lists.casaweb.org [mailto:biosolids-bounces@lists.casaweb.org] On Behalf Of Greg Kester
Sent: Tuesday, September 18, 2012 6:56 AM
To: biosolids@lists.casaweb.org
Subject: [CASA Biosolids] FW: Informal Workshops on September 25 and October 3

Hello all - Please find attached information on the two public hearings referenced in my message yesterday. The hauled in organic waste jurisdiction question is addressed in Issue 5: "Regulatory Coordination of Publicly Owned Treatment Works (POTWs) Accepting Food Waste, Fats, Oils and Grease (FOG)".
http://www.calrecycle.ca.gov/Actions/PublicNoticeDetail.aspx?id=793&aiid=738 - Sacramento on September 25
http://www.calrecycle.ca.gov/Actions/PublicNoticeDetail.aspx?id=794&aiid=739 - Baldwin Park on October 3

http://www.calrecycle.ca.gov/Laws/Rulemaking/Compost/default.htm - General information

Also, if I was not clear in my message yesterday, we believe this proposed language provides the wastewater community with most of what we have been seeking. It provides jurisdictional coverage by State Water Board NPDES permits or WDRs and eliminates the potential need for solid waste permits in most cases. If a POTW seeks to accept organic waste not covered by the exclusion (such as green waste), there is a process clearly defined which may allow the exclusion to apply. We believe this language will help significantly as POTWs help to fulfill state mandates of 33% renewable energy and 75% recycling of solid waste; both by 2020, as well as your own green and cost effective initiatives. More history on this issue can be found at the CASA website at http://www.casaweb.org/biosolids/regulations/calrecycle-position-regulating-hauled-waste-potws-and-definition-compost or of course by contacting me. I am happy to discuss all aspects of this. In the meantime please do let me know if you have any questions or comments. Thanks - Greg

-----Original Message-----
From: Compost.transfer.regs@calrecycle.ca.gov [mailto:Compost.transfer.regs@calrecycle.ca.gov]
Sent: Monday, September 17, 2012 6:00 PM
To: gkester@casaweb.org
Subject: Informal Workshops on September 25 and October 3

Calrecycle Compostable Materials, Transfer/Processing Rulemaking Listserv

CalRecycle will hold informal workshops on September 25, 2012 and October 3, 2012 to review regulatory issues and potential approaches for future revisions to Title 14 and Title 27.

The agenda and workshop details are posted at:

September 25, 2012 workshop in Sacramento, CA (http://www.calrecycle.ca.gov/Actions/PublicNoticeDetail.aspx?id=793&aiid=738)

October 3, 2012 workshop in Baldwin Park, CA (http://www.calrecycle.ca.gov/Actions/PublicNoticeDetail.aspx?id=794&aiid=739)

Additional information on this rulemaking can be found at the Compostable Materials, Transfer/Processing Rulemaking Home Page (http://www.calrecycle.ca.gov/Laws/Rulemaking/Compost/default.htm).

To subscribe to or unsubscribe from the Compostable Materials, Transfer/Processing Rulemaking listserv or other listservs, please go to http://www.calrecycle.ca.gov/Listservs/.

Collection Systems Committee Report to BACWA Board

September 20, 2012
From: Dan Stevenson, Committee Chair
Prepared By: Monica Oakley

Committee Request for Board Action: None

Highlights of New Items Discussed and Action Items

Changes to SSS WDR Monitoring and Reporting Program Update

The State Water Board released extensive proposed revisions to the Monitoring and Reporting Program (MRP) of the Sanitary Sewer System (SSS) Waste Discharge Requirements (WDR) on August 14, 2012. Two "workshops" were held with State Water Board staff (Russell Norman, Victor Lopez, Jim Fischer, and Julie Perry), on August 28 in Vacaville and August 30 in Fountain Valley. These "workshops" were essentially meetings of the Data Review Committee, which over the past several years has worked on very minor changes to the California Water Quality Information System (CIWQS) SSO reporting system. Many BACWA Collection Systems Committee members attended the August 28 meeting in Vacaville and provided verbal comments. The meeting in Vacaville was from 9 AM to 3 PM.

Significant changes have been proposed to the MRP. For reference, the existing MRP is 5 pages and the proposed version is 30 pages. BACWA is working with the California Association of Sanitation Agencies (CASA) to provide comments to State Water Board staff and obtain reasonable revisions. Detailed comments are due to staff by October 2. It appears that a likely timeframe for the State Water Board to finalize the revisions is January, 2013. However, there is a possibility that the revisions could take effect in November, 2012.

Tech-Topic: Manhole Rehabilitation

The Tech Topic series continued with a round-robin discussion of techniques in use around the Bay Area for manhole rehabilitation. Various aspects of manhole rehabilitation were discussed, including typical problems observed during inspections, working in easements, and materials used for rehabilitation, among other considerations. A new product that has come on the market is the Mainstay coating, by Madewell Products Corporation (Alpharetta, Georgia, www.madewell.net). The City of Sunnyvale has tried this product with good results, although QA/QC with the contractor leading up to completion need extra attention. Another coating in popular use is SewperCoat. A summary of manhole rehabilitation practices and presented during the discussion will be posted to the BACWA website at a later date.

US EPA Review of Dichlobenil

A comment letter was recently submitted to USEPA on the scope of the upcoming review of dichlobenil, a root control pesticide that is an ingredient in commonly-used products such as RootX and Sanafoam. BACWA Collection Systems Committee members participated in the development of this comment letter, which focuses on including in the review a thorough investigation of potential risks to worker safety related to exposure (especially during application of the product); and focusing on mitigating any issues of concern if possible rather than banning the product, considering the importance of having multiple effective options for root control. The final letter is attached to this report.

Next BACWA Collection Systems Committee Meeting

Our next meeting will be held on Thursday, October 4, 2012, from 1:30 – 3:00 PM at the Boy Scouts Facility in San Leandro.

BACWA
BAY AREA
CLEAN WATER
AGENCIES

September 7, 2012

Eric Miederhoff
Office of Pesticide Programs (OPP)
Regulatory Public Docket (7502P)
U.S. Environmental Protection Agency (U.S. EPA)
1200 Pennsylvania Ave., NW.
Washington, DC 20460–0001

Subject: Dichlobenil Registration Review, Case # 0263 (Docket ID Number EPA–HQ–OPP–2012–0395)

Dear Mr. Miederhoff:

On behalf of the Bay Area Clean Water Agencies (BACWA), we thank you for the opportunity to comment on the registration review for the herbicide and root control chemical dichlobenil.

BACWA's members include fifty-five publicly-owned wastewater treatment facilities and collection system agencies serving 6.5 million San Francisco Bay Area residents. We take our responsibilities for safeguarding receiving waters seriously and are very concerned about discharges of pesticides into wastewater systems that may compromise effluent quality, biosolids reuse, and compliance with NPDES permit requirements.

BACWA is especially interested in the registration review for dichlobenil as it is an effective chemical used to control root invasion in a wastewater collection system. Roots are a leading cause of collection system blockages, which can cause untreated wastewater to spill out of the collection system. Controlling roots helps prevent these backups, while protecting water quality. Because of the importance of effective root control options, BACWA encourages EPA to identify risk management strategies that will allow for dichlobenil's continued use, while protecting wastewater collection system workers, wastewater treatment operations, and the nation's receiving waters.

Primary Use of Dichlobenil is to Control Roots in Wastewater Collection Systems (Sewer Lines)

According to the Biological and Economic Analysis Division's (BEAD) analysis of California Department of Pesticide Registration (DPR) use data, dichlobenil's primary uses are in "rights of way" and "sewer systems" ("Chemical Profile for Registration Review," US EPA, February 2012, p.3). Upon further analysis of California DPR data available for 2010,[1] we find that almost

[1] See the California DPR's Pesticide Use Reporting database, available at http://calpip.cdpr.ca.gov/main.cfm.

94% of dichlobenil use (in pounds of active ingredient) is in products that specifically target sewer lines – Vaporooter, Vaporooter II, Vaporooter Plus and RootX.[2]

Please note that when reporting uses of pesticides to California DPR, the category "rights of way" is often selected when treating wastewater collection systems because this category covers a number of government properties such as sewer lines, median strips and utilities. Pest control operators may choose to write in more specific information about the application location, such as sewer systems, but there is no requirement to do so.

Background on Root Control in Wastewater Collection Systems

Sewer lines that flow to wastewater treatment plants are known as "wastewater collection systems." These systems are actively managed to ensure their successful operation at all times. Controlling roots prevents line blockages, which can back sewage up into homes, businesses, and through manholes into streets, where overflows may reach storm drains, creeks, rivers, estuaries, and ocean beaches. To protect public health and water quality, wastewater collection system management programs have long included root control as a proven maintenance option. In the face of increasing regulatory requirements to reduce water pollution from sewer overflows, root control programs have grown in the last few years.

BACWA would like to provide EPA with further information about chemical root control within the context of wastewater collection system management. In 2005, seven California wastewater collection agencies together prepared a manual that describes best practices for root control in wastewater collection systems.[3] The manual recommends an integrated approach to root control, which includes assessing existing conditions, and employing a combination of physical repairs, mechanical removal, and chemical control, as appropriate, to maximize effectiveness and control costs. Chemical root control is recommended in certain situations where other control options are not as effective.

While collection system agencies strive to manage their collection systems as well as possible, many agencies face budgetary or other resource constraints and may favor less-expensive chemical control options. Non-chemical management methods tend to be more time-consuming, expensive (e.g., slip lining), opportunity-specific (e.g., root barrier installation when collection lines are repaired or replaced), or stimulate future root growth (e.g., mechanical removal).

Chemical root control used in California include RootX (dichlobenil), Razorooter II (diquat dibromide), and metam-sodium. Although copper sulfate is technically an option, its use is prohibited in parts of California (including BACWA member agencies' service areas) and is not preferred by wastewater collection system managers due to questions about efficacy and concerns about NPDES permit compliance with copper effluent limits. For your reference, we

[2] Calculated by summing pounds of dichlobenil used in products for sewer root control, divided by the total of pounds of dichlobenil in all products and uses reported.
[3] California Collection System Collaborative Benchmarking Group (2005). *Best Practices for Sanitary Sewer Integrated Root Control Best Management Practices*. March.

have enclosed several reports that describe common root control chemical application practices and provide additional information on available root control methods.[4]

Evaluate Potential Wastewater Collection System Worker Health & Safety Risks

Because worker safety is a top priority to our member agencies, BACWA requests that EPA require further studies that better evaluate wastewater collection system workers' potential exposure to dichlobenil. Wastewater collection system workers encounter unique occupational requirements that the Health Effects Division (HED) may not be aware of, such as entering and working in sanitary sewer lines, and standing above manholes for prolonged periods to conduct maintenance and/or collect wastewater samples. Many of these tasks generally do not currently require extensive personal protective equipment, such as respirators.

Given that the primary use for dichlobenil is for root control in wastewater collection systems, we believe that the Human Health Assessment ("Dichlobenil Human Health Assessment Scoping Document in Support of Reregistration Review," US EPA, May 16, 2012) should be modified to address these specific occupational exposures. To this end, we request that HED remove its waiver to the registrant for inhalation studies in confined or enclosed spaces (Human Health Assessment, p. 5) and instead modify this requirement to specifically examine potential worker inhalation exposures associated with wastewater collection system applications. Further, we request that EPA also require dermal, oral, olfactory and eye sensitization studies and applicator exposure measurements that are designed to identify whether current worker safety measures are sufficient to provide appropriate protections for wastewater collection system workers.

We would be happy to engage our member agencies and our national association to assist EPA and the registrant in the design of the exposure measurement studies and to provide sampling opportunities, so as to ensure that study scenarios appropriately reflect application methods and worker safety practices for workers who are applying dichlobenil to the collection system, and workers who may enter the collection system after dichlobenil has been applied.

Evaluate Potential Wastewater Treatment Process Interference

In modern wastewater treatment plants, microorganisms do the basic work of removing fecal matter and dissolved organics in sewage, reducing biological and chemical oxygen demand as well as suspended solids prior to discharge to receiving waters. If a pesticide enters a treatment plant in sufficient quantities, it is possible it could harm these crucial microorganisms, causing "process interference," or a plant "upset" where wastewater is no longer able to be treated properly before discharge. In the case of a plant upset, microorganisms may either be impaired or

[4] See enclosures, including American Society of Civil Engineers (2004). *Sanitary Sewer Overflow Solutions*. Prepared under EPA Cooperative Agreement CP-828955-01-0. April. California Department of Pesticide Regulation (1995). *Evaluation of Copper- and Tributyltin-Containing Compounds.* Report Number EH-95-07. August [see Part 4]. Available at http://www.cdpr.ca.gov/docs/empm/pubs/ehapreps/eh9507.pdf. County of Sacramento Department of Public Works Water Quality Division (1973). *Chemical Control of Roots*. September. Water Environment Research Foundation (2009). *Fats, Roots, Oils, and Grease (F.R.O.G) in Centralized and Decentralized Systems.* WERF Project Number 03-CTS-16T. Union Sanitary District (undated). "Traps and Vents: Information for Property Owners." San Francisco Bay Regional Water Quality Control Agencies (2005). Sewer System Management Plan Development Guide. State Water Resources Control Board (2006). Statewide General Waste Discharge Requirement for Wastewater Collection Agencies: Order No. 2006-0003-DWQ.

killed, such that treatment does not occur for hours, days, or even weeks, resulting in impacts to water quality, fish and wildlife, as well as NPDES permit violations.

Based on scientific information indicating that at certain concentrations dichlobenil may adversely impact the microorganisms that treat wastewater, BACWA is concerned that dichlobenil used in root control programs may interfere with wastewater treatment processes. We request that EPA require a sludge respiration inhibition test (EPA OPPTS Guideline 850.6800) and consider all available open literature to assess the potential for wastewater treatment process interference.

We have attached two studies that may assist in this effort. In 2007, the City of Palo Alto commissioned Stanford University to investigate the potential for the three most common chemical root control products to interfere with the biological operations in the City's wastewater treatment process. All three products were found to have the potential to interfere with the City of Palo Alto POTW's biologically based nitrification treatment.[5] More recently, the Water Environment Research Federation funded an impartial study of the effects of root intrusion on collection systems and identified the best root control methods taking environmental effects into consideration.[6]

In designing its process interference risk assessment, EPA should use a quantitative approach. Quantification of risks will provide the basis for future risk management. Both pesticide control operators and wastewater facility operators would benefit from specific guidance on how to calculate how much root control product may be safely applied within a wastewater collection system. This would ideally be a "maximum allowable headworks loading" formula that would provide a simple formula to calculate the maximum hourly and daily quantity of a root control product that can be allowed in a treatment plant's influent stream, which will afford protection of the treatment facility microorganisms and prevent interference with the treatment process.

Other Comments

Support Down-the-Drain Modeling. While chemical root control is an important component of the management of the wastewater collection system, our member agencies also wish to ensure that the use of these chemicals does not compromise the quality of wastewater effluent. With this in mind, BACWA supports EPA's analysis plan that will use the Exposure and Fate Assessment Screening Tool (E-FAST) down-the-drain model (Problem Formulation, p. 32). To ensure consistency with the analysis plan, we request that the conceptual models (Problem Formulation, pp. 27-29) explicitly indicate that dichlobenil use in sanitary sewers is an exposure pathway.

Fate of Dichlobenil in Wastewater Collection System. The environment within a wastewater collection system differs greatly from the outdoor environment. There is little to no light, it is often cooler in summer and warmer in winter than temperatures above ground, and the air may

[5] Yeung, C.H. and C. Criddle (2007). Inhibition of Activated Sludge Nitrification by Root Control Chemicals: an Initial Evaluation of Dosage and Contact Time. (Enclosed)
[6] Water Environment Research Foundation (2009). *Fats, Roots, Oils, and Grease (F.R.O.G) in Centralized and Decentralized Systems.* WERF Project Number 03-CTS-16T. (Enclosed)

contain more ammonia, nitrogen and sulfur-based compounds, carbon dioxide and/or methane resulting from bacteriological processes that already have begun to break down sewage within the lines. All of these conditions and others may affect the fate of dichlobenil, perhaps modifying its half-life, creating unique reaction products, or causing formation of different degradates. We request that EPA consider these possibilities during its review.

Aquatic Toxicity Data for the Degradate BZZ. BACWA supports the EPA requirement for acute toxicity data for freshwater fish and aquatic plants for the degradate BZZ (Problem Formulation, p. 44). In addition, we request that EPA require of the registrant acute invertebrate, chronic fish and invertebrate, and estuarine/marine fish and invertebrate studies for BZZ. These data are necessary for the Down-the-Drain assessment to evaluate the potential environmental risks from BZZ, which may occur in wastewater effluent.

Chemical Analysis Methods for Wastewater. During the registration process, pesticide registrants are required to submit analytical methods for commodity residue measurements; however, they are not currently required to provide sufficiently sensitive analytical methods for the analysis of pesticides at environmentally relevant concentrations for environmentally relevant matrices, such as wastewater, surface water, sediments, wastewater effluent and biosolids. Such methods exist for very few pesticides. Surface water quality monitoring programs and Publicly Owned Treatment Works (POTW) laboratories need analytical methods for pesticides with sufficiently low detection limits that are practicable in commercial and government analytical laboratories. Where they don't exist, public agencies sometimes are forced to develop them at public expense. Instead, we believe that the manufacturer, at the time of initial registration of its product, should be responsible for development of these methods. If appropriate chemical analysis methods are not available for the above matrices, they should be required during registration review.

In the case of dichlobenil, our primary need is for analytical methods that would allow us to examine whether a wastewater treatment process interference incident may be linked to dichlobenil. We appreciate that EPA is requiring independent laboratory verification of environmental chemistry methods (ECMs) for dichlobenil and BAM in mud, fish, and water (Problem Formulation, p. 40) that will provide method detection limits that are environmentally relevant. BACWA requests that EPA also require of the registrant ECMs for BZZ with appropriate method detection limits, and as noted above, that the methods are practicable in commercial and government laboratories.

California DPR has already established specifications for pesticide analysis method development, which EPA may draw from to further develop these requirements:

> 1. The methods should be routinely executable by commercial laboratories. Reporting limits (RL) are set at 3-5 times method detection limits (MDL). RLs should be no greater than 0.05 $\mu g\ L^{-1}$ [water] and 1 $\mu g\ kg^{-1}$ [sediment]. [Note: U.S. EPA may need to specify a lower RL based on aquatic toxicity data—the RL should be no greater than 10% of the lowest available aquatic toxicity value.] Method detection limits shall be determined as

described in 40 CFR Ch.1, Part 136 Appendix B, "Definition and procedure for the determination of the method detection limit."

2. The method should be gas chromatography (GC) or high pressure liquid chromatography (HPLC)-based methods with mass spectral (MS) detection preferred. Other methods (e.g., HPLC with fluorescence detection; GC with thermionic specific detection) may be used with justification, but the MS-based detection is strongly preferred due to its specificity.

3. Analytical method documentation shall include all method validation data. Method validation shall be conducted as described in DPR's "Chemistry Laboratory Quality Control: Standard Operating Procedures" (Segawa, 1995). Briefly, water methods shall include triplicate analysis at each of six concentration levels: 0 (blank spike), 0.025, 0.05, 0.1, 0.2, and 1 $\mu g\ L^{-1}$. Soil or sediment methods shall include triplicate analysis at each of six concentration levels: 0 (blank spike), 0.1, 0.2, 0.5, 2, and 10 $\mu g\ kg^{-1}$. These standard validation concentrations should be adjusted as appropriate when lower RLs are required.

4. Acceptable overall mean method validation recoveries are 70% < recovery < 120% with relative standard deviation (RSD) of <20%.

5. The method shall include a sample storage stability study that will be evaluated in the respective matrix (e.g. water, sediment, wastewater, or biosolids).

Why Pesticide Registration & Review Process Must Prevent Water Quality Impacts from Root Control Chemicals

It is essential that pesticide regulatory processes adequately consider impacts to wastewater treatment processes, so that such impacts are prevented before they result in impairments to water quality and violations of NPDES permit requirements.

Costs to address these problems can mount quickly: staff must be deployed to first identify the cause of toxicity to the treatment organisms and then to investigate the source of the toxicity. Both may involve extensive sampling, costly laboratory fees and significant staff resources. The cost of a toxicity identification evaluation (TIE) can vary widely from $10,000 to well over $100,000 depending on complexity and persistence of the toxicant. Once identified, the cost to treat or remove the toxicity causing compound(s) can vary dramatically. In addition, agencies are often required to develop programs to minimize the release of the toxicant in the future and in California, face escalating enforcement by the Regional and State Water Boards, including mandatory minimum penalties for many types of effluent violations. A robust risk assessment will help manage risks and ultimately prevent toxicity. The California State Water Board is currently considering a regulatory proposal that would move toxicity from a narrative standard to a numeric standard. Exceedances would not only trigger the expensive test described above, but would also be subject to both fines and citizen lawsuits.

Implement Treatment Plant Notification Prior to Collection System Applications Now

To manage risk in the near term, BACWA requests that EPA require root control applicators to provide advance notification to wastewater treatment facility operators of any planned chemical root control application in the wastewater collection system. The growing use of chemical root control products and the available scientific evidence justify EPA's immediate implementation of advance notification, prior to completion of this multi-year registration review process for dichlobenil.

Wastewater collection systems are commonly managed separately from wastewater treatment plants, and it is not uncommon for multiple municipal and private wastewater collection systems to flow to a single, separately owned and operated treatment facility. Treatment plant operators may not be aware of chemical root control being applied in the collection system. Furthermore, chemical root control is often applied by contractors, who are not necessarily in daily communication with either wastewater collection systems managers or treatment managers. However, if proper notification is required, wastewater treatment operations staff can work with applicators to ensure that applications remain below levels that can cause treatment process interference.

EPA has already established a wastewater treatment plant notification requirement for metam-sodium.[7] BACWA requests that EPA work with registrants to immediately implement labeling requirements for 24-hour advance notification to wastewater treatment plant operators before the application of not only metam-sodium products, but also all other chemical root control products, including dichlobenil products. Similar to label language required for metam-sodium products, we suggest the following wording:

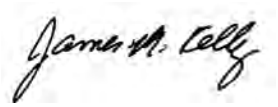
> "Applicators must notify downstream wastewater treatment facilities at least 24 hours prior to the start of dichlobenil applications so that operations of the wastewater treatment plant can be properly monitored.
>
> Applicators must report to operators of downstream water treatment plants the quantity and concentration by volume of the product to be applied to the sewer system and inform these operators that high concentrations of these chemicals in wastewater may adversely affect the biological sewage breakdown process in wastewater treatment plants. Applicators must maintain confirming documentation of the notification to treatment facilities."

BACWA stands ready to engage our member agencies and others in the wastewater community to ensure that the registration review for dichlobenil fully addresses potential wastewater process interference and worker safety issues. We are happy to provide input on exposure measurement studies and to provide sampling opportunities.

[7] U.S. EPA Office of Prevention, Pesticides, and Toxic Substances (2009). Amended Reregistration Eligibility Decision (RED) for the Methyldithiocarbamate Salts (Metam- sodium, Metam-potassium) and Methyl Isothiocyanate (MITC). EPA 738-R-09-310.

Thank you for your consideration of our comments. If you have any questions, please contact BACWA's Project Manager, Melody LaBella, at (925) 229-7370 or mlabella@centralsan.org.

Sincerely,



James M. Kelly
Executive Director

Enclosures:

1. California Collection System Collaborative Benchmarking Group (2005). *Best Practices for Sanitary Sewer Integrated Root Control Best Management Practices*. March.

2. American Society of Civil Engineers (2004). *Sanitary Sewer Overflow Solutions*. Prepared under EPA Cooperative Agreement CP-828955-01-0. April.

3. California Department of Pesticide Regulation (1995). *Evaluation of Copper- and Tributyltin-Containing Compounds.* Report Number EH-95-07. August [see Part 4].

4. San Francisco Bay Regional Water Quality Control Agencies (2005). Sewer System Management Plan Development Guide.

5. County of Sacramento Department of Public Works Water Quality Division (1973). *Chemical Control of Roots*. September.

6. Water Environment Research Foundation (2009). *Fats, Roots, Oils, and Grease (F.R.O.G) in Centralized and Decentralized Systems.* WERF Project Number 03-CTS-16T.

7. Yeung, C.H. and C. Criddle (2007). Inhibition of Activated Sludge Nitrification by Root Control Chemicals: an Initial Evaluation of Dosage and Contact Time. (Includes related correspondence.)

cc: Elyssa Gelmann, U.S. EPA Office of Pesticide Programs, Environmental Fate & Effects Division
Greg Orrick, U.S. EPA Office of Pesticide Programs, Environmental Fate & Effects Division
Kristina Garber, U.S. EPA Office of Pesticide Programs, Environmental Fate & Effects Division
R. David Jones, Ph.D., U.S. EPA Office of Pesticide Programs, Environmental Fate & Effects Division
Brian Anderson, Branch Chief, U.S. EPA Office of Pesticide Programs, Environmental Fate & Effects Division

Michael Goodis, Branch Chief, U.S. EPA Office of Pesticide Programs, Pesticide Re-evaluation Division
Rick P. Keigwin, Jr., U.S. EPA Office of Pesticide Programs, Pesticide Re-Evaluation Division
Donald Brady, Director, U.S. EPA Office of Pesticide Programs, Environmental Fate & Effects Division
Randy Hill, Acting Director, U.S. EPA Office of Water, Office of Wastewater Management
Alexis Strauss, Director, Water Division, U.S. EPA Region 9
Nancy Woo, Water Division, U.S. EPA Region 9
Debra Denton, U.S. EPA Region 9
Patti TenBrook, Life Scientist, U.S. EPA Region 9
Syed Ali, California State Water Resources Control Board
Tom Mumley, California Regional Water Quality Control Board, San Francisco Bay Region
Janet O'Hara, California Regional Water Quality Control Board, San Francisco Bay Region
Daniel McClure, California Regional Water Quality Control Board, Central Valley Region
Tessa Fojut, California Regional Water Quality Control Board, Central Valley Region
Nan Singhasemanon, California Department of Pesticide Regulation
Kelly D. Moran, Urban Pesticides Pollution Prevention Project
Greg Kester, California Association of Sanitation Agencies
Chris Hornback, Senior Director, Regulatory Affairs, National Association of Clean Water Agencies

Permits Committee – Report to BACWA Board

Reporting Date: 9/17/12
Executive Board Meeting Date: 9/27/12
Committee Chair: Jim Ervin

Committee Request for Board Action: None.

Adoption of Permits/Permit Amendments –

Oct – C&H Sugar Refinery – Crockett Community Services Joint Treatment Plant. *Lila Tang informed the committee that Bay Keeper commented that Reasonable Potential Analysis should be required for acute and chronic toxicity in this permit.*
Nov – Sausalito-Marin City Sanitation District. *Lila informed us that there will be some technology based blending language added to this permit per request from Water Board members. There is also some bacteria and toxicity language that will be further evaluated by the BACWA Regulatory Program Manager.*

Residual Chlorine Meters: Permits Committee is considering two options to address compliance with the chlorine water quality objective of 0.0 while recognizing an on-line continuous meter detection limit. On very rare occasions, a Plant will encounter a very low concentration residual chlorine reading. Any reading above "0" must be reported and diagnosed. Permits Committee proposed to Water Board staff arbitrarily establishing a continuous meter MDL of 0.05 mg/l. This is well below the instrument detection capability of 0.3 mg/l determined in the 2008 Chlorine Meter Study and also well below concentrations that can impair aquatic life. In addition, Plants rely on multiple backup indicators to assure that chlorine residual is at or below "0": excess dose of SBS de-chlorinating agent is monitored, backup continuous meters are maintained, etc. Lila informed us that Robert Schlipf will be evaluating the proposed chlorine meter proposal.

Mercury & PCBs Watershed Permit: Robert Schlipf sent an Admin Draft permit for BACWA review in August. BACWA comments were submitted to Robert via email on 14 Sep. The Admin Draft permit proposes some reductions in monitoring and reporting requirements:

- The annual mercury group reporting requirement is dropped
- Requirement to monitor methylmercury is dropped.
- The number of PCBs congeners to be monitored will drop from 209 to the SFEI 40 congeners + co-elutes
- Monitoring frequency for PCBs will be determined by POTW load. BACWA is proposing that the monitoring effort will be directed into a 2-year study of interlaboratory comparison and Method 1668 reliability since the data to date suggests that there are quality control issues.

The Risk Reduction requirement in the Admin Draft permit requires that BACWA continue to support OEHHA and CDPH efforts. There are some questions about what level of continued support is needed and what benefit is expected to be achieved with the Risk Reduction program. Thus far, CDPH & OEHHA disseminated a San Francisco Bay sport fish advisory website, produced advertisements, and poster for posting at local piers and funded community groups to conduct educational workshops . Jim Ervin sent an electronic copy of the poster to BACWA members for review.

Nutrients 13267: The first nutrient 13267 report is due to Water Board in October. Jim Ervin sent the latest version of the Nutrient Excel data template to everyone on 12 Sep. For nutrient reporting, NDs and DNQs will be reported as zeros (Separate worksheets in the workbook report MDLs and RLs.), and PO4 will be reported as P. Richard Looker is developing a program at Water Board to download the data which will require that BACWA agencies submit data in both Excel and MS-DOS.csv formats – which is a very simple file-save conversion.

Toxicity Policy: The State Board workshop on the Toxicity Policy was held on 21 August. CASA and a number of BACWA agencies commented at the workshop. State Board indicated a continued desire to adopt the policy in December. CASA is urging a phased implementation approach. Thus far, State Board staff may consider implementing the TST method, but not issuing numeric toxicity limits for a few years to allow assessment of the impact on POTWs.

- Acute Toxicity. BACWA Exec Director and RPM have discussed how acute toxicity can be handled under the proposed policy with Water Board staff. The policy allows dropping acute monitoring. However, State Board staff must still address antibacksliding if they drop acute toxicity testing requirements.
- TIEs/TREs. The policy will reinforce the need for evaluation of effectiveness and issuance of guidance on

TIE/TRE investigations. On suggestion: conduct TIEs on low dilution samples as per Ocean Plan approach.

- Instream Waste Concentration. The mixing zone policy in the SF Bay Basin Plan does not clearly support the proposed Toxicity Policy use of Instream Waste Concentration (IWC). The Water Board's Triennial Review process may provide an opportunity to adjust the language.

Toxicity Workgroup: A fourth Toxicity Workshop was held at PERL Labs on 23 August. The workshop discussed effects of epibionts contaminating toxicity tests, and the use of zeolite to remove ammonia from the effluent There was a general discussion of TIE and TRE work plans, and how a group effort could provide review for toxicity hits. Ways to justify dropping acute testing from permits were –brainstormed. There was also a tour of the PERL facility.

Notice of Public Hearing – Triennial Review hearing on 14 November. The 2012 Triennial Review Staff Report was released in early September. High Priority projects were identified as:

- Complete Stream and Wetland Protection Policy
- Develop Nutrient WQOs
- Develop and implement Biological Objectives
- Develop Dissolved Oxygen SSOs for the Bay
- Amend Wet Weather Overflow Policy
- Update Toxicity Testing Requirements

Next BACWA Permits Committee Meeting: Tuesday, October 9th, 2012, at EBMUD Plant Library.

Recycled Water Committee Report to BACWA Board

September 27, 2012

Prepared By: Cheryl Muñoz
Committee Chair

Committee Requests for Board Action:

None.

Business Discussed and Action Items:

Business	Discussion
BAIRWMP and Prop 84 Updates	Prop 84/BAIRWMP Updates • Update on Prop. 84 Planning Grant Activities (BAIRWMP) o Chapter Updates - Regional Description and Objectives chapters are in draft form and are being reviewed by the targeted reviewers. o BAIRWMP Project Template Submittals – The deadline was September 7, 2012. This is to get projects into the BAIRWMP, not for grant funding. o Goals & Objectives – The Goals & Objectives were finalized along with the Project Scoring and Ranking Methodology. o Project Review – All projects that were submitted by the September 7, 2012 deadline will be scored and ranked based on the Project Scoring and Ranking Methodology that has been developed (incorporates the BAIRWMP Goals & Objectives and scoring metrics). o Public Workshops – Next public workshop most likely take place in February 2013. o BAIRWMP schedule – The draft scored and ranked project results will be discussed at the October 22, 2012 BAIRWMP Coordinating Committee meeting. o The Project Submittal Template, Goals & Objectives, Project Scoring and Ranking Methodology, Project Review Process and Schedule are all available on the BAIRWMP website at http://bairwmp.org/ • Update on Prop. 84 Implementation Grant o Invoicing – 2nd quarter invoice (April to June) to be prepared and submitted to DWR by the end of September. o Consultant procurement – Avila & Associates was selected to assist with administration of the implementation grant agreement. The contract will go to BACWA Board for approval on September 27, 2012. o Agreements – There are two pending agreements that must be finalized by September 30, 2012 to be eligible to receive Prop. 84 funds: Santa Clara Valley Water District and Sonoma County Water Agency.

Legislative/Regulatory Updates	AB 2398 (Water Recycling Act of 2012) Update • Work continues to revise the language of the bill with the expectation of reintroduction in the 2013 session. Title XVI Update- Bay Area Recycled Water Coalition • The Coalition is continuing to solicit new membership. o Fresno (Central Valley) is interested in joining the Coalition. Potential expansion to the Central Valley and other agriculture interests will be discussed with the current membership before any decisions are made. Other Federal Initiatives • S.3352 provides tax credits for industries investing in water reuse or water conservation technology equal up to 30% of the cost of the equipment purchased. • H.R.1802 raises the limit on private activity bonds that can be issued to private sector companies investing in water and wastewater systems. Other State Initiatives • The California Medical Association is currently considering a resolution endorsing the use of recycled water for potable and nonpotable purposes for presentation to its Board of Delegates in October, 2012.
Projects	Recycled Water Landscape Guide • Overview, activities, status, schedule – local case study to be included after each chapter. Eight chapters drafted. First chapter to be issued by late September for review. The final draft is expected to be completed by next April.
Agency Projects and Announcements	North Novato Recycled Water Project • Project dedication ceremony will be held on October 11, 2012 at 3:00 pm. The project received Title 16 and IRWMP funding. The project includes a 1.7 mgd filter plant that will produce recycled water for irrigation purposes. The customers include golf course, cemetery, industrial park, and schools. Las Gallinas Recycled Water Project • Project dedication ceremony will be held on September 25, 2012. The new advanced Recycled Water Treatment Facility will provide recycled water for landscapes at schools, parks, and other large irrigated areas. This project also received Title 16 and IRWMP funding. Redwood City • Justin Ezell from Redwood City will be leaving to become the new Public Works Director for the City of Concord. Courtney Rubin will temporarily take over his responsibilities.

	<u>On-line Site Supervisor Training Program</u> • An update on the status of the WateReuse Association CA Section program will be given at the October Recycled Water Committee meeting.
Next RW Committee Meeting	October 3, 2012, from 10:00 am to 12:00 pm EBMUD Headquarters, 4th Floor Small Conference Room.

Director's Report to the Board

August 17, 2012-September 21, 2012
Prepared for the September 27, 2012 Executive Board Meeting

NUTRIENTS

SWRCB BAY-DELTA PLAN WORKSHOP: Attended the Comprehensive (Phase 2) Review and Update to the Bay-Delta Plan, Workshop 1: Ecosystem Changes and the Low Salinity Zone on September 5-6th in Sacramento. Notes are attached to this report. Also attached is a recent letter by Phil Isenberg on Bay Delta matters. He correctly predicted the positions taken at the Sept 5-6 meeting, and provides some very good insight that I thought you might enjoy reading.

13267 LETTER: BACWA is reporting using template developed by Jim Ervin; RB2 staff is planning to work with SEFI to get the submitted data into SFEI's system. Historical electronic data that is not in the State's system was submitted September 1, 2012.

SUISUN BAY/SWAMP STUDY: Attended SWAMP Suisun Bay Study Meeting. D. Dougdale stated in 2012, Suisun Bay was acting like Central Bay- less NH3, more chlorophyll. There was on testing using Phyto-Flash that appeared to show the algae in the Suisun Bay were not as active as Algae in other parts of the Bay. We finally got a copy of the spiking study. The group stated they did not want to release the results until the taxonomy and spiking studies were done.

NUTRIENT STRATEGY: Many conversations with D. Senn, RB2 staff, and BACWA members about strategy, project management, governance, next steps and funding. Governance and strategy are both on the agenda today. SFEI bill and list of activities are provided in the handout packet, and considerations of funding the remainder of 2012 and part of 2013 activities is also on the agenda.

NUTRIENT SUMMIT: See attached TriTac issue paper. The concept is that if the normal NNE process is followed for most water bodies, the resultant effluent limits would be beyond what is technically feasible and the desired water quality could not be achieved due to inability to control non-point sources. Agreed to prepare a one to two page document that will include case studies showing calculated limits, costs, and potential benefits, then approach the SWRCB to consider an alternative way to manage nutrients.

GOVERNACE: Worked with consultant to develop interview questions, potential governance structures and finalize scope. Expect most of the interviews will be in early October.

FRESHWATER CYANOTOXIN WORKSHOP: This conference will be held in Oakland November 28th. The flyer is attached, and BACWA members are welcome to attend.

VALLAJO F&SD APPEAL: The Water Contractors requested the Permit appeal be held in abeyance for 2 months. The SWRCB placed the appeal in abeyance for 2 years.

2010 SUISUN BAY SWAMP PAPER ACCEPTED FOR PUBLICATION: The attached paper was accepted for publication.

REVIEW AND COMMENT ON SSS MRP PROPOSED REVISIONS: Facilitated review of proposed revisions and attended workshop in Vacaville. RMC coordinated preparation of talking points for BAWCA members; there were approximately 30 Bay area representatives at the Vacaville Workshop. CASA is engaging RMC to build on our efforts and prepare a redline-strikeout version of the proposed revisions and talking points. CASA has a meeting October 2nd with Jon Bishop and Tom Howard to discuss this matter (I think RMC will also be present).

RWQCB/BACWA MEETING: Held meeting August 20, 2012. Working to schedule meeting between now and Pardee.

ANNUAL PARDEE TECHNICAL SEMINAR: Scheduled for November 5-7, 2012.

REGULATORY PROGRAM MANAGER (RPM): See RPM report in the handout packet.

SACRAMENTO REGIONAL NEW DRAFT NPDES PERMIT: There have been no SWRCB actions since the SWRCB Sacramento Hearing. Sac Regional is expecting action in either October or November, as the court stay expires December 10th, and if they have not ruled by then, the SWRCB has to request another extension, and explain why the could not act.

DRAFT POLICY FOR TOXICITY ASSESSMENT AND CONTROL: See RPM's report for more information. Bobbi Larson,Craig Johns and the ED met with SWRCB Members Tam Dudak and Charlie Hoppins to discuss phasing in the TST. The TST test phasing discussed at the meeting was for all agencies to use the TST test after the new policy is adopted, but the first two to three years would in effect be a test drive as there would be not violations, just triggers. At the end of the test drive, a review would be conducted, and based on that either the Board would act to delay implementation, or the policy would be in full effect. Four SWRCB staff attended the meeting with Tam and Charlie. Subsequent to that meeting, Bobbi Larson has learned that staff is unclear on how to proceed and that POTW's have been asked to not submit a protocol for a TST test drive. Tam has requested POTW's to prepare a proposal at the October SWRCB meeting that would include ag and storm water; to that end, a conference call has been scheduled for September 25 that will include representatives of all potentially regulated parties. I will provide an update on the status at the September 27 Board meeting.

REGIONAL BOARD UPDATE: The EPA is auditing RB2; the principle areas they will be auditing are permits, compliance, and enforcement. One of the first things the EPA has weighed in on is that the Hg watershed permits should reduce the mass limit to the final target now, because compliance schedules must be as short as practical. The EPA did not seek to challenge the group allocation. We hope to hear more about the PCB study before the Board meeting. The EPA also expressed an interest in nutrients.

BIOSOLIDS FACT SHEET: A final draft of the Biosolids Fact Sheet is part of the handout packet; since this fact sheet is likely to be used with the media, I am requesting your review before it is finalized.

STATE BOARD PROPOSED REVISION TO OPERATOR TRAINING REQUIREMENTS: Monitoring activity. Nothing to report to date.

TECHNOLOGY RESEARCH & DEVELOPMENT: ED coordinate a conference call between members Farrell and Conner and Isle Representatives to discuss potential presentation at the September 27th Board meeting. The next Isle TAG meeting in California is tentatively scheduled in Orange County November

8th. Isle has offered to support BACWA representatives attending that meeting and allowing BAWCA representatives to have access to the Isle website to learn more processes that have been presented.

MEETINGS ATTENDED: Permits Committee; SWAMP; proposed SSS MRP WDR comment meeting; Nutrient Summit Meeting; Meeting with RB2 Staff and Lorien Fono to discuss 1668C PCB data and special study, TST/acute testing and nutrients, RWQCB meeting, met with two SWRCB Board Members to discuss draft Policy for Toxicity Assessment and Control.

MISCELLANEOUS:

- Answered miscellaneous questions of from the public.
- Discussions with Alex Parker regarding his request for POTW's to collaborate on a effluent/receiving water toxicity study proposal he has submitted to IEP.
- Followed up on Laypersons Guide: We will receive an electronic copy of the executive summary, the funding partners will receive 1000 hard copies and can freely excerpt from the document, and each can have one person on the editorial board.
- Stan Dean is participating in facilitated meetings discussing Flow Based Pricing for Wastewater Services. The NRDC, Pacific Institute and Center for Water Efficiency are also on the panel and strongly support Flow Based Pricing.

NEXT MONTH

FOLLOWUP ON SACRAMENTO REGIONAL PERMIT WORKSHOP: As needed.

SUISUN BAY ISSUES: As needed.

RWQCB/ BACWA JOINT MEETINGS: Set up RWQCB/BACWA Meeting Schedule for October?

BAPPG: Follow up on flushable flyer and PCB annual reporting.

NPDES PERMIT PETITION DISMISSAL: Consult co-petitioners as they come up for renewal.

ANNUAL TECHNICAL SEMMINAR: Work with BACWA Executive Board and RB2 to develop an agenda.

NEXT MEETING: Hold at SFPUC's new offices?

AIR COMMITTEE: Work with Air Committee Leadership to develop fee and funding alternatives, and contact Air Board regarding a number of issues.

Hg/PCB WATERSHED PERMIT REISSUANCE: Follow-up with RB2 on permit issues and risk reduction;

TECHNOLOGY RESEARCH & DEVELOPMENT: Follow up with Isle Utilities and the Orange County Sanitary District representative to their Technology Approval Group (TAG).

SCHEDULE GARY DARLING: Schedule Gary to come to an upcoming meeting to discuss alternative JPA governance structures: Is the 25th of October okay?

Attachments:

1. *Bay-Delta Workshop 1, September 5-6, 2012 Notes*
2. *Comments from Delta Stewardship Council Chair Phil Isenberg Regarding Bay-Delta Conservation Plan Announcement*
3. *Tri-TAC/CASA Nutrient Management Strategy*
4. *River flow and ammonium discharge determine spring phytoplankton blooms in an urbanized estuary*
5. *Flyer for Freshwater Cyanotoxin Workshop, November 28, 2012*
6. *Biosoilds Fact Sheet*

TO: BACWA BOARD
FROM: JIM KELLY

SUBJECT: Comprehensive (Phase 2) Review and Update of the Bay-Delta Water Quality Control Plan
Workshop 1: ECOSYSTEM CHANGES AND LOW SALINITY ZONE
September 5-6, 2012 Notes

Summary

Water contactors don't want to give up water and want others to fix the delta problems. They blame nutrient ratios and nutrients from wastewater as one of the mechanisms for POD.

Wastewater interests want to use good science and coordinate what is being done better.

All agree that Adaptive management will be needed as the system is changing and will continue to change.

Science Panel: flow matters for a lot of reasons, part of which is habitat.

EPA cited a number of actions they are interested, including setting a new Se water quality objective.

State Board Reactions: They were frustrated that water interest were so protective-they wanted someone to offer water, which did not happen. There were statements, well we are solving the ammonia issue, and Glibert's talk was very well received. They got frustrated for calls for more studies, particularly if they were going to increase costs.

Introduction

All BM's there except Charlie Hoppin. There were over 150 attendees.
In the Summer 2014, the Board is to consider adoption of revised bay delta plan and set the allowed flows. All of the submitted papers and the overheads are on the SWRCB web site: SWRCB>Public Notices>Sept 2012>Sept 5-6>additional information>Program Page>Written Information and presentations. I understand that over a 1000 pages were submitted.

I have attempted to provided a sense and summary of the meeting, and highlight some of the Board Member comments that are of interest to BACWA. I have discussed the panels in the order that they appeared. Many of the presentations were commenting on the straw proposal of attempting to release water such that the original flow regime is mimicked, even though not in the same volume.

Invited Science Panel: flow matters

The Panel had 5 Key Points:
1. Environmental flows are more that just Volume
2. Recent low flows have harmed natives and encouraged invasives
3. Flow is the major determinate of habitat in the Low Salinity Zone
4. Recent Qs are not enough to support natives
5. More study needed

One other key/interesting points:
- The LSZ has the lowest Chlorophyll a in the Delta
-Climate change is having an effect, and will continue an effect, along with sea level rise. **Sea level rise with require more flow to keep X2 in the same location.**
- The bay-delta system will continue to change: climate change, invasive species, levee breaches, more mycrosystis are expected.
This will require an Adaptive Management Plan for the delta to respond to the changing conditions.
Note to BACWA: I expect this will mean we will not have regulatory certainty.

Regulatory Fisheries Agencies Panel

Key points;
-Smelt are at risk
-Impairment of outflow threatens LF smelt
-Decrease in LSZ and quantity affect smelt
-Current plans are not protective of smelt
-2011 test supports this (more water was release to push X2 into the Suisun Bay in the fall of 2011, and there were more smelt).
-Higher flows may be good, but low flows are bad.

EPA: The CWA tools/concerns are: WQSs (numeric, narrative) anti degradation: protect beneficial uses. The EPA SF Bay Delta Action Plan found Aquatic life beneficial uses are not adequately protected. Need to Update flow standards, Delta RMP, consider a TMDL, **adopt New Se objectives**, improve Pesticide pollution prevention , monitor MeHg better, and BDCP. The NRC (2012) report cited a fisheries abundance -X2 relation. Downstream of the LSZ is better. The report was criticized as mechanism not known. NRC said valid even if mechanism not known.

General: Need to plan for the next round of clams: zebra and Corbiculia? We know enough to have some restoration projects.

Resource Management Agencies Panel

Accomplishing Flood Control and Water Supply benefits via managing highly limited system is hard, and trying to mimic actual flows makes it harder. There is not a lot of storage compared to CO River storage. A lot of flow is not captured in major events and that makes it harder
AMP: fits with evolving understanding, real time monitoring, but has its limitations.

Environmental Groups/NGOs/Other Panel

G. Fred Lee: If you are not going to regulate NPS, you will have to increase the flow to dilute contaminates.

CA Sportfishing Alliance: Se is too high in the South Delta, and more measures are needed to reduce Se, as it is harming some fish

John Cain, American Rivers: There is not enough water to do all that you want to do.

In-Delta Water Interest Panel (BACWA, Sac Regional, City of Antioch, South Delta Water Agency)

Joint fact-finding process crucial and working ok
Steve Richie deal re reducing individual efforts and contributing to collective should be considered.

Balance recycling, energy, N&P removal: Look at CO and MT
Supports multi agency approach: example, expert panels, EG emerging CEC
Recommendations to go forward for any science study to have:
-DQO
-QA/QC
-Data verification,
-Peer review
These were the key points made by BACWA and Sac Regional, and in general they were well received.

State and Central Valley Project Contractors

The main theme was we need to know the mechanism. Cited an example where more flow was allowed, and there was a positive environmental outcome that was largely attributed to inundation of flood plains. Stated that of the environmental stressors, the easiest to change were nutrients (aka effluent) and landscape. Stated that climate issues must be looked at and they opposed natural flow alterative. They then had Pat Glibert present her nutrient ratio talk-the clear link they were trying to draw was that nutrient ratios are the mechanism of what has caused the POD, not less water.

Glibert was very well received, although the Board told the contractors that they had to put water on the table. Glibert's paper needs to be carefully and critically reviewed.

Sacramento Valley Water Suppliers

The Sacramento Valley Water Suppliers offered little new information, opposed the concept of unimpaired flow, and wanted to continue the status quo.

Return of Invited Science Panel

The Board members asked the Panel for their thoughts at the end of the session. Here is a summary of their thoughts:

-Stated Board needs to ensure there is a common modeling effort.
-From Jim Cloern: Model the impact of a 5 year drought, impact of a new invasive mussel, climate change and rising sea level and flooding an island.

-There is a Water Quality Monitoring Council whose purpose it to integrate and coordinate monitoring of all agencies. Are there any wastewater reps on it? Val is on it.
-Need to integrate and synthesis the work that has been done.

DELTA STEWARDSHIP COUNCIL

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Comments from DSC Chair Phil Isenberg Regarding BDCP Announcement

In response to requests for comments on the BDCP announcement this week by Governor Jerry Brown, US Secretary of Interior Ken Salazar, and NOAA Deputy Administrator Eric Schwaab. These are the views of DSC Chair Phil Isenberg, not those of the Delta Stewardship Council.

(Sacramento) - The announcement by Governor Brown, Secretary Salazar, and Deputy NOAA Administrator Eric Schwaab shed light on federal and state policy on water in California, the Delta ecosystem and efforts to complete the Bay-Delta Conservation Plan, including construction of a new Delta water export facility. The announcement will not end debate over BDCP. Nothing stops Californians from arguing about water.

As a grumpy old guy involved in California's water wars, I thought the announcement, the theatrics surrounding it, and the staff work that backed it up was very, very interesting. Serious public policy people should pay attention.

Listening to the press conference left me with the impression that federal and state adult supervisors had walked into the room and put some boundaries around BDCP. Secretary Salazar said, *"As broken and outdated as California's water system is, we are also closer than ever to forging a lasting and sustainable solution…."* My own 50-year experience in politics and water battles confirms that when angry voices are raised, it usually means something important is about to happen.

BDCP started as an interest-based negotiation, with the strength and weakness of that orientation. Interest group negotiations are strong because agreement helps to ease approval by policy-makers. Interest group negotiations are weak, because participants tend to protect their own interests, not automatically the interest of the people of California. The Governor and Secretary put the larger public interest back into the discussion of BDCP.

There were many interesting things in the announcement.

- **The coequal goals of state and federal law - a more reliable water supply for California, and a protected, restored and enhanced Delta ecosystem - will be the measures of success for BDCP**. This is a very big deal.

- **The proposed new Delta water export tunnel just got a lot smaller.** The size of the underground water pipes pumping capacity has been reduced by 40 percent, from 15,000 cfs to 9,000 cfs. Ditto for the reduction of intakes/pumps from five to three.

  Does a smaller project satisfy opponents? No. Those who object to the last 60 years of water exports from the Delta for Central Valley farmers, urban Southern California, and even several key Northern California water districts, continue to do so. Others argue the project is still too big, or that it does not give adequate protection to those who live in or near the Delta. In the large sense, however, a big cut in the size of the project moves BDCP closer to what independent science tells us is required for the Delta ecosystem to improve, and also comes closer to what the benefited water ratepayers may be willing to pay.

- **"Science will now guide how to best restore the ecosystem and how much water can be exported."** This declaration breaks new ground. Not by saying that science should be involved, but by saying that science will guide water operations as well. Taking a cue from the coequal goals (and the Delta Vision recommendations that preceded it), the BDCP will need a structure where science judges and recommends, and then joins in operating a water and environmental protection system, one that reflects a more modest demand for water taken from the Delta. How independent scientific judgment fits into BDCP's complicated management system is not yet clear. However, by irreversibly linking available water supply and reasonable efforts to restore the Delta ecosystem, the state and federal officials are cutting new ground in water policy for California.

- **Absolute guarantees of endless amount of 'new water' are slipping from the discussion.** This may be the most interesting part of the BDCP announcement. For the entire history of California, people have demanded legal guarantees of water supplies (we also call them "assurances," or "entitlements"). But if you read all the documents presented this week, it clear that water contractors are not asking BDCP to guarantee a set amount water will be provided - not even a "minimum amount" to be exported (see the Questions and Answers on page 3).

  Rumbles have circulated through the water world for many weeks that "guarantees are no longer a pre-condition for BDCP approval." That was so peculiar that many of us thought it could not be true.

On reflection, this may well qualify as a major change in how California deals with water supply and water demand. Historically, we have overpromised the total amount of water to be delivered. That was not a big problem when California's population and economy were small and the supply of water ample. Today, our population and economy is very large and the supply of water has remained static. The tension is also greater because of strong public supports for reversing the environmental damage from previous water development.

Is dropping the demand for guaranteed levels of water a way to talk honestly about supply and demand? I sure hope so. The Delta Stewardship Council has wrestled with this problem, and ultimately decided that the best way to say it "matches the demands for water to the available supply - not the other way around." The announcement this week sounds very much like this approach.

Some lingering questions for BDCP

The battle over BDCP will continue for many months, as Governor Brown indicated. Here are some key questions essential to achieving a successful BDCP, which could be improved if BDCP incorporated the policy recommendations of the landmark study by the National Research Council (March 2012), National Research Council, *Sustainable Water and Environmental Management in the California Bay-Delta* (March 29, 2012).

1. Will the pledge to improve water management statewide (i.e., conservation and water system efficiency) be a mandatory part of BDCP, or only an option? Will BDCP help meet the statutory mandate in the Delta Reform Act of 2009 to "…*reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency*?"

2. Will the BDCP biological goals and objectives include new updated Delta water quality flows to be adopted by the State Water Resources Control Board by mid-2014?

3. How will the changed BDCP ensure that independent, neutral science is involved in both water supply and ecosystem decisions, and will that involvement of science also be applied to other non-BDCP federal and state plans and programs?

4. Will BDCP shift its focus from a species-by-species evaluation under the Endangered Species Act, and move toward restoration of the Delta ecosystem as a whole? The latter approach is consistent with BDCP's current agreement and legal requirements to satisfy California and federal environmental law. The best available scientific information shows the interconnection of the health of fish species, the loss of habitat and the channelization of water, changes in water supply and flows, and the presence of "other stressors." The National Research Council prudently advised us to be cautious about

expecting instant improvement in either water supply or the Delta ecosystem even if we solve one problem, or two or many.

5. BDCP supports the concept of "user pays," but the announcement today noted, *"Habitat and other conservation measures in the BDCP would be financed in part by the contractors, but would mostly be paid by the state over a period of 40 years, with likely additional investment by the federal government through existing programs."* Is it possible to comply with federal and state laws that deal with environmental and endangered species - and not identify a secure source of funding?

6. The new approach to BDCP pledges "continued investment in the Delta for flood protection, community development, and biological restoration." That is positive, but how much money, from whom, and for what and when?

All of us should expect to see months of intense arguments about water, economic interests, regional differences, the environment, local control and a near-endless list of issues. The public debate is likely to sound very familiar.

Some months ago I gave separate speeches to three groups with different views on California's water and environmental problems Reflecting on what I do as Chair of the Delta Stewardship Council, I told them this:

> *My normal workweek includes endless meetings with staff and stakeholders, occasional press queries, and then public events, including speeches like this. My time is consumed with Delta Stewardship Council meetings, where water districts, government agencies, environmentalists, business and agriculture representatives, and the public at large, come to say what they want to say. After all these years, I recognize most of these people, and have supported their views or opposed them, at various points in my life.*
>
> *In public, most of the speakers say pretty much the same thing. The most common refrain is "me, and my interest first." However, when I talk to these people in private, they say things differently. In private, people are more candid, flexible and pragmatic. This difference between public posturing and reasonable private conversation irritates me. I occasionally demand they say in public what they tell me in private. Some smile, but mostly they glower or stare back without responding.*
>
> *This is the American way to negotiate: demand more than you want or need, in the hope of getting something better than you expect. Ask tough questions of your opponents, but duck the ones that come your way. Offer to compromise 30 minutes before a final decision. This pattern is not a great way to make public policy.*

Every time I give a speech like this, someone comes up and asks, "Why are you so cynical?" Actually, I consider myself optimistic, albeit with an appetite for uncomfortable questions, and a sense of history.

This week, federal and state officials stepped forward to change the shape and direction of the BDCP. In spite of their very interesting and important statements and policy changes, I am certain that much of the debate to follow will be loud and confusing. I would guess that most of the voices say one thing in public, and say other things in private. Governor Brown wisely advised the press conference that there is a lot of detailed work before BDCP is complete.

This week I rate myself a slightly more optimistic grumpy old water guy. When BDCP is finished, the Delta Stewardship Council will likely review the decision by the Department of Fish and Game that it meets the tests of law. When that happens, I will kick the tires of the BDCP to see if it complies with federal and state law. I expect to ask questions that seem relevant, clarify what BDCP is or is not doing, and listen carefully to those who will tell the Council how we should act on the proposal.

Recently, one of my colleagues reminded me that the Delta Reform Act of 2009 directed the Council to adopt a Delta Plan --- a comprehensive plan for water and ecosystem issues affecting the Delta. The Delta Plan is the policy framework for California, and BDCP is the plumbing. Science must guide how we adaptively manage the entire enterprise. There is no immutable articulation of all policies or projects which will develop over years to come. Nor should there be a rigidly defined solution to which all facts must bow. Useful words to remember.

The Governor, Secretary and Deputy Administrator put some meat on the bones of BDCP this week. No final decisions yet, but this messy and important process is moving forward. That is good news.

Note: Isenberg has chaired the Delta Stewardship Council since 2010. He previously chaired the Delta Vision Blue Ribbon Task Force (2007-2008).

Copies of some speeches are at: http://deltacouncil.ca.gov/chairs-page.

TriTAC/CASA Nutrient Management Strategy

TR Grovhoug, LWA

July 16, 2012

Problem Statement

The SWRCB has announced its intention to establish numeric nutrient criteria in California, following either the NNE approach or the USEPA Ecoregion approach. Separate efforts are underway by the SWRCB to establish numeric criteria in inland surface waters, bay and estuaries and the Delta. Regardless of the approach used, the resulting criteria values for Total N and Total P are projected to be well below the effluent quality that is achievable with the limit of technology for biological nutrient removal. For POTWs that do not receive a dilution credit, the likely result is going to be effluent limits for Total N and Total P that are not achievable with biological nutrient removal and would only achievable with membrane treatment (a question exists regarding the ability to reliably achieve projected values with membrane treatment due to a lack of data).

In various documents [cite], USEPA has acknowledged several problems with the current approach to nutrient numeric criteria and standards:

(1) Costly treatment requirements
(2) Uncertainty regarding benefits produced
(3) Significant reservations by the regulated community
(4) Others ???

USEPA, in its recently released integrated planning framework [June, 2012], has acknowledged that the local costs of Clean Water Act implementation are a problem, that local communities are struggling to meet numerous demands resulting from wastewater NPDES permits, storm water NPDES permits, TMDLs implementation requirements, sanitary sewer overflow prevention, and others. New nutrient criteria that would drive significant additional expense for new advanced treatment facilities will only add to this economic burden. EPA has stated its willingness to address the issue of the regulatory burden on communities and to receive ideas from communities regarding prioritizing projects based on their potential environmental benefit.

In the case of nutrient management in California, widespread problems associated with eutrophication have not been observed. Problem areas that have been identified are (1) low dissolved oxygen, (2) nuisance growths of algae, causing aesthetic impairment, and (3) impacts on biological communities. The ability to address these problems through nutrient management actions has been studied by the State Water Board over the past decade.

A Different Approach is Needed

Given the high cost of biological nutrient removal, CASA/TriTAC suggests that a different approach should be used in the process of setting nutrient objectives in California. The following approach is proposed:

Prior to adopting numeric objectives, complete the following:

- Develop ambient data for levels of total N and P and associated biological conditions (benthic algae concentration, percent cover, dissolved oxygen, pH, etc)
- Use site specific data to verify the NNE model results for different ambient situations
- Quantify controllable sources of total N and total P
- Develop a range of source control scenarios for significant sources. Develop costs and impacts of each scenario.
- Predict the load reductions under the source control scenarios
- Use modeling tools to predict ambient levels of total N and total P under various control scenarios
- Use NNE model (or other suitable tool) to predict changes in biological endpoints (benthic algae concentration, percent cover, dissolved oxygen level, etc) resulting from predicted ambient levels
- Secure independent validation/expert peer review of above steps
- Utilize above information to evaluate and quantify the attainable ambient concentrations and biological endpoints
- Utilize above information to inform the process of setting numeric water quality objectives, consistent with Sections 13241 and 13242 of the CA Water Code.

The above information would be used to assess the connection between nutrient management measures, management outcomes and nutrient objectives, prior to the adoption of objectives. This information would be utilized in the consideration of alternative objectives and in the development of supporting staff reports and water quality control plan language for objectives, implementation and monitoring.

Advantages and Disadvantages of Proposed Approach

The proposed approach has both advantages and disadvantages.

<u>Advantages</u>

- Complies with California Water Code in setting water quality objectives
- Clarifies management capabilities and outcomes prior to adoption of objectives
- Creates information which helps to avoid unintended regulatory requirements and outcomes
- Allows consideration of affordability prior to setting objectives
- May lead to greater consensus

Disadvantages

- May delay adoption of objectives
- Implements a new approach – vulnerable to legal challenges?
- May increase costs of process to adopt objectives
- May not lead to scientific or political consensus

Given the high costs and scientific uncertainties associated with large scale nutrient management decisions in California, the potential advantages associated with the proposed approach, and the absence of severe problems in most waters of the state that require immediate actions, it should be given serious consideration.

What is our Ask??

08/06/2012

Revised manuscript for submission to ECSS

River flow and ammonium discharge determine spring phytoplankton blooms in an urbanized estuary

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Running Head: River flow, ammonium and phytoplankton in urbanized estuaries

Abstract

Nutrient loadings to urbanized estuaries have increased over the past decades in response to population growth and upgrading to secondary sewage treatment. Evidence from the San Francisco Estuary (SFE) indicates that increased ammonium (NH_4) loads have resulted in reduced primary production, a counter-intuitive finding; the NH_4 paradox. Phytoplankton uptake of nitrate (NO_3), the largest pool of dissolved inorganic nitrogen, is necessary for blooms to occur in SFE. The relatively small pool of ambient NH_4, by itself insufficient to support a bloom, prevents access to NO_3 and bloom development. This has contributed to the current rarity of spring phytoplankton blooms in the northern SFE (Suisun Bay), in spite of high inorganic nutrient concentrations, improved water transparency and seasonally low biomass of bivalve grazers. The lack of blooms has likely contributed to deleterious bottom-up impacts on estuarine fish. This bloom suppression may also occur in other estuaries that receive large amounts of anthropogenic NH_4. In 2010 two rare diatom blooms were observed in spring in Suisun Bay (followed by increased abundances of copepods and pelagic fish), and like the prior bloom observed in 2000, chlorophyll accumulated after NH_4 concentrations were decreased. In 2010, low NH_4 concentrations were apparently due to a combination of reduced NH_4 discharge from a wastewater treatment plant and increased river flow. To understand the interactions of river flow, NH_4 discharge and bloom initiation, a conceptual model was constructed with three criteria; 1) NH_4 loading must not exceed the capacity of the phytoplankton to assimilate the inflow of NH_4, 2) the NH_4 concentration must be ≤ 4 μmol L^{-1} to enable phytoplankton NO_3 uptake, 3) the dilution rate of phytoplankton biomass set by river flow must not exceed the phytoplankton growth rate to avoid "washout". These criteria were determined for Suisun Bay; with sufficient irradiance and present day discharge of 15 tons NH_4-N d^{-1}at the upstream wastewater treatment plant. The loading criterion requires phytoplankton NH_4 uptake to exceed 1.58 mmol m^{-2} d^{-1}; the concentration criterion requires river flow > 800 m^3s^{-1} at the SRWTP for sufficient NH_4 dilution and the washout criterion requires river flow at Suisun Bay <1100 m^3 s^{-1}. The model and criteria are used to suggest how a reduction in anthropogenic NH_4, either by reduced discharge or increased dilution (river flow), could be used as a management tool to restore pre-existing productivity in the SFE and similarly impacted estuaries.

1. Introduction

Prior to 1987, phytoplankton blooms occurred regularly in spring and summer in the northern San Francisco Estuary (SFE) (Fig. 1). Ball and Arthur (1979) described the high chlorophyll conditions in Suisun Bay from 1969 to 1979 with mean chlorophyll concentrations of 30 - 40 μg L^{-1} in spring and 40 - 100 μg L^{-1} in summer. Diatoms were the dominant phytoplankton functional group. Phytoplankton blooms of this magnitude are now rare (Jassby, 2008), in spite of increasing inorganic nutrient concentrations delivered to Suisun Bay by the Sacramento River (Parker et al., 2012c). The zooplankton consumer trophic level is now food-limited (Müeller-Solger et al., 2002; Kimmerer et al., 2005). The lack of blooms has likely contributed to deleterious bottom-up impacts on estuarine fish by lowering the quantity and quality of food for the pelagic food web. Declines in four pelagic fish stocks and the listing of the delta smelt and longfin smelt as endangered and threatened species have been linked to the decline in phytoplankton in the northern SFE (Sommer et al., 2007), a demonstration of the dependence of fishery yield on primary production (Nixon, 1988).

The decline in chlorophyll concentrations began in the early 1980's and blooms became rare after 1987, coincident with the introduction of an invasive clam, *Potamocorbula amurensis* (Alpine and Cloern, 1992; Jassby et al., 2002). The appearance of *P. amurensis* has been considered the major factor in the disappearance of phytoplankton blooms in Suisun Bay (Alpine and Cloern, 1988: Kimmerer and Orsi, 1996). However any role of *Potamocorbula* in eliminating phytoplankton blooms during spring could only be minor as clam biomass is low during that season (Greene et al., 2011). The lack of spring phytoplankton blooms in Suisun Bay suggests some other causal agent may suppress phytoplankton activity.

Since 1999, spring blooms have been observed only twice in Suisun Bay, in 2000 (Wilkerson et al., 2006; Kimmerer et al., 2012; Parker et al., 2012b) and recently in 2010 (during this study). A common feature of both blooms in which 30 μg L^{-1} chlorophyll was measured, was a decline in ammonium (NH_4) concentrations to ~1 μmol L^{-1} (Wilkerson et al., 2006), suggesting a possible role for NH_4 as the causative agent. Ammonium concentrations increased in the northern SFE and in Suisun Bay prior to the clam invasion, coincident with human population increase since the 1970's (Jassby, 2008; Glibert et al., 2011), reflecting increased wastewater discharge from the Sacramento Regional Wastewater Treatment Plant (SRWTP).

The SRWTP currently discharges 15 tons N d^{-1}, largely as NH_4, to the inland delta of the SFE and to Suisun Bay (Jassby, 2008; his Fig 1), a 3-fold increase from 5 tons N d^{-1} in 1987.

Elevated NH_4 from sewage effluent was implicated in depressed primary production along the California coast (MacIsaac et al., 1979), the Delaware Estuary (Yoshiyama and Sharp, 2006), the Scheldt Estuary (Cox et al., 2009), Wascana Creek, Canada (Waiser et al., 2010), and the inner bay of Hong Kong Harbor (Xu et al., 2010). At locations within the SFE, including Suisun Bay, elevated NH_4 has been linked to low chlorophyll, low rates of primary production and changes in phytoplankton community structure (Wilkerson et al., 2006; Dugdale et al., 2007; Glibert et al., 2011; Parker et al., 2012a,c).

The well-known inhibition of NO_3 uptake by NH_4 (e.g. Pennock, 1987) appears to be a key process and a likely causal agent leading to reduced primary production in environments with elevated NH_4 concentrations. In the SFE and the Sacramento River, phytoplankton NO_3 uptake is inhibited by NH_4 (Dugdale et al 2007; Parker et al 2012c). The lack of access to NO_3 limits primary production (Parker et al. 2012a, c) and the buildup of chlorophyll, i.e. blooms, since NO_3 is by far the largest component of the inorganic N pool, about 80% in Suisun Bay. The increased NH_4 may have also resulted in deleterious changes in the food web structure, e.g. diatoms replaced by cryptomonads and flagellates, large zooplankton replaced by smaller species (Glibert 2010; Glibert et al., 2011).

Drawing from time-series data of chlorophyll, nutrient concentrations, phytoplankton nitrogen uptake (Wilkerson et al., 2006) and results from enclosure experiments (Dugdale et al., 2007), the events leading to a spring phytoplankton bloom in SFE were shown to follow a predictable sequence (Dugdale et al., 2007; Parker et al., 2012a). In early spring, phytoplankton N demand in Suisun Bay is satisfied by NH_4 but with low biomass-specific and depth-integrated NH_4 uptake rates due to high turbidity and poor irradiance (Parker et al., 2012b). NO_3 uptake is low or near zero during this period due to NH_4 inhibition. With improved irradiance conditions (via increased water transparency, water column stability or seasonal increase in irradiance), phytoplankton NH_4 uptake rates and biomass increase causing water column NH_4 concentrations to decrease. Once NH_4 decreases to < 4 μmol L^{-1} phytoplankton NO_3 uptake is enabled. With continued phytoplankton growth, NH_4 concentration is further reduced to ≤ 1 μmol L^{-1} and biomass-specific NO_3 uptake rates accelerate resulting in a rapidly developing bloom nourished by NO_3. However, if residence time is too low to allow the phytoplankton to assimilate the

inflowing NH_4, as may happen with high river flow conditions or if there is very elevated NH_4 inflow, the production processes are only NH_4-based. NO_3 is unused and exported from the ecosystem (i.e. to the Pacific Ocean). Reduced primary production is a counter-intuitive result of elevated NH_4; the NH_4 paradox.

Here, we focus on a change in the chronically elevated NH_4 as a potential trigger for blooms in northern SFE; and those factors that may decrease the NH_4 concentration. A weekly sampling program was conducted during spring 2010 allowing a detailed examination to be made of the conditions that enabled the spring bloom to develop. The data are interpreted with respect to a conceptual model describing how NH_4 discharge from the SRWTP and flow in the Sacramento River may modulate nutrient conditions in Suisun Bay to allow a phytoplankton bloom (as occurred in 2000 and 2010) or to prevent blooms as in other years. These results contribute toward an understanding of the role of elevated anthropogenic NH_4 in estuarine primary productivity such that similar ecosystems with low productivity related to elevated NH_4 discharge could be successfully managed.

2. Conceptual Model of Nutrients, River Flow and Phytoplankton in Suisun Bay: Criteria for Phytoplankton Blooms

2.1. Box model

A simple input/output model for Suisun Bay (herein "Bay") based on the sequence of bloom events described by Dugdale et al. (2007) was used to establish three criteria to evaluate when conditions are favorable for phytoplankton blooms. Fundamentally, the initial phytoplankton population must be capable of assimilating and controlling NH_4 input to the Bay so that NH_4 concentrations can be reduced sufficiently to enable NO_3 uptake. The critical variables of the NH_4 input are loading and concentration. 1) Loading to the Bay must not exceed the capacity of the phytoplankton to assimilate inflowing NH_4 (Loading Criterion) otherwise NH_4 concentrations within the Bay will increase. 2) The NH_4 concentration in the Bay must be $\leq$ 4 μmol L^{-1} or if the incoming concentration is > 4 μmol L^{-1} then water residence time must be sufficient for the phytoplankton to reduce the concentration to < 4 μmol L^{-1} (Concentration Criterion). 3) To avoid washout of the phytoplankton from the Bay before they can accumulate, the dilution rate of the Bay must not exceed the growth rate of the phytoplankton (Washout

Criterion). If any of the criteria are not met, blooms will not form and the ecosystem will remain in a low productivity mode based solely on NH_4 uptake.

The variables needed to evaluate these criteria are NH_4 input to the river, river flow, and NH_4 uptake by the phytoplankton. From these variables, the parameters: loading, concentration, residence time and washout flow can be obtained by considering Suisun Bay as a box with surface area (A) of 1.7×10^8 m^2 and volume (V) of $9.9 \times 10^8 m^3$ with inflow from the Sacramento River that contains NH_4 from the SRWTP and outflow toward Suisun Bay and the northern SFE. River flow rates (F) were obtained from California Department of Water Resources Dayflow algorithm ("Delta Outflow" - www.water.ca.gov/dayflow/). Effluent NH_4 concentrations and effluent flow rate were obtained from SRWTP (SRWTP pers. comm.). First, the NH_4 input (discharge) as metric tons N d^{-1} or mmol N d^{-1} at the SRWTP (NH_4 $input_{(SRWTP)}$) is calculated from the NH_4 concentration in the effluent multiplied by the effluent flow.

$$NH_4\ input_{(SRWTP)} = [NH_4]_{effluent} * \text{effluent flow} \qquad \text{Eqn. 1}$$

Then the NH_4 input at the SRWTP (in mmol N d^{-1}) divided by the area of Suisun Bay (A) provides an estimate of the *potential loading* to the Bay:

$$\textit{Potential loading}\ \text{to Suisun Bay (mmol N } m^{-2}\ d^{-1}) = NH_4\ input_{(SRWTP)} / A \qquad \text{Eqn. 2}$$

The *realized loading* will be lower than the *potential loading* due to *in situ* changes in the Sacramento River during its transit from SRWTP to Suisun Bay, e.g. by nitrification and phytoplankton uptake (Parker et al., 2012c). NH_4 concentrations decline downstream and NO_2 and NO_3 concentrations increase (e.g. Parker et al. 2012c), an indication of nitrification (Hager and Schemel, 1996). The NH_4 was observed to decrease downstream by 75% (Foe et al., 2010; Parker et al. 2012c, their Table 1) and this change must be applied to calculate *realized loadings* to Suisun Bay. Measurements of phytoplankton NH_4 uptake (4.7 mmol N m^{-2} d^{-1}) using ^{15}N-NH_4 and estimates of microbial nitrification (32.0-51.2 mmol N m^{-2} d^{-1}) indicated that the downstream decrease in NH_4 was due mostly to nitrification. The nitrification rates were obtained using both a mass balance approach from increasing NO_3 concentrations downstream between SRWTP and Suisun Bay along with travel time, and also using an average specific nitrification factor (Yool et al., 2007) to predict the NO_3 produced from the ambient NH_4 in the river.

The *directly estimated loading* to Suisun Bay can also be obtained by calculating the NH_4 input to the Bay from the measured NH_4 concentration of the water entering the Bay multiplied by the flow into the Bay

$$NH_4\ input_{(Suisun)} = [NH_4]_{Suisun} * \text{river flow} \quad \text{Eqn. 3}$$

And then:

$$\textit{Directly estimated loading}\ \text{to Suisun Bay (mmol N m}^{-2}\ \text{d}^{-1}) = NH_4\ input_{(Suisun)} / A \quad \text{Eqn. 4}$$

The NH_4 concentration (in µmol L^{-1} = mmol m^{-3}) at the entrance to Suisun Bay ($[NH_4]_{(Susiun)}$) can be calculated using the NH_4 discharge at SRWTP and river flow (F) to calculate concentration at the source of discharge ($[NH_4]source_{(SRWTP)}$) that is then multiplied by 0.25 to allow for the 75% decrease in NH_4 downriver due to microbial nitrification (see Section 2.1 for rationale):

$$[NH_4]_{(Susiun)} = [NH_4]source_{(SRWTP)} = (NH_4\ input_{(SRWTP)} / F)*0.25 \quad \text{Eqn. 5}$$

To estimate the maximum river flow (F_{max}) allowed before dilution (D) results in no net phytoplankton growth for the Washout Criterion, Suisun Bay dilution is calculated as:

$$D\ (\text{as time}^{-1}) = F / V \quad \text{Eqn. 6}$$

where F is river flow and V is volume of Suisun Bay ($9.9 \times 10^8 m^3 s^{-1}$). Then:

$$F = D * V \quad \text{Eqn. 7}$$

From chemostat analogy, dilution (D) cannot be greater than phytoplankton growth rate - in this case the mean phytoplankton biomass-specific NH_4 uptake rate (VNH_4, time^{-1}).

So the washout point $D_{max} = VNH_4$

From Eqn. 7

$$F_{max} = D_{max}*V = VNH_4 * V = VNH_4 * 9.9 \times 10^8 m^3 s^{-1} \quad \text{Eqn. 8}$$

At this flow and greater, there is no net growth of phytoplankton in the Bay, and the concentration of inflowing and outflowing phytoplankton biomass will be the same.

The interrelationships between NH_4 discharge, NH_4 concentration and river flow are shown as three hyperbolae (Fig. 2) calculated for discharges at the SRWTP of 15, 10 and 5 metric tons NH_4-N d^{-1} from Eqn. 5 relating river flow and NH_4 concentration. At any given river flow, the NH_4 concentration at the entrance to Suisun Bay increases as discharge increases (Eqn.

5). The intersection of the solid horizontal line drawn from the NH_4 =4 μmol L^{-1} with a discharge hyperbola indicates the minimum flow needed to dilute NH_4 concentration to 4 μmol L^{-1} (the Concentration Criterion). The washout threshold flow (F_{max}) is shown as the right-hand vertical dashed line on Fig. 2. The range of river flows within which bloom initiation can occur is set by this upper limit and a lower flow set by the discharge (vertical dotted lines). The window of flow rates contracts as the discharge increases, shown by the dotted vertical lines.

2.2 Calculating NH_4 loadings and concentrations

Using NH_4 discharges at SRWTP of 5, 10 and 15 tons NH_4-N d^{-1} (bracketing 1987 to present-day NH_4-N discharges, Jassby, 2008) and Eqn. 2, the *potential area-based loading* of NH_4 to Suisun Bay from the Sacramento River increased from 2.11 to 6.32 mmol m^{-2} d^{-1} over that period (Table 1). A reduction of 75% is applied to the discharge at SRWTP, to give *realized* (nitrification-corrected, see Section 2.1) *area-based NH_4 loadings* to Suisun Bay of 0.53 (when there was 5 tons NH_4-N d^{-1} discharge at SRWTP), to 1.58 mmol m^{-2} d^{-1} at 15 tons NH_4-N d^{-1} (present-day).

Three flow rates (500, 1000, and 2000 m^3s^{-1}) and three NH_4 inputs at SRWTP (5, 10 and 15 tons NH_4-N d^{-1}) were used to calculate NH_4 concentration at the SRWTP discharge point and then at the entrance to Suisun Bay applying the 75% reduction due to nitrification (Table 1, Eqn. 5). Ammonium concentrations at a given flow rate increase as the discharge rate increases. This analysis does not include when the flow into Suisun Bay is not equal to the flow at the SRWTP which occurs when water is diverted from the Sacramento for agricultural and domestic use. Also, additional sources of NH_4 (e.g. other WTPs) were not included in these calculated loadings as it is assumed here that SRWTP represents the only NH_4 source to Suisun Bay. It has been shown that SRWTP as a point source supplies 90% of the NH_4 (Jassby, 2008) in the northern SFE. Present-day nutrient inventories for the Sacramento River and Suisun Bay are incomplete but Hager and Schemel (1992) suggest that agricultural sources are minor downstream of the SRWTP and the location of nonpoint source of nutrients is unclear and likely to have insignificant inputs.

2.3. Obtaining values for the three criteria

2.3.1. Loading Criterion

To evaluate the Loading Criterion (i.e. that NH_4 loading must not exceed the NH_4 uptake capacity of the phytoplankton), peak and non-peak phytoplankton NH_4 uptake rates were used to evaluate whether Suisun Bay phytoplankton have the capacity to keep pace with potential NH_4 loading. The mean phytoplankton NH_4 uptake during spring in Suisun Bay measured from 1999-2003 was 0.032 mmol m^{-3} h^{-1} (Wilkerson et al., 2006) and the peak value was 0.074 mmol m^{-3} h^{-1} (unpublished data). These hourly rates were converted to daily rates (*24) and then depth-integrated values were obtained (0.88 mmol m^{-2} d^{-1} and 2.02 mmol m^{-2} d^{-1}) assuming uniform uptake throughout the euphotic zone and estimating euphotic zone from the mean spring Secchi depth measured in Suisun of 0.3m (Wilkerson et al,. 2006) using the relationship in Cole and Cloern (1987). Comparison of the historical NH_4 discharges to Suisun Bay with the mean and peak phytoplankton NH_4 uptake rates (0.88 mmol m^{-2} d^{-1} and 2.02 mmol m^{-2} d^{-1}) indicates that the discharge of 10 tons NH_4-N d^{-1} and the current 15 tons NH_4-N d^{-1} exceed the mean capacity of the Suisun Bay phytoplankton to absorb the input of NH_4. With discharge of 15 tons NH_4-N d^{-1} phytoplankton uptake rate must exceed 1.58 mmol m^{-2} d^{-1} (Table 1). In order to change the balance in favor of phytoplankton bloom formation, either NH_4 loading would need to decrease or the phytoplankton NH_4 uptake rate would need to increase (to the peak value). At the 5 tons NH_4-N d^{-1} discharge in 1987, the phytoplankton uptake would have been capable of absorbing the NH_4 input.

2.3.2. Concentration Criterion

The second criterion (Concentration Criterion) for rapid NO_3-based bloom initiation requires an NH_4 concentration of $\leq$4 µmol L^{-1}. The concentrations calculated for Suisun Bay (allowing for 75% reduction between the SWRTP and Suisun Bay due mostly to nitrification-see Section 2.1) (Table 1) suggest that this criterion is met at present-day discharge at flows of 1000 and 2000 m^3s^{-1}. At 500 m^3s^{-1}, the calculated inflowing NH_4 concentration is 6.2 µmol L^{-1}, in excess of the required 4 µmol L^{-1}. In Fig. 2, a line drawn from the y-axis at a concentration of 4 µmol L^{-1} is the upper boundary for the Concentration Criterion. The intersection of that line with a discharge hyperbola indicates the minimum flow required to meet the Concentration Criterion indicated by the vertical line intersecting the x-axis. As discharge increases, the necessary river

flow increases. At the present discharge, 15 tons NH_4-N d^{-1}, flow of at least 800 m^3s^{-1} is required.

2.3.3. Washout Criterion

The washout threshold flow (F_{max}), shown as the right-hand vertical dashed line on Fig. 2, is based on the mean NH_4 uptake rate for Suisun Bay in spring, 0.004 h^{-1} (Wilkerson et al., 2006). From Eqn. 8

$$F_{max} = 0.004\ h^{-1} * 9.9 \times 10^8 m^3 = 1100\ m^3s^{-1} \quad \text{Eqn. 9}$$

The range of river flows within which bloom initiation can occur is set by this upper limit and a lower flow set by the discharge. The window of flow rates contracts as the discharge increases and at present discharge (15 metric tons NH_4-N d^{-1}) is relatively narrow (i.e. 800-1100 m^3s^{-1}).

In summary, for bloom initiation, besides sufficient irradiance, if the discharge at SRWTP is the present day value of 15 tons NH_4-N d^{-1}, Criterion 1 (Loading Criterion) requires that the phytoplankton NH_4 uptake rate must exceed 1.58 mmol m^{-2} d^{-1}; Criterion 2 (Concentration Criterion, NH_4 = ~4 µmol L^{-1} at Suisun) requires river flow > 800 m^3s^{-1} at the SRWTP for sufficient dilution and Criterion 3 (Washout Criterion) requires river flow at Suisun Bay <1100 m^2 s^{-1}. The river flow, discharge and loading conditions during spring 2010 were evaluated to establish if any of these criteria were met to allow bloom initiation.

3. Site Description and Methods

Seven stations were sampled in the main channel (~10m depth) of Suisun Bay along with a single shoal station (< 2m depth: DWR-D7), on 17, 24 March; 7, 14, 26 April; 12, 24 May and 16, 21 June 2010 (Fig. 1). At each station measurements of water transparency were made with a Secchi disk, and temperature and salinity with a YSI- 6920 sonde. Salinity was measured using the Practical Salinity Scale. Surface water was sampled with a clean bucket for concentrations of nutrients and chlorophyll as well as enumeration of phytoplankton species.

The sampled water was filtered through clean precombusted (450ºC, 4-hr) 25 mm Whatman GF/F filters and the filtrate collected for nutrient analyses. Twenty ml filtered samples were analyzed using a Bran and Luebbe AutoAnalyzer II with MT-19 manifold chemistry

module for NO_3+ NO_2 and NO_2 according to Whitledge et al. (1981) and Bran and Luebbe Method G-172-96, phosphate (PO_4) according to Bran and Luebbe Method G-175-96 and silicate ($Si(OH)_4$) by Bran and Luebbe Method G-177-96. NO_3 + NO_2 is referred to as NO_3 throughout the text as NO_2 concentrations were very low (< 1.0 μmol L^{-1}). Twenty-five ml filtered samples were analyzed for NH_4 according to Solorzano (1969). Samples for chlorophyll were prepared in the field by filtering 50-ml of sample water onto 25mm Whatman GF/F filters. Chlorophyll on the filters was determined by *in vitro* fluorometry after extraction in 90% acetone using a Turner 10AU fluorometer (Arar and Collins, 1992) calibrated with commercially available chlorophyll (Turner Designs) and corrected for phaeophytin by hydrochloric acid addition (Holm-Hansen et al., 1965). Water was sampled in 250-ml amber glass bottles and preserved with Lugols iodine for phytoplankton enumeration, using the Utermohl settling technique (Utermohl, 1958) with 25-ml chambers and inverted microscopy. Phytoplankton were identified to genus. Laboratory quality assurance/quality control followed the Surface Water Ambient Monitoring Program (SWAMP) protocols set by the California State Water Resources Control Board (http://www.waterboards.ca.gov/water_issues/programs/swamp/qamp.shtml). This included implementation of standard laboratory procedures including replicates, field blanks, matrix spikes, certified reference materials, setting of control limits, criteria for rejection, and data validation methods. All analyses were carried out on fresh samples within 24 hours of collection.

4. Results

4.1. Field observations of chlorophyll, nutrients and phytoplankton

When sampling began on 17 March, 2010, NH_4 concentrations were high, (6.8 - 10.3 μmol L^{-1}) with the maximum value at the most upstream location, at the entrance to Suisun Bay, DWR-D4 (Fig 1, Fig. 3a) and chlorophyll concentrations were uniformly low (1.4 - 3.4 μg L^{-1}). By 24 March, chlorophyll concentrations increased (2.8 - 4.3 μg L^{-1}) and NH_4 concentrations were relatively unchanged (Fig. 3b) except for DWR-D4 where NH_4 had declined substantially. Two weeks later, 7 April, chlorophyll concentrations had increased (3.7 -7.4 μg L^{-1}) at all but the two most downstream stations (Fig. 3c). NH_4 concentrations had declined at all stations except DWR-D4. The lowest NH_4 concentrations were found at the mid Suisun Bay stations, USGS 5

and USGS 6 (4.4 and 3.7 μmol L^{-1}, respectively) and the shoal station DWR-D7 (3.4 μmol L^{-1}). Station DWR-D4 had elevated NH_4 compared to the other stations.

One week later, 14 April, a phytoplankton bloom was observed in mid Suisun Bay (USGS 5) with a chlorophyll concentration of 30.9 μg L^{-1}. NH_4 concentrations at this station were 1.7 μmol L^{-1} (Fig. 3d) and were consistently low across stations in mid Suisun Bay. The highest NH_4 concentration (8.6 μmol L^{-1}) occurred at USGS 7, located near the Central Contra Costa Sanitation District WTP discharge. This discharge contributes a considerable load primarily to the downstream bays, San Pablo and Central Bays (Fig. 1) but some of the NH_4 load from the WTP is likely advected into Suisun Bay on flood tides via deep water flow. Chlorophyll concentrations were low (1.9 μg L^{-1} and 1.5 μg L^{-1}) at USGS 7 and the next downstream station, USGS 8.

On 26 April, there was a clear U-shaped pattern of NH_4 concentration within Suisun Bay with a minimum at USGS 5 (Fig. 3e). A mirror image pattern of chlorophyll was also observed (Fig. 3e) with the lowest chlorophyll upstream and downstream and the maxima at USGS 5 (21 μg L^{-1}) and the shoal station (DWR-D7, 20 μg L^{-1}). By May 12, the bloom had largely faded although substantial chlorophyll concentrations (5 - 10 μg L^{-1}) still remained at all but the two downstream stations where the highest NH_4 concentrations (5.2 and 7.2 μmol L^{-1}) were measured (Fig. 3f).

Two weeks later, 24 May, a second, larger phytoplankton bloom both in magnitude and spatial extent had developed, with chlorophyll up to 34 μg L^{-1} at all but the two downstream stations, USGS 7 and USGS 8 (Fig. 3g). Ammonium concentrations were $\leq$ 1 μmol L^{-1} at mid-Bay stations including DWR-D7, and < 4 μmol L^{-1} at the most upstream station (DWR-D4). By 16 June, chlorophyll had declined to between 2.5 and 6.9 μg L^{-1} within the study area and NH_4 concentrations were ~ 4 μmol L^{-1} (Fig. 3h). One week later, 21 June, chlorophyll concentrations had declined further (2 - 5 μg L^{-1}) and a pattern of NH_4 concentration (2.5 - 5.5 μmol L^{-1}) increasing downstream was apparent (Fig. 3i).

The spatial and temporal patterns in chlorophyll and NH_4, along with NO_3, $Si(OH)_4$ and PO_4 are shown also as contours on a location (DWR-D4 in Suisun Bay to USGS 8 near San Pablo Bay) versus time plane in Fig. 4a-e. The two blooms (end of April and May) were centered at USGS 3 to USGS 5 (Fig. 4a). These blooms occurred on the upstream side of the 2 isohaline (Fig. 4a). NH_4 concentration (Fig. 4b) declined through mid-Bay but increased again at USGS 7,

with an NH_4 minimum (< 4 μmol L^{-1}) corresponding closely to the chlorophyll maximum distribution with time. NO_3 concentrations (Fig. 4c) declined with time from about 35 to 10 μmol L^{-1}, the latter coincident with the second bloom. Phosphate and $Si(OH)_4$ concentrations declined as spring progressed with lower values observed during the periods of both blooms (Fig. 4 d, e). A $Si(OH)_4$ minimum was associated with the second bloom. At DWR-D4 the Secchi depth varied little with a mean of 0.6 ± 0.2 m and the mean salinity was low, 0.14 ± 0.07 (Table 2).

Diatoms made up virtually all of the phytoplankton counted (Fig. 5). The abundances of the five most common diatoms at three channel stations, DWR-D4, USGS 3, USGS 5 and at the shoal station, DWR-D7 are plotted for five sampling dates in 2010; 24 March, 7, 14 and 26 April and 24 May (Fig. 5). The first bloom in April (Fig. 5c) was dominated by the pennate diatom *Entomoneis* (synonym: *Amphiprora;* http://westerndiatoms.colorado.edu*)* and the second on 24 May (Fig 5e) by the long-chain centric diatom *Melosira* (Figs. 5a-d). *Entomoneis* (a tychopelagic diatom that is normally benthic; Cupp, 1943) occurred persistently in the shoal and downstream region of Suisun Bay, while centric pelagic diatoms (*Cyclotella* and *Melosira*) were upstream (Figs. 5a-d). Diatom dominance in the two blooms is consistent with the concurrent decline in $Si(OH)_4$ and increased chlorophyll (Fig. 4).

4.2. NH_4 loading to Suisun Bay, NH_4 concentrations in Suisun Bay and river flow in spring 2010

4.2.1. Loading

Discharge of NH_4 at SRWTP (Fig. 6a) was calculated from effluent concentrations and effluent flow at the SRWTP and normalized to the surface area of Suisun Bay (Eqns. 1 and 2). In the period 17 March to 7 April *potential loading* varied from 5.24 mmol m^{-2} d^{-1} to 6.61 mmol m^{-2} d^{-1} (Table 2), then remained ~6 mmol m^{-2} d^{-1} through 12 May and then declined to 5.59 mmol m^{-2} d^{-1} on 24 May. The mean NH_4 loading for the period 17 March to 24 May, 5.86 ± 0.52 mmol $m^{-2}d^{-1}$ is not distinguishable from the loading with a discharge rate of 15 tons NH_4-N d^{-1}, 6.32 mmol m^{-2} d^{-1} (Table 1). When *realized loading* at the entrance to Suisun Bay was estimated by application of a 75% reduction due to nitrification (see section 2.1), the values (Table 2) fall within the range of the Loading Criterion defined by mean and peak NH_4 uptake (Fig. 6a, horizontal dotted lines).

Using the discrete measurements of NH_4 concentrations at DWR-D4 (entrance to Suisun Bay) and Delta Outflow, a more direct estimate of the NH_4 loading to Suisun Bay for the same

period in spring 2010 was calculated (Eqns. 3 and 4). This *directly estimated NH_4 loading* declined from 2.79 mmol m^{-2} d^{-1} on 7 April prior to the bloom period, to 0.91 mmol m^{-2} d^{-1} at the end of the bloom period (Table 2, Fig. 6a). During the bloom period, it fell within the Loading Criterion range (only slightly above the peak criterion line on 12 April) (Fig. 6a). The overall mean *directly estimated NH_4 loading* from March through May (1.73 ± 0.69 mmol $m^{-2}d^{-1}$)(Table 2), is close to the value estimated assuming 15 tons NH_4-N d^{-1} discharge at the WTP discharge location after accounting for nitrification losses of NH_4, 1.58 mmol $m^{-2}d^{-1}$ (Table 1).

4.2.2. Ammonium concentrations

Although changes in river flow at SRWTP do not affect the calculated NH_4 loading to Suisun Bay (with no export pumping), changes in flow at SRWTP affect the concentration of NH_4 in the river as a result of dilution and these changes are propagated downstream. A rapid change in concentration (calculated from the SRWTP discharge and flow) occurred at SRWTP between 7 and 14 April when NH_4 concentration declined by ~30% from 30.95 to 20.63 µmol L^{-1} (Table 2, Fig. 6b). The discharge at SRWTP decreased only slightly from 6.61 mmol $m^{-2}d^{-1}$ to 6.22 mmol m^{-2} d^{-1} between these dates and could not have caused such a change in concentration at SRWTP (Table 2, Fig. 6b). The change in concentration was the result of rapid increase in flow at the SRWTP (from 418.9 to 591.6 m^3s^{-1}) (Fig. 6b, Table 2). Between 7 and 14 April the calculated NH_4 concentrations at DWR-D4 also declined, from 7.74 to 5.16 µmol L^{-1} (Table 2) and the measured concentration of NH_4 declined nearly 50% from 9.66 to 5.50 µmol L^{-1} as river flow at DWR-D4 increased from 567.0 m^3s^{-1} to 760.0 m^3s^{-1}.

Both measured and calculated NH_4 concentrations at DWR-D4 fell slightly above the Concentration Criterion, 4 µmol L^{-1}, with measured concentrations near the criterion value from the first bloom period in April to the second bloom in late May. The overall mean NH_4 concentration (6.52 ± 2.59 µmol L^{-1}) that was measured at the overall mean river flow (543.22 ± 173.83 m^3s^{-1} , Table 2) is in good agreement with the predicted NH_4 concentrations at the entrance to Suisun Bay assuming 15 metric tons NH_4-N d^{-1} discharge and 500 m s^{-1} river flow (6.2 µmol L^{-1},Table 1).

4.2.3. Washout flow

The highest river flow, on April 14, 759.72 $m^3 s^{-1}$ (Table 2), was well below the present Washout Criterion threshold, 1100 $m^3 s^{-1}$. For the rest of the period flows into Suisun Bay were about 50% of the washout thresholds.

5. Discussion

5.1. Overview

Two diatom blooms were observed in Suisun Bay in spring 2010. NH_4 loading was within the criteria limits set by mean and peak NH_4 uptake capacity of the phytoplankton. NH_4 concentrations in Suisun Bay in April were near the Concentration Criterion (4 μmol L^{-1}) predicted to enable blooms. Washout was clearly avoided and river flow was below the current Washout flow Criterion. The major trigger was a sudden decline in both measured and predicted NH_4 concentration at the entrance to Suisun Bay (DWR-D4), the result of rapid increases in flow at both SRWTP and Delta Outflow (Fig. 6b, Table 2). Ammonium concentrations continued to decline throughout the bloom period to about 1 μmol L^{-1} (Figs 3, 4). The 2010 bloom followed the sequence described by Dugdale et al. (2007) in which NH_4 initially declined and chlorophyll biomass started to increase. When NH_4 concentration was reduced to 1 μmol L^{-1} NO_3 was used and chlorophyll biomass increased rapidly.

5.2. The NH_4 Paradox

The observation that high NH_4 concentrations, in the presence of ample NO_3, results in reduced algal productivity is counter-intuitive and requires explanation, since it is well known that when most algae are grown in batch culture on a medium containing both NH_4 and NO_3, NH_4 will be taken up first and when exhausted NO_3 will be taken up. The physiological process that reduces or eliminates phytoplankton NO_3 use is generally referred to as NH_4 inhibition of NO_3 uptake (e.g. Eppley et al., 1979; Dortch, 1990; Cochlan and Bronk, 2003) and may occur at NH_4 concentrations as low as 0.1 to 0.3 μmol L^{-1} (Wheeler and Kokkinakis, 1990).

When both NH_4 and NO_3 are fully assimilated, the yield of algae is the sum of the commonly considered inorganic nitrogen forms (typically NH_4 plus NO_3). In a lake or lagoon, the progression of NH_4 and NO_3 uptake and algal production would follow that of the laboratory

culture flask, providing no other nutrient becomes limiting. However, in a river or estuary, nutrients are refreshed from source regions by flow and the relative proportions of NH_4 and NO_3 become important. For example, consider source water flowing into a bay containing a 50:50 mixture of NH_4 and NO_3, 20 μmol L^{-1} in each component. If the flow rate is low enough to allow phytoplankton biomass to accumulate and take up first all NH_4 and then all NO_3, 40 μmol L^{-1} of phytoplankton N will be produced. This is equivalent to 40 μg L^{-1} chlorophyll (1 μmol N removed produces ~1 μg L^{-1} chlorophyll; see Dugdale and Goering, 1970; Marra et al., 1990 and refs therein). However, if the flow is sufficiently high to prevent full biomass accumulation (i.e. residence time is short), NH_4 may remain at concentrations sufficient to block NO_3 uptake. The 20 μmol L^{-1} of NO_3 is unused and flows out of the system. The maximum phytoplankton biomass (~chlorophyll) would depend only on the NH_4 taken up, a maximum of 20 μmol L^{-1} NH_4 in the inflowing source water (a maximum of 20 μg L^{-1} chlorophyll). In this way, high NH_4 results in less than maximal chlorophyll and productivity.

5.3. Diatom contribution and distribution

Diatoms made up virtually all of the phytoplankton (72-100% of the phytoplankton counted) during the bloom periods, consistent with recent phytoplankton studies in the SFE (Cloern and Dufford, 2005) and with historic studies (Ball and Arthur, 1979). The diatoms observed included benthic *Cocconeis* and *Entomoneis*. Lidstrom (2008) also observed an abundance of *Entomoneis* in Suisun Bay in 2007. Two of the dominant diatom genera described in Ball and Arthur (1979), *Melosira* and *Cyclotella*, were also dominant in the Suisun 2010 bloom. From Figs. 3a – e it appears that that the April 2010 bloom grew and was centered in the channel of the central part of Suisun Bay and then spread to the shoal areas.

5.4. Comparison of 2009 and 2010

No bloom was observed in 2009 and some comparisons can be made for 2009 with criteria parameters and environmental conditions during the bloom year 2010. Loading Criteria for 2009 compared to 2010 can be evaluated from average April SRWTP discharge rates. No direct estimates of loading at DWR-D4 are available since no detailed sampling of Suisun Bay was made in 2009. The average discharge of NH_4 from SWRTP declined by 7% in 2010 compared to 2009, and the loading to Suisun Bay declined by the same amount (Table 3).

The average river flow rate at SRWTP in April was 50% higher in 2010 compared to 2009 (Fig. 7a, Table 3). The temporal pattern of flow also was different in the March to May periods of the two years. In 2009 flow declined to a low level and remained low until a single peak in early May. In 2010, a March low flow was followed by a sharp increase in mid-April declining by the end of May, the flow increase thought to be the trigger for the 2010 bloom. The effect of different flow patterns on NH_4 concentration is shown by the trends in NH_4 concentration at the effluent discharge location March to June of 2009 and 2010 (Fig 7b). The decline in NH_4 concentration in 2010 in April does not occur in 2009 due to the lack of increased flow in April 2009.

Flow rates were below the current Washout Criterion, 1100 $m^3 s^{-1}$, during the 2010 study period (Fig. 7a) and the same was true for the spring period in 2009 except for early March (Fig. 7a). The interaction between calculated NH_4 concentration, discharge and flow can be visualized using the data for 2009 and 2010 (Fig. 8). The two hyperbolae were calculated for the mean April 2009 and 2010 estimates of discharge at SRWTP (Table 3). The NH_4 concentrations at SRWTP calculated from the daily discharge and flow data are shown. Some of the data for 2010 (crosses) falls below the hyperbola drawn through the mean conditions, indicating that during the study period in April 2010 discharge was reduced below the average value. The horizontal dotted line drawn from the y-axis at 16 μmol L^{-1} is the NH_4 concentration at SRWTP required to meet the Concentration Criterion at the entrance to Suisun Bay. The vertical dotted line indicates the flow (~760 m^3 s^{-1}) required to reduce the concentration of NH_4 to 16 μmol L^{-1} at the discharge point and to 4 μmol L^{-1} at DWR-D4 in Suisun Bay. The left-most vertical dashed line drawn at average river flow for April 2009 (345 m^3 s^{-1}) intersects the 2009 hyperbola at about 38 μmol L^{-1} (Table 3). The next vertical dashed line plotted for the river flow (592 m^{-3} s^{-1}) at SRWTP on 14 April 2010, intersects the 2010 hyperbola above the Concentration Criterion (dotted horizontal line). In 2009 the flow was too low to meet the Concentration Criterion whereas in 2010 the higher flow and the likely lower discharge allowed concentrations close to the criterion to be met.

5.5. Other factors that might influence the spring Suisun Bay blooms

Other possible factors that might influence bloom occurrences are improved irradiance, physical processes, e.g. entrapment or fronts, and changes in the clam population density. The

irradiance field in the SFE is determined primarily by the sediment load, except for times of high chlorophyll concentrations, when the latter will also decrease the water column transparency. The sediment load has decreased substantially in the northern SFE, and is predicted to continue to decline, leading to improved irradiance conditions (Jassby, 2008; McKee et al., 2006; Schoellhamer, 2009). However, increased irradiance does not always result in phytoplankton blooms (Ball and Arthur, 1979). From 1999-2002, Suisun Bay had a mean Secchi depth of 0.3m in spring (Wilkerson et al., 2006). In 2010 Secchi depths were greater and averaged 0.7m prior to the bloom (Table 2). Depth-integrated NH_4 uptake rates were likely enhanced by the resultant deeper euphotic zone depth and this may have enabled the phytoplankton to meet the loading criterion.

Physical processes in addition to flow, which affects NH_4 concentration and interacts with growth rate to determine the threshold flow for washout, will also play a role in bloom initiation. Mixing often results in a homogeneous water column in Suisun Bay. Transient water column stratification may act to not only improve the average water column irradiance conditions but also may concentrate the phytoplankton and aid bloom formation. Such increased biomass would result in an increase in NH_4 uptake, another mechanism that would contribute to assimilation of the NH_4 load. One candidate for such a mechanism is the particle entrapment zone or turbidity maximum, a feature of many estuaries. In the SFE, a salinity of 2 has been shown to coincide with the turbidity maximum and the distance from the Golden Gate where the bottom water salinity declines to 2 and is referred to as X2 (Kimmerer, 2002). X2 was within Suisun Bay during the historic bloom periods observed by Ball and Arthur (1979) for a range of river flows and also in this study (X2 ~68 km, water.ca.gov/dayflow). The 2010 data set described here was obtained from surface samples only and not useful for investigating vertical distributions of water properties. However Fig. 4a shows that the blooms occurred in surface water of ≤ 2 suggesting that particle entrapment might have contributed to the bloom. A detailed study of the vertical salinity field during an ongoing bloom with nutrient and carbon uptake rate measurements is needed to better constrain the role of circulation and stratification in bloom development. Stratification would also create a barrier to benthic grazing on the phytoplankton.

The invasive clam, *Potamocorbula amurensis* (= *Corbula amurensis*) has been present in Suisun Bay since 1987 and considered the cause for the rapid decline in summer phytoplankton that occurred shortly after the introduction (Alpine and Cloern, 1992; Jassby et al., 2002). The

clam population follows a seasonal cycle of growth and predation, with a biomass minimum in spring and biomass maximum in fall (e.g. Greene et al., 2011). The question arises; did the clams have a role in the appearance of the 2010 spring bloom? For example, was the population lower in spring 2010 than 2009? In Suisun Bay similar population sizes were reported for spring 2009 and 2010, except for at DWR-D6 where the mean population of *P. amurensis* was higher in April 2010 (6337 ± 1226 individuals m^{-2}) than April 2009 (5985 ± 705 individuals m^{-2}) (Fuller, Bay-Delta Monitoring and Analysis, California Department of Water Resources, pers. comm.). The similarity in clam abundance between years argues against reduced grazing on phytoplankton in 2010 as a cause for the bloom.

In summary, the major drivers of the spring 2010 bloom in Suisun Bay were increased river flow and decreased discharge of NH_4 at SRWTP, enabling the phytoplankton population to absorb the inflowing NH_4 and reduce the NH_4 concentration to levels that would allow use of NO_3. The populations that arose were very similar quantitatively and qualitatively (diatom dominated) to pre-1987 Suisun blooms of phytoplankton.

5.5. Food web response

The cause(s) of the decline in pelagic fisheries in the northern SFE has so far eluded the scientific and management community. No sustained resurgence in fish populations has occurred in spite of extensive financial contributions towards habitat restoration and research (Sommer et al., 2007). The present study, in concert with other studies conducted in the northern SFE (Glibert et al. 2011; Parker et al. 2012c) suggests increased discharge of NH_4 into the Sacramento River as a cause of reduced phytoplankton blooms and the subsequent food-limited conditions in Suisun Bay. When this NH_4 discharge is reduced, the food web should respond positively. In May 2010, accompanying the observed phytoplankton blooms and lower NH_4 loading, there was a nine-fold higher abundance of the zooplankton food source (calanoid copepod adults) for the pelagic fishes in Suisun Bay compared to May 2009 (Hennessey, CA Dept. Fish and Game, pers. comm.), likely a result of the 2010 phytoplankton blooms described here. *Eurytemora affinis* increased from 32 individuals m^{-3} in May 2009 to 246 individuals m^{-3} in May 2010 and *Sinocalanus doerri* from 70 individuals m^{-3} in May 2009 to 1299 individuals m^{-3} in May 2010. Results from the 2010 Fall Midwinter Trawl Index for delta smelt and longfin

smelt were 70% and 194% greater than those reported for 2009 (CA Dept. Fish and Game, dfg.ca.gov/delta/data/fmwt/charts.asp).

5.6. Future predictions

In December 2010, changes were approved to the SRWTP discharge permit requiring reductions in NH_4 inputs to the Sacramento River both through nitrification and denitrification. Reductions in NH_4 loadings should result in an increased probability of spring diatom blooms. Upgrading the SRWTP to full biological nitrogen removal (BNR, coupled nitrification/denitrification) would likely result in the Sacramento River phytoplankton productivity and community structure being driven by the conditions in the upper Sacramento River above the SRWTP (Parker et al. 2012c). These conditions of high NO_3, low NH_4 would likely fuel diatom blooms in Suisun Bay if the washout flow was not exceeded (i.e. the Washout Criterion) since both the Loading and Concentration Criteria would be met.

Increased irradiance conditions due to the expected decrease in sediment load (Schoellhamer, 2009) should result in an improved capacity of the phytoplankton to assimilate the NH_4 load to Suisun Bay from the Sacramento River, thereby reducing NH_4 concentrations to below NO_3 threshold, and enabling phytoplankton NO_3 use and blooms. The similarity in spring conditions occurring during the 2010 bloom (low NH_4, high chlorophyll, diatom success) with spring conditions (high chlorophyll and diatom dominance) that were described by Ball and Arthur (1979) for Suisun Bay from 1969 to 1979 suggests that a reversion to a diatom-fueled food web should also result in a return to the pre-1979 food web that supported larger zooplankton and higher food quality for fish. Ball and Arthur (1979) give mean values of chlorophyll of 30 - 40 $\mu g\ L^{-1}$ for Suisun Bay in spring and 40-100 $\mu g\ L^{-1}$ in summer 1969 - 1979 and according to Cloern and Cheng (1981) mean NH_4 concentrations for this period were low, in summer 1.8 and 4.0 $\mu mol\ L^{-1}$ in winter. These results suggest that the high concentrations of chlorophyll characteristic of the pre-1987 period could occur in spring if low NH_4 conditions were restored to the river and flow conditions were within prescribed limits. Phytoplankton could be restored to high spring chlorophyll conditions in Suisun Bay and even to high summer values if the clams were to disappear, as has happened elsewhere when NH_4 inputs were reduced (see case studies in Glibert, 2010). In this scenario, an increase in SFE productivity would follow the pattern of recovery observed in the Scheldt Estuary where nutrient inputs were reduced (Cox et

al., 2009; Mialet et al., 2011). The present study provides an example of how the reduction of anthropogenic NH_4 inputs may be employed to restore pre-existing productivity to SFE and similarly impacted estuaries and coasts.

6. Acknowledgments

This research was supported by the San Francisco Regional Water Quality Control Board and the Delta Stewardship Council (formerly CalFED) Grant 1039. We wish to thank Chris Foe for advice, Peter Otis and his crew for water sampling and graduate students Sarah Blaser, Erica Kress and Christina Buck for help with laboratory analyses and Debbie Bronk for her critical review of the manuscript.

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Figure Legends

Fig. 1 Map of study site in northern San Francisco Estuary, California, USA showing the Sacramento Regional Wastewater Treatment Plant (SRWTP), Sacramento River (Sac. R), San Joaquin River (SJ. R) and the seven sampling stations in Suisun Bay.

Fig. 2 NH_4 concentration of inflowing river water at the entrance to Suisun Bay as a function of river flow at point of discharge and three effluent discharge levels (5. 10 and 15 tons NH_4-N d^{-1}). The 3 dotted vertical lines show the river flow that will result in NH_4 = 4 μmol L^{-1} at Suisun Bay for each of three discharge levels. The dashed vertical line shows the Washout Criterion at which the phytoplankton population washes out.

Fig. 3 Chlorophyll (white bars) and NH_4 concentrations (black bars) at the seven sampling locations measured in 2010 on a) 17 March, b) 24 March, c) 7 April, d) 14 April, e) 26 April, f) 12 May, g) 24 May, h) 16 June and i) 21 June. The dashed lines show NH_4 = 4 μmol L^{-1}. DWR-D7 is not located on the Suisun Bay transect but lies to the north of USGS 6 so is plotted next to USGS 6.

Fig. 4 Surface contours of concentrations of nutrients and chlorophyll plotted versus sampling location on the Suisun Bay transect (y-axis) from USGS 8 (downstream) to DWR-D4 (upstream) and time (x-axis). DWR-D7 is not included. a) chlorophyll with areas > 10 μg L^{-1} shaded in grey. The 2 salinity isohaline is overlaid as a bold black line. b) NH_4 with areas > 4 μmol L^{-1} shaded in grey, c) NO_3, d) $Si(OH)_4$, e) PO_4. Crosses on c) show the sampling locations.

Fig. 5 Cell concentration (cells ml^{-1}) of the most abundant diatom species (from bottom: *Cocconeis, Cyclotella, Entomoneis, Fragilaria, Melosira*) at three channel stations and one shoal station (DWR-D7) collected in 2010 on a) 24 March, b) 7 April, c) 14 April, d) 26 April and e) 24 May.

Fig. 6 a). Ammonium loading calculated at SRWTP and at station DWR-D4 (entrance to Suisun Bay) from discharge and river flow; DWR-D4 loading values (in crosses) calculated using NH_4 concentration at DWR-D4 and Delta Outflow, overlaid with horizontal dotted lines with mean and peak phytoplankton NH_4 uptake rates for Suisun Bay indicating the Loading Criterion to be met.

b) River flow at the SRWTP with calculated (predicted) NH_4 concentration at SRWTP and DWR-D4, and measured NH_4 at DWR-D4 (crosses). The Concentration Criterion of 4 μmol L^{-1} is shown as a horizontal dotted line.

Fig. 7 Comparison of 2009 (dashed line) and 2010 (solid line) at SRWTP of a) river flow and b) NH_4 concentration calculated from the daily effluent NH_4 discharge and river flow.

Fig. 8 Calculated concentration of NH_4 during March to May of 2009 (circles) and 2010 (crosses) at SRWTP versus river flow. Two hyperbolae were calculated using the average SRWTP discharge for April 2009 and 2010 (Table 3). The horizontal dashed line at 16 μmol L^{-1} corresponds to the 4 μmol L^{-1} Concentration Criterion realized at Suisun Bay. The vertical dashed lines designate mean April flow in 2009 and on 14 April 2010. The dotted vertical line shows the flow necessary to meet the Concentration Criterion at mean discharge for April 2010.

Table 1. Calculated NH_4 concentration at the SRWTP discharge ([NH_4]source) and Suisun Bay with varying effluent loads and Sacramento River flow rate. Ammonium loading to Suisun Bay is calculated with and without NH_4 loss (due to nitrification).

SRWTP effluent load tons NH_4-N d^{-1}	Flow Rate $m^3 s^{-1}$	[NH_4]source at SRWTP µmol L^{-1}	NH_4 inflow at Suisun Bay µmol L^{-1}	Loading to Suisun Bay mmol m^{-2} d^{-1}	
				Potential with no nitrification	*Realized* with nitrification
5	500	8.27	2.07	2.11	0.53
5	1000	4.13	1.03	2.11	0.53
5	2000	2.07	0.52	2.11	0.53
10	500	16.63	4.13	4.21	1.05
10	1000	8.27	2.07	4.21	1.05
10	2000	4.13	1.03	4.21	1.05
15	500	24.8	6.2	6.32	1.58
15	1000	12.4	3.1	6.32	1.58
15	2000	6.2	1.6	6.32	1.58

Table 2. Secchi depth, salinity and NH_4 concentration at Suisun Bay (i.e. DWR-D4) with Delta Outflow used to calculate *directly estimated NH_4 loading* to Suisun Bay, and river flow at SRWTP used to calculate NH_4 concentration and *potential loading* at SRWTP and *realized NH_4 loading* to Suisun Bay from the NH_4 discharge at SRWTP. No discharge data available for June 2010, so no calculated values

Date 2010	Secchi depth m	Salinity	Delta Outflow m^3s^{-1}	Measured NH_4 at Suisun $\mu mol\ L^{-1}$	*Directly estimated NH_4 loading* to Suisun mmol $m^{-2}d^{-1}$	Calc NH_4 at Suisun $\mu mol\ L^{-1}$	*Realized NH_4 loading* to Suisun mmol $m^{-2}d^{-1}$	River flow at SRWTP m^3s^{-1}	Calc NH_4 at SRWTP $\mu mol\ L^{-1}$	*Potential NH_4 loading* at SRWTP mmol $m^{-2}d^{-1}$
17 March	0.50	0.13	395.1	10.31	2.08	5.2	1.31	495.3	20.78	5.24
24 March	0.50	0.30	262.5	6.97	0.93	6.68	1.31	384.9	26.73	5.25
7 April	1.00	0.18	567.0	9.66	2.79	7.74	1.65	418.9	30.95	6.61
14 April	0.75	0.14	759.7	5.50	2.13	5.16	1.56	591.6	20.63	6.22
26 April	0.50	0.11	709.8	5.18	1.87	5.36	1.49	546.3	21.45	5.97
12 May	0.50	0.11	604.8	4.43	1.36	6.98	1.54	433.1	27.9	6.15
24 May	0.25	0.11	503.7	3.56	0.91	6.5	1.40	421.7	26.0	5.59
16 June	0.50	0.07								
21 June	0.50	0.08								
mean ± s.d.	0.6 ± 0.2	0.14 ± 0.07	543.2 ± 173.8	6.52 ± 2.59	1.73 ± 0.69	6.23 ± 1.01	1.47 ± 0.13	470.3 ± 76.1	24.92 ± 4.03	5.86 ± 0.52
17 Mar – 7 Apr mean ± s.d.	0.7 ± 0.3	0.20 ± 0.09	408.2 ± 152.7	8.98 ± 1.77	1.93 ± 0.94	6.54 ± 1.28	1.43 ± 0.2	433.1 ± 56.5	26.15 ± 5.11	5.70 ± 0.79
14 Apr – 24 May mean ± s.d.	0.4 ± 0.1	0.09 ± 0.02	644.5 ± 113.9	4.67 ± 0.86	1.57 ± 0.54	6.00 ± 0.88	1.50 ± 0.07	498.2 ± 83.9	24.00 ± 3.52	5.98 ± 0.28

Table 3. Mean (± s.d.) flow, effluent discharge and calculated NH_4 concentration at SRWTP in April 2009 and 2010, and *realized loading* and calculated NH_4 concentration at entrance to Suisun Bay.

	Flow	Effluent discharge*		NH_4 at SRWTP	*Realized loading* to Suisun Bay	NH_4 at Suisun Bay (DWR-D4)
	$m^3 s^{-1}$			$\mu mol\ L^{-1}$	$mmol\ m^{-2} d^{-1}$	$\mu mol\ L^{-1}$
		10^6 mol N d^{-1}	tons N d^{-1}			
2009	345 ± 37	1.11 ± 0.26	15.54	37.62 ± 9.67	1.63	9.41
2010	518 ± 80	1.03 ± 0.10	14.42	23.38 ± 4.10	1.51	5.85

* Calculated from daily data from SRWTP

Figure(s)

Fig. 1

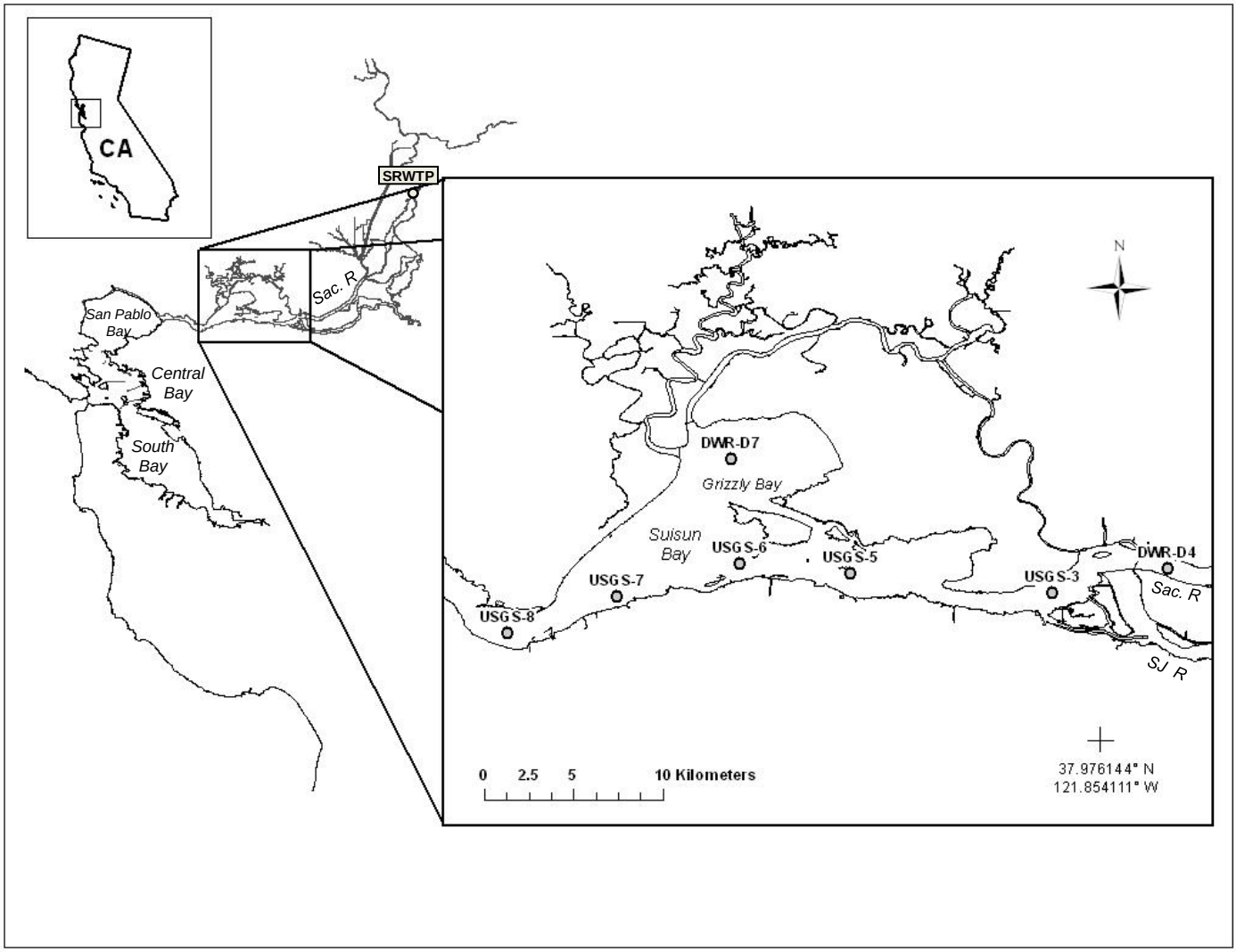
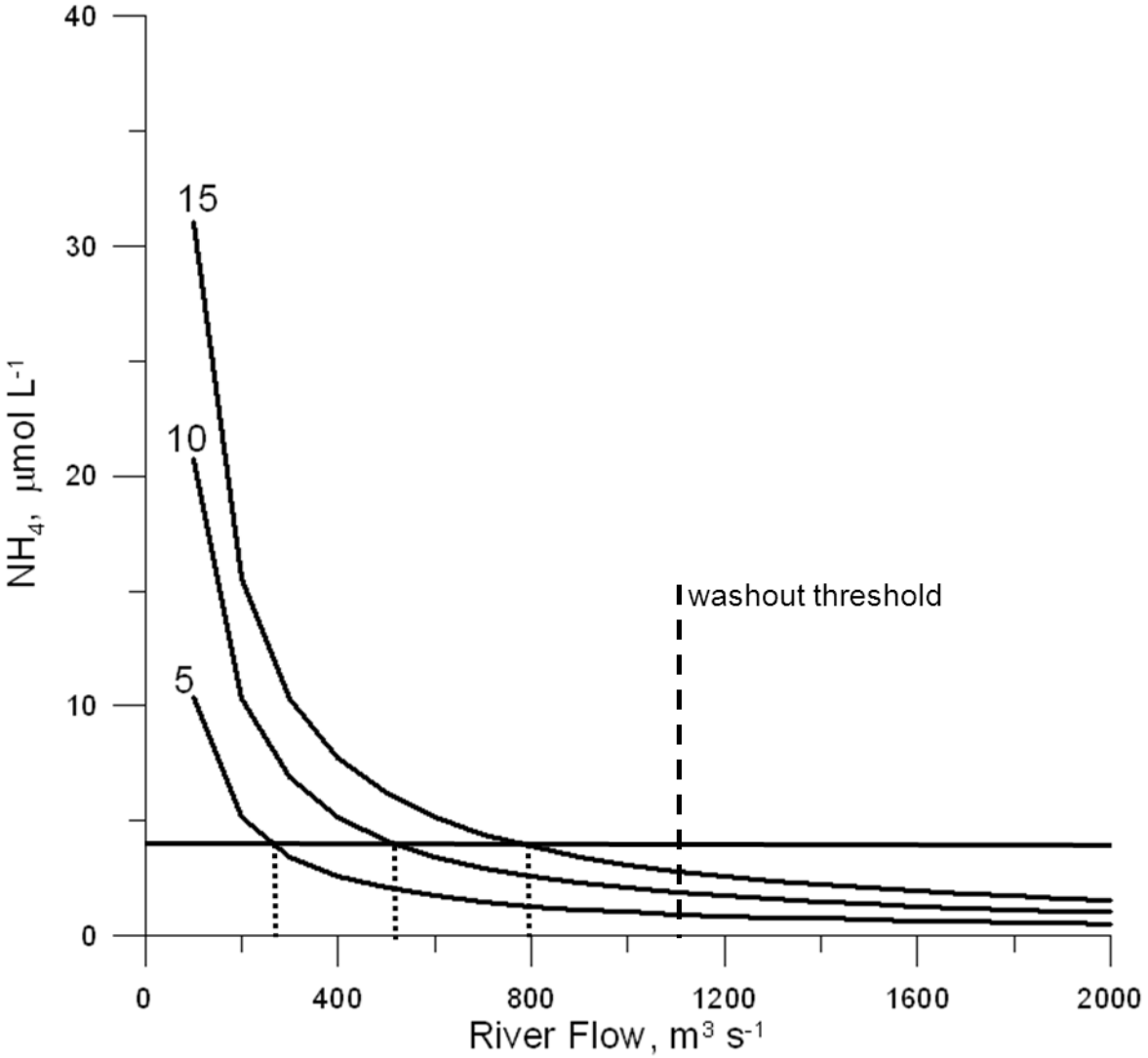


Fig. 2


40
30
20
10
0
15
10
5
washout threshold
0
400
800
1200
1600
2000
River Flow, m3 s-1
NH4, µmol L-1

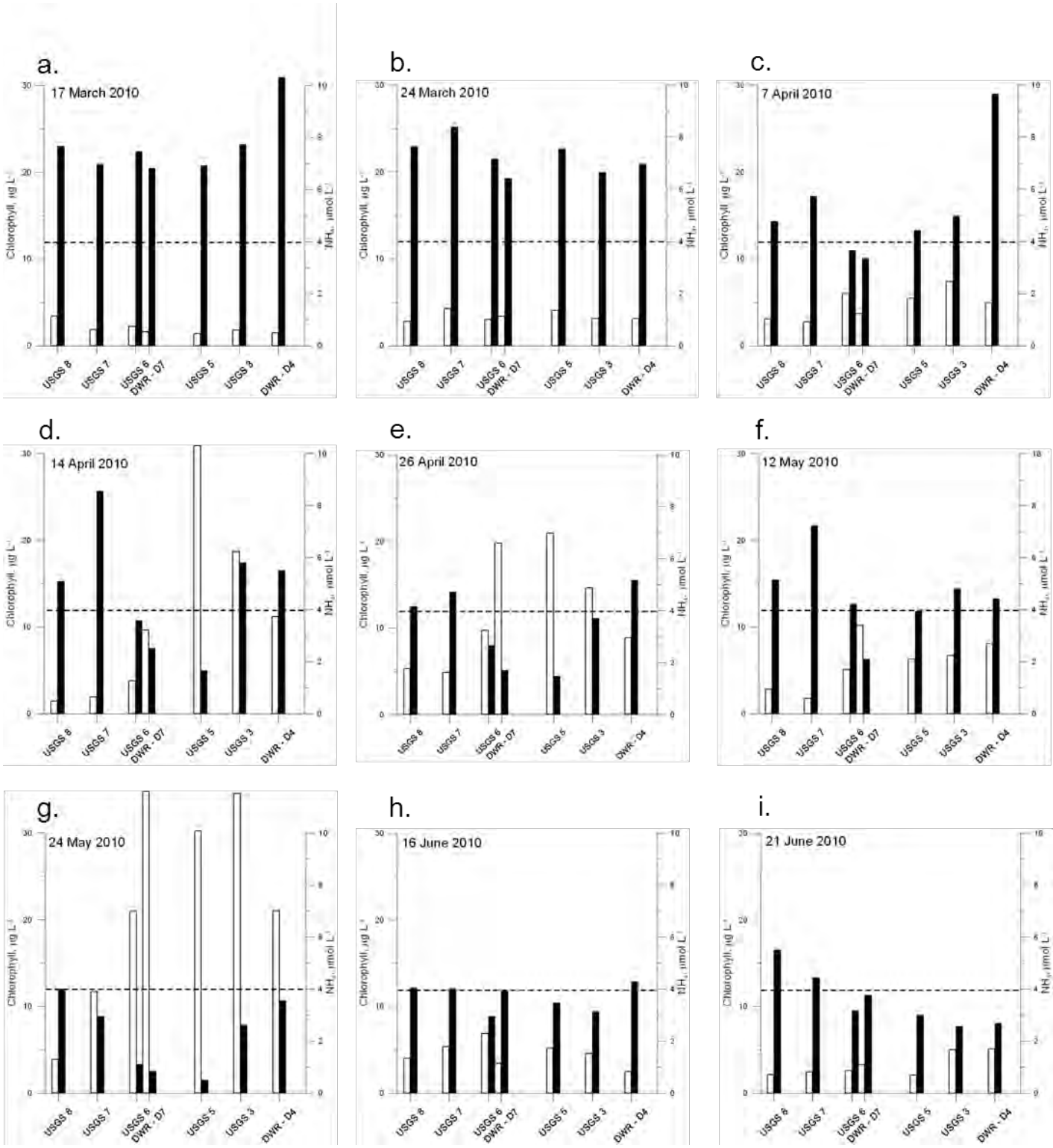
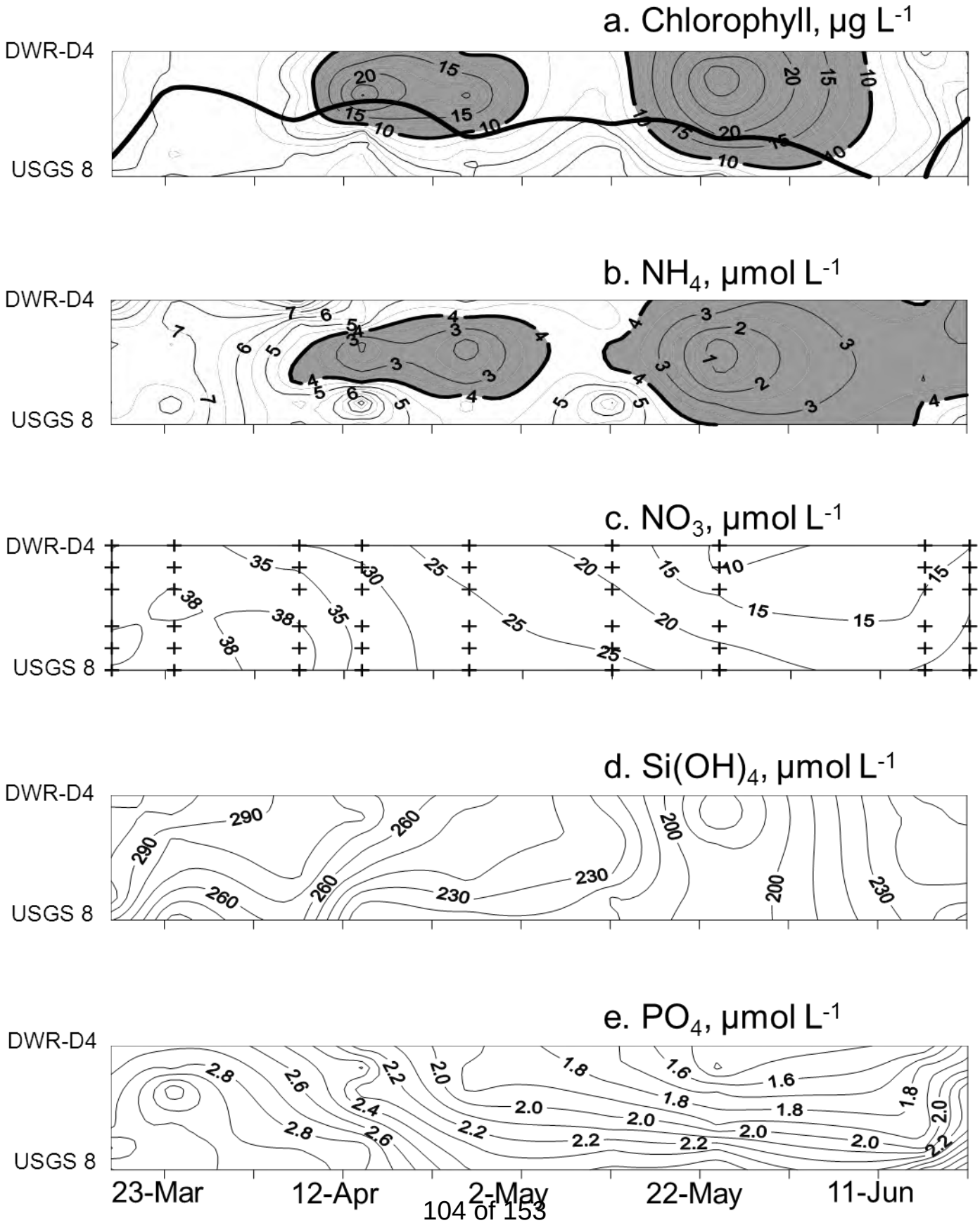
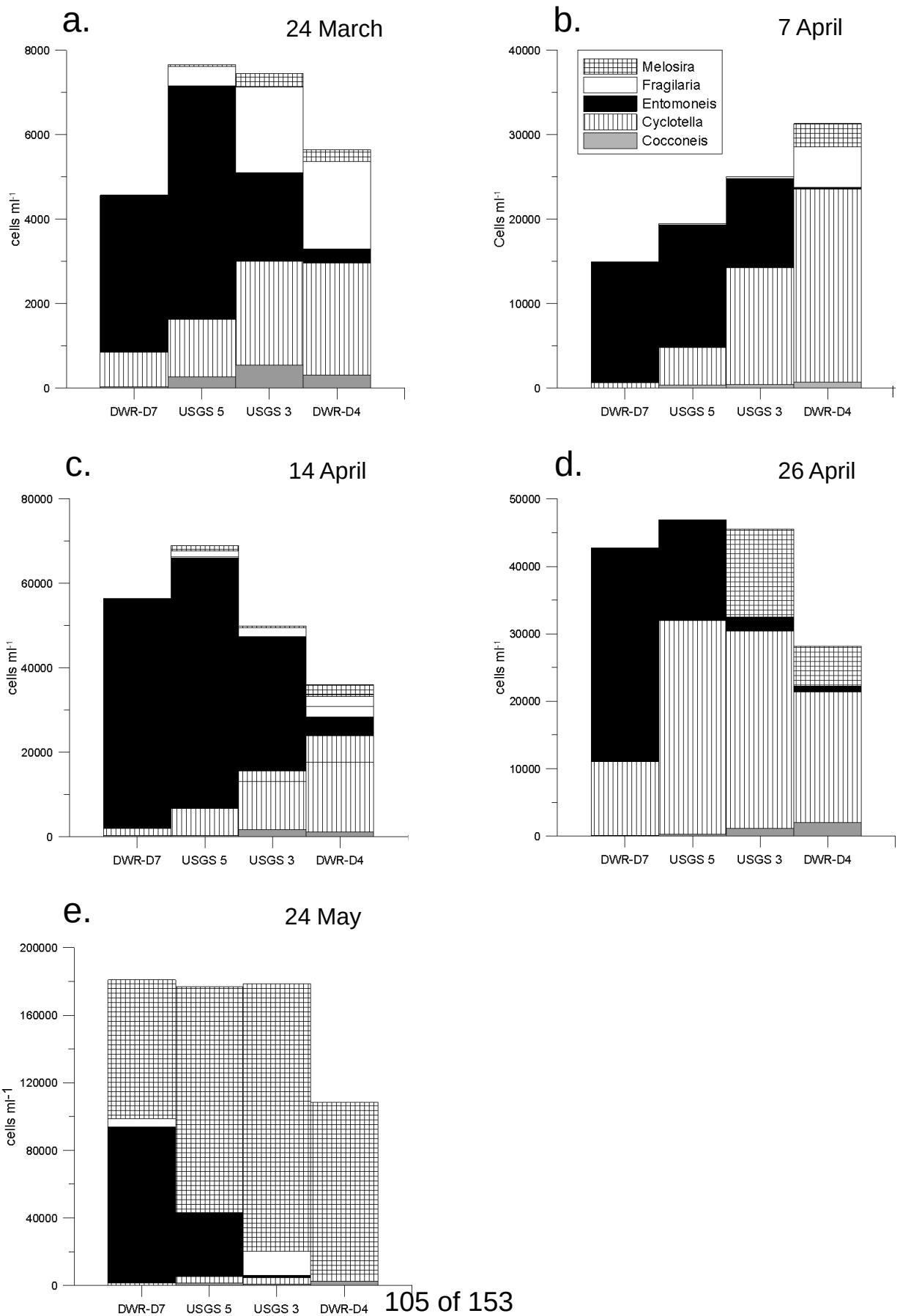
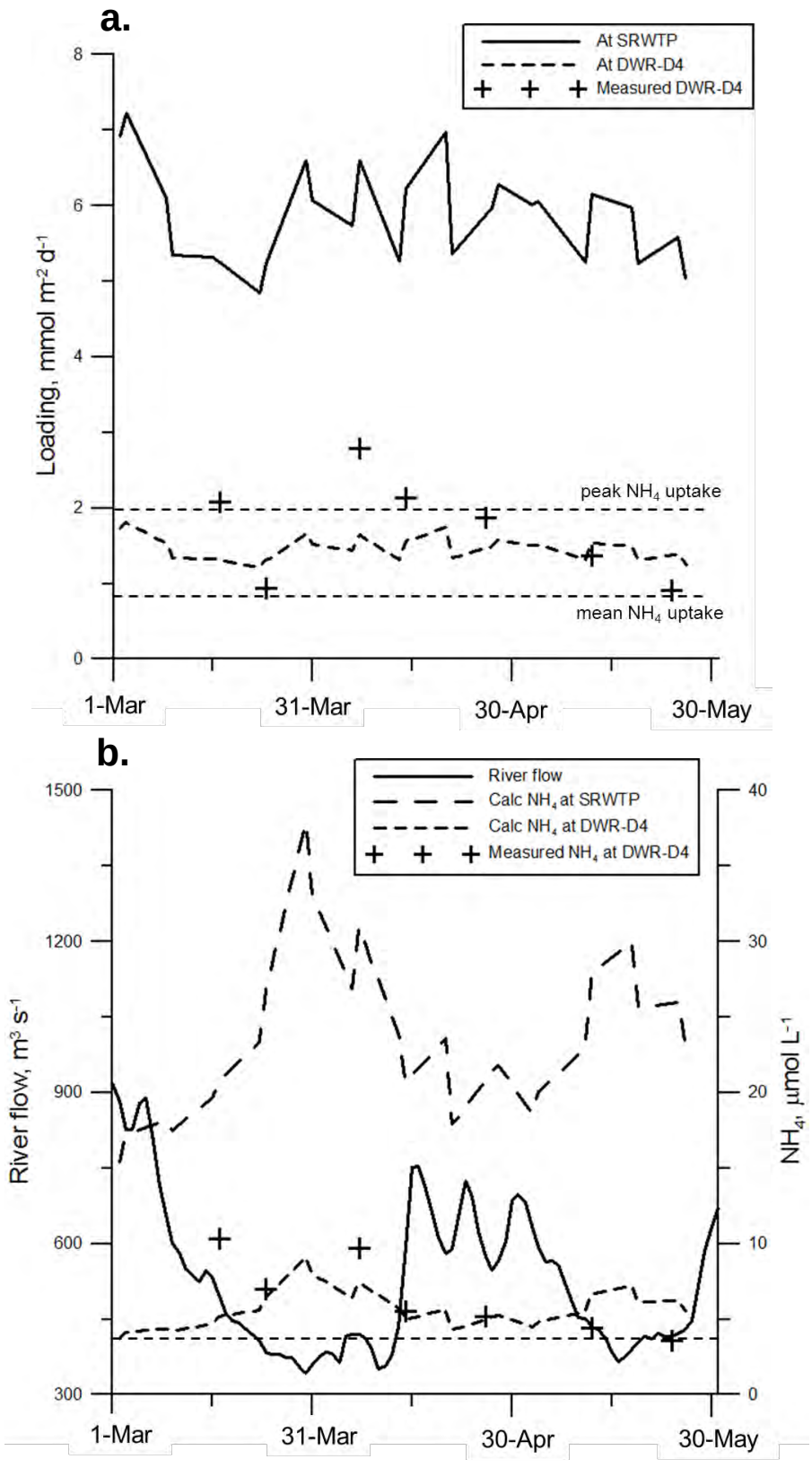

a.
17 March 2010
b.
24 March 2010
c.
7 April 2010
d.
14 April 2010
e.
26 April 2010
f.
12 May 2010
g.
24 May 2010
h.
16 June 2010
i.
21 June 2010
Chlorophyll, µg L⁻¹
NH4+, µmol L⁻¹
USGS 8
USGS 7
USGS 6 DWR - D7
USGS 5
USGS 3
DWR - D4

Fig. 4


a. Chlorophyll, µg L-1
DWR-D4
USGS 8
b. NH4, µmol L-1
DWR-D4
USGS 8
c. NO3, µmol L-1
DWR-D4
USGS 8
d. Si(OH)4, µmol L-1
DWR-D4
USGS 8
e. PO4, µmol L-1
DWR-D4
USGS 8
23-Mar
12-Apr
2-May
22-May
11-Jun


a.
24 March
8000
6000
4000
2000
0
cells ml-1
DWR-D7
USGS 5
USGS 3
DWR-D4
b.
7 April
40000
30000
20000
10000
0
Cells ml-1
Melosira
Fragilaria
Entomoneis
Cyclotella
Cocconeis
DWR-D7
USGS 5
USGS 3
DWR-D4
c.
14 April
80000
60000
40000
20000
0
cells ml-1
DWR-D7
USGS 5
USGS 3
DWR-D4
d.
26 April
50000
40000
30000
20000
10000
0
cells ml-1
DWR-D7
USGS 5
USGS 3
DWR-D4
e.
24 May
200000
160000
120000
80000
40000
0
cells ml-1
DWR-D7
USGS 5
USGS 3
DWR-D4


a.
At SRWTP
At DWR-D4
Measured DWR-D4
Loading, mmol m-2 d-1
peak NH4 uptake
mean NH4 uptake
1-Mar
31-Mar
30-Apr
30-May
b.
River flow
Calc NH4 at SRWTP
Calc NH4 at DWR-D4
Measured NH4 at DWR-D4
River flow, m3 s-1
NH4, µmol L-1
1-Mar
31-Mar
30-Apr
30-May

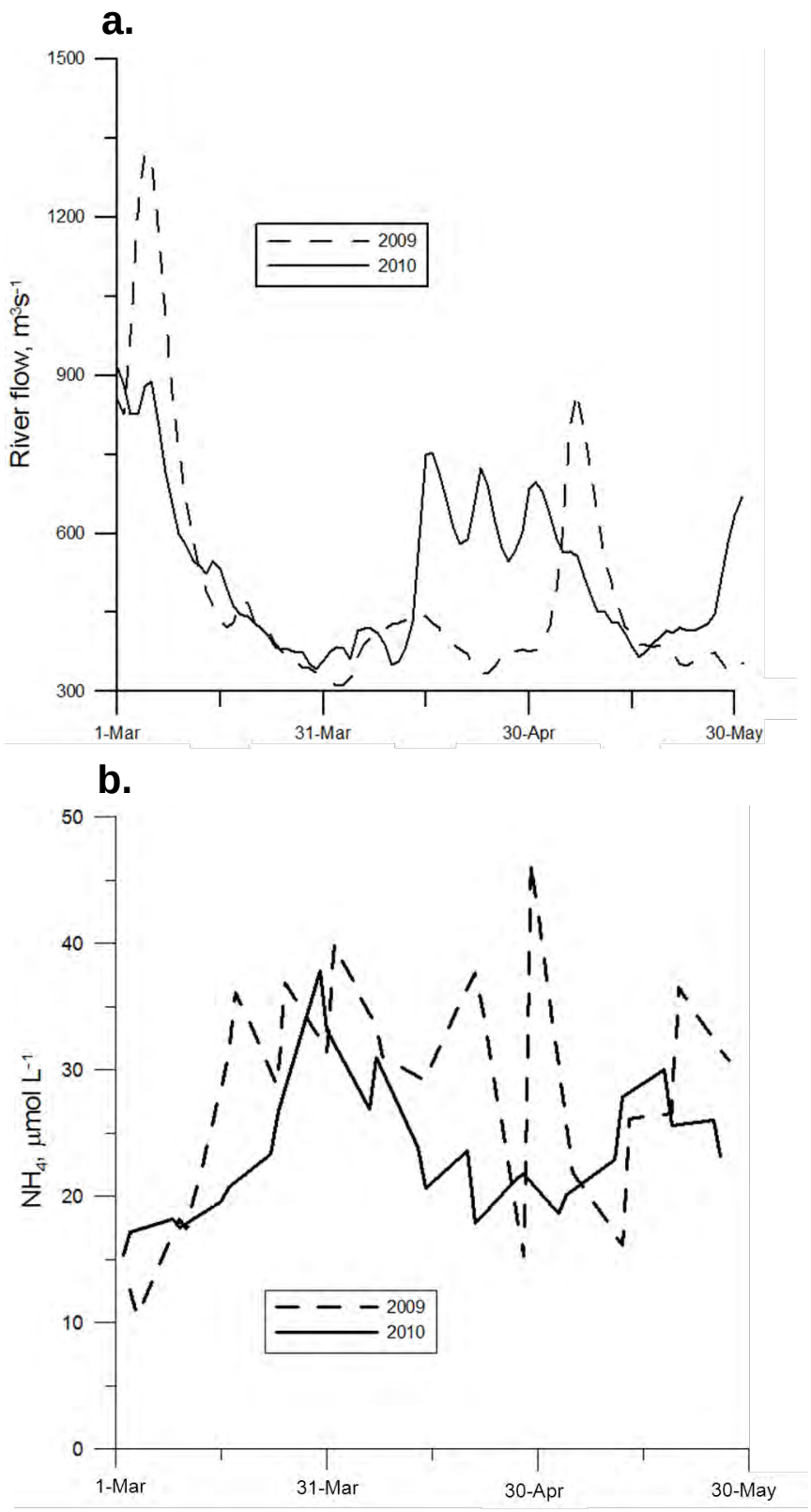
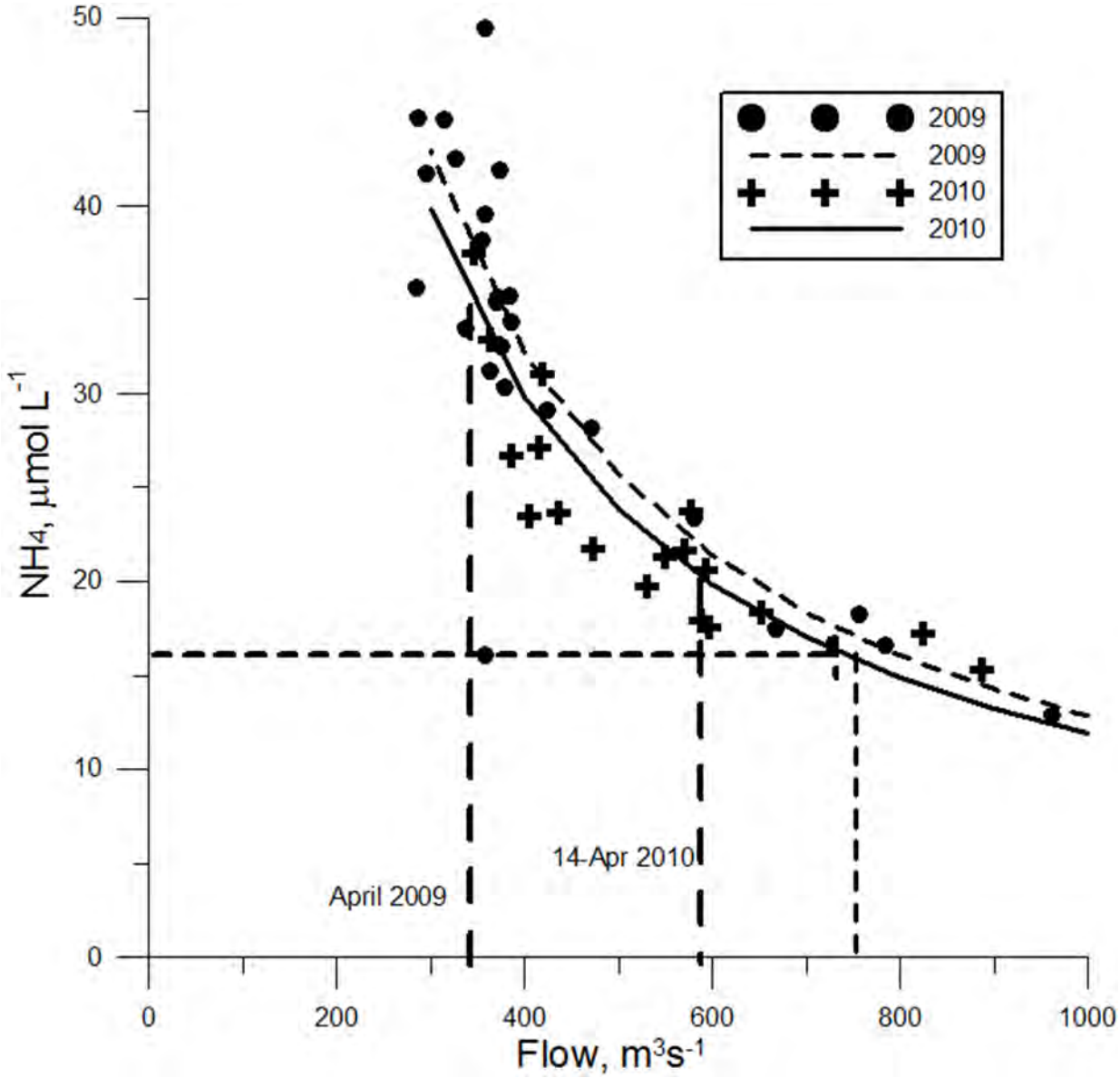

a.
1500
1200
900
600
300
River flow, m3s-1
2009
2010
1-Mar
31-Mar
30-Apr
30-May
b.
50
40
30
20
10
0
NH4, µmol L-1
2009
2010
1-Mar
31-Mar
30-Apr
30-May

Fig. 8


50
40
30
20
10
0
0
200
400
600
800
1000
NH4, µmol L-1
Flow, m3s-1
2009
2009
2010
2010
April 2009
14-Apr 2010