

Technical Advisory Team
California Wetland and Riparian Area Protection Policy

Technical Memorandum No. 1: Technical Advisory Team

Oct. 12, 2009

San Francisco Estuary Institute
Aquatic Science Center

7770 Pardee Lane
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Technical Advisory Team
California Wetland and Riparian Protection Area Policy
Technical Memorandum No. 1: Technical Advisory Team

July 15, 2009, rev. Oct. 12, 2009

Background

In 2008, the State Water Resources Control Board (State Water Board) passed Resolution 2008-0026 for “development of a policy to protect wetlands and riparian areas in order to restore and maintain the water quality and beneficial uses of the waters of the State.” The resolution was needed to foster greater efficiency, effectiveness, and consistency among State Water Board programs, to reverse the trend in wetland loss revealed by recent scientific studies, and to counter a series of U.S. Supreme Court decisions that have destabilized Federal wetland jurisdiction, resulting in less protection for California wetlands.

The resolution calls for a Policy Development Team (Policy Team) to coordinate with other State and federal agencies and interested stakeholders to ensure a high degree of public involvement and agency coordination throughout the policy development process. The Policy Team includes a “Drafting Team” that is charged with overall management of the process, including production of the draft policy documents; a “Steering Committee” of executive managers from the State Water Board and selected Regional Water Boards; and an “Interagency Coordination Committee” comprised of executive managers from State and federal agencies with regulatory authority over wetlands.

According to Resolution 2008-0026, development of the Wetland and Riparian Area Protection Policy is organized into three Phases.

In Phase 1, a policy will be established to protect wetlands from dredge and fill activities by establishing the intent of the California Water Boards to protect all waters of the State in coordination with other local, State, and federal agencies and local watershed interests; provide a statewide wetland definition; develop a framework for protecting water quality and beneficial uses at watershed scales; and, provide guidance on tracking wetland condition and function..

Phase 2 will expand the scope of the policy to protect wetlands from all other activities, other than dredge and fill activities, that impact water quality. The Policy Team will bring forward for State Water Board consideration: (a) new beneficial use definitions, (b) water quality objectives, and (c) a program of implementation to achieve the water quality objectives, as necessary, to protect wetland-related functions.

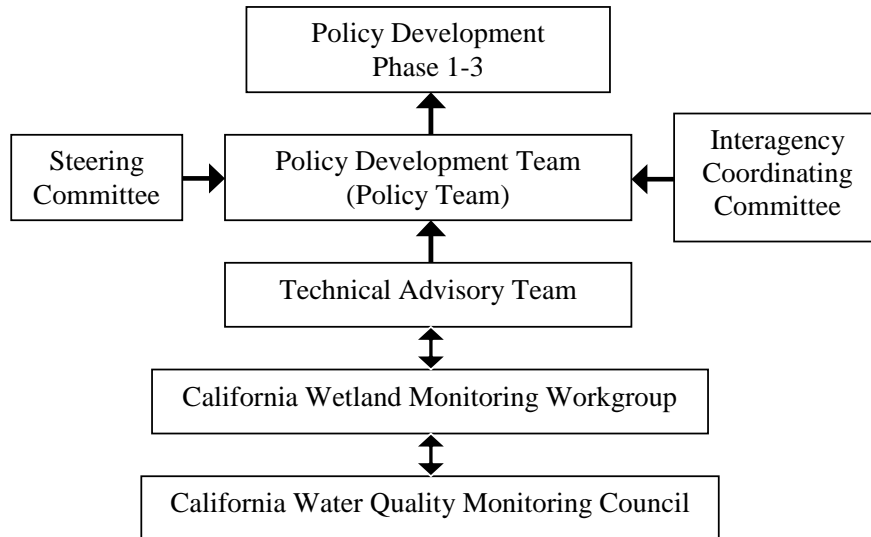
Phase 3 will extend the policy’s protection to riparian areas. The Policy Team will bring forward for State Water Board consideration: (a) new beneficial use definitions, (b) water quality objectives, and (c) a program of implementation to achieve the water quality objectives, as necessary, to protect riparian area-related functions.

TAT Formation and Purpose

In mid 2008, the Policy Team approached the Aquatic Science Center (ASC) for science support for policy development. The ASC is a Joint Powers Authority created by the State Water Board and the Bay Area Clean Water Agencies to assist with the efficient delivery of financial, scientific, monitoring, and information management support functions. The ASC is staffed by the San Francisco Estuary Institute (SFEI), a not-for-profit science organization that fosters scientific understanding to better manage the environment.

SFEI established a Technical Advisory Team (TAT) to provide the breadth and depth of scientific understanding about wetlands and riparian areas needed to assure the scientific credibility of the policy. SFEI can recruit new TAT members in response to the Policy Team's evolving needs for science support. SFEI can establish sub-teams of the TAT that work concurrently on multiple topics if necessary. The Policy Team and the TAT have overlapping membership to ensure good communication and coordination of timelines and products. Appendices A and B provide the current TAT roster and its members' brief biographies.

After the TAT was established, key State and federal agencies responsible for wetland regulation and management established the California Wetland Monitoring Workgroup (CWMW) to help coordinate wetland monitoring throughout the State. Soon thereafter, the California Water Quality Monitoring Council was established under Senate Bill 1070, and the CWMW became a workgroup of the Monitoring Council. Appendix C provides the CWMW charter. With agreement from the Policy Team, the CWMW advises and reviews the TAT's recommendations, and helps facilitate their review by State and federal agencies.



TAT Workplan

The TAT's workplan is based on the needs of the Policy Team. These needs can change over time as the policy evolves. The current ASC/SFEI workplan is outlined below. The workplan is more certain for Phase 1 than subsequent phases. The workplan will be updated as progress is made. All necessary funding has not been secured.

Phase 1

- Recommend a wetland definition, delineation method, classification system, and mapping methodology that are applicable statewide.
- Recommend a technical approach to avoid, minimize, and mitigate impacts within a watershed context.
- Recommend a plan to assess and track wetland extent and condition for regulatory and non-regulatory purposes that is coordinated with other State agencies and purposes.
- Assist in Phase 1 Adoption Process.

Phase 2

- Recommend statewide standard Beneficial Use definitions for wetlands.
- Recommend water quality objectives for wetlands.
- Review the scientific rationale for wetland regulatory language for implementing water quality objectives.
- Assist in Phase 2 adoption process.

Phase 3

- Assist in the integration of riparian protection into the policy, beginning with recommendations for a statewide riparian definition and methods to delineate and map riparian areas.

The Policy Team's initial request for science support focused on developing a State wetland definition. The Policy Team agreed with SFEI's response that standardized methods of wetland delineation, mapping, and classification were also fundamental to the kind of statewide wetland monitoring program that the policy should support. SFEI then established the TAT to work on recommendations for the statewide wetland definition, delineation method, classification system, and mapping approach.

The first product by the TAT was a set of principles to guide its support of the Policy Team. These principles were created in a consensus process with detailed editing of the language of each point. In short, the TAT sought to develop recommendations rooted in science and supported by previous approaches and the experience ensuing from them.

TAT's guiding principles for providing science support to the California Wetland and Riparian Protection Policy Development Team

- Recognizing the goal of wetlands protection, describe the wetland science needed to support the policy.
- To the extent possible, adopt a wetland definition that relies on existing approaches to wetland delineation, mapping, classification, and monitoring.
- To the extent possible, develop recommendations based on science rather than regulatory, economic, or political concerns.

APPENDIX A: Formation of TAT and its Current Roster

SFEI worked with the Policy Team to develop criteria for TAT membership. The core group consists of senior scientists with exceptional expertise in wetland mapping, classification, delineation, and assessment for a broad range of wetlands types, plus wetland scientists with special expertise for arid and extremely wet climates in California. The Policy Team and the Steering Committee provided technical representatives to assure close coordination between the Policy Team and the TAT. Abbreviated CVs for the TAT members are provided in Appendix B.

Technical Advisory Team Roster	
Name	Affiliation
Josh Collins	San Francisco Estuary Institute
Chad Roberts	Humboldt Bay Harbor, Recreation and Conservation District
Terry Huffman	Huffman-Broadway Group
Aaron Allen	US Army Corps of Engineers
Eric Stein	Southern California Coastal Water Research Project
Ben Livsey	Region 2 Water Quality Control Board and PDT member liaison
Cliff Harvey	California Water Resources Control Board and PDT member liaison
Meredith Williams*	San Francisco Estuary Institute
Letitia Grenier	San Francisco Estuary Institute
Dan Martel*	US Army Corps of Engineers
Todd Keeler-Wolfe	California Department of Fish and Game
Bill Kirchner*	US Fish and Wildlife Service National Wetlands Inventory
Ralph Tiner	US Fish And Wildlife Service
Mark Brinson	East Carolina University
Mike Finan*	US Army Corps of Engineers

* These participants have not yet provided biographical information for inclusion in this Memo. Subsequent revisions will provide more complete information. Membership in the TAT is subject to change as assigned topics change, so that participants with specific expertise can be consulted.

APPENDIX B: TAT Members' Abbreviated Biographies

AARON O. ALLEN

EDUCATION

Ph.D. Geography, University of California, Los Angeles, Los Angeles, California, November 1999.

Dissertation: *Urbanization and Dryland Fluvial Systems - Modeling Hydrogeomorphic Change in Ephemeral Streams.*

M.A. Geography, University of California, Los Angeles, Los Angeles, California, June 1993.

Thesis: *Impact of the Section 404 Permit Program on Wetland Resources in Southern California.*

B.A. Social Science Field Major (Environmental Studies), University of California, Berkeley, Berkeley, California, June 1989.

PROFESSIONAL POSITIONS

2006-Present **Chief, North Coast Branch**, Regulatory Division, U.S. Army Corps of Engineers, Los Angeles District.

2003-2004 **Acting Branch Chief** (120-Day Temporary Promotion), Regulatory Branch, U.S. Army Corps of Engineers, Los Angeles District.

2002-2006 **Technical Expert - Dryland Fluvial Geomorphology**, Regulatory Branch, U.S. Army Corps of Engineers, Los Angeles District.

1998-2001 **Senior Project Manager**, Regulatory Branch, U.S. Army Corps of Engineers, Los Angeles District.

1993-1998 **Project Manager**, Regulatory Branch, U.S. Army Corps of Engineers, Los Angeles District.

1993-1995 **Teaching Associate**, Department of Geography, University of California, Los Angeles.

1990-1992 **Teaching Assistant**, Department of Geography, University of California, Los Angeles.

SELECTED PRESENTATIONS AND PUBLICATIONS

Allen, A. O. 1993. *Impact of the Section 404 Permit Program on Wetland Resources in Southern California.* Paper presented at the Annual Meeting of the American Association of Geographers, Atlanta, Georgia.

Allen, A. O. and J. J. Feddema, 1996. Wetland Loss and Substitution by the Section 404 Permit Program in Southern California USA. *Environmental Management* 20(2): 263-274.

Allen, A. O. 2000. *Individual Permits & Compliance with the Section 404(b)(1) Guidelines.* Presentation at the American Public Works Association - Wetlands Permitting Workshop, Los Angeles, California.

Allen A. O. and D. Malanchuk, 2001. *Jurisdictional Determinations for waters of the United States in the Arid Southwest.* Presentation at the Regulatory Program Managers Training Seminar, Coeur d'Alene, Idaho.

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Allen, A. O. 2003. *SWANCC and Other Issues – the Los Angeles District Perspective*. Presentation at the California Bar Environmental Law Conference - Wetland Panel, Yosemite, California.

Allen, A. O. 2004. *SWANCC, Tributaries and OHWM - the Los Angeles District Perspective*. Presentation at the American Law Institute-American Bar Association Wetland Law and Regulation Conference, Washington D.C.

Allen, A. O. 2005. *Stream Restoration in the Arid Southwest - the Los Angeles District Perspective*. Presentation at the American Law Institute-American Bar Association Wetland Law and Regulation Conference, Washington D.C.

Allen A. O. 2005. *Value Stream Analysis - USACE Regulatory Process*. Presentation at the USACE Senior Leaders Conference, Dallas, Texas.

Allen, A.O. 2006. *Lean Six Sigma: Reviewing the SPD Regulatory Program*. Presentation at the USACE Regulatory Executive Conference, Alexandria, Virginia.

Allen, A. O. 2006. *Section 404 of the Clean Water Act – the Challenge of Floodplain Management*. Presentation at the 2006 Frankel Symposium at UCLA Law School, Los Angeles, California.

Allen, A. O. 2006. *Wetland Delineations and OHWM Determinations in the Arid Southwest*. Presentation at the American Law Institute-American Bar Association Wetland Law and Regulation Conference, Washington D.C.

Allen, A. O. 2007. *Stream Delineation and Creation in the Arid Southwest*. Presentation at the American Law Institute-American Bar Association Wetlands Law and Regulation Conference, Washington D.C.

Allen, A. O. 2007. *The Rapanos Guidance – the Los Angeles District Perspective*. Presentation at the CLE California Wetlands Conference, San Diego, California.

Allen, A. O. 2008. *The Rapanos Guidance – the Los Angeles District Perspective*. Presentation at the National Association of Environmental Professionals (NAEP/AEP) Annual Conference, San Diego, California.

Allen, A. O. 2008. *The Rapanos Guidance – Case-Studies from the Los Angeles District*. Presentation at the American Law Institute-American Bar Association Wetlands Law and Regulation Conference, Washington D.C.

RECENT AWARDS

Performance Award - 2008 - U.S. Army Corps of Engineers

Special Act Award - 2005 - U.S. Army Corps of Engineers (SPD Lean 6 Sigma Research Project)

Don Lawyer Award - 2004 - U.S. Army Corps of Engineers (National Regulator of the Year)

Special Act Award - 2003 - U.S. Army Corps of Engineers (MVD Peer Review Project)

APPENDIX B: TAT Members' Abbreviated Biographies (Continued)

MARK M. BRINSON

Department of Biology
East Carolina University
Greenville, North Carolina 27858
Office: (252) 328-6307
Fax: (252) 328-4178

Professional Preparation

Heidelberg College, Tiffin, Ohio	Biology	B.S. 1965
University of Michigan, Ann Arbor, Michigan	Botany	M.S. 1967
University of Florida, Gainesville, Florida	Botany	Ph.D. 1973

Appointments

Department of Biology, East Carolina University, Assistant Professor, 1973-77; Associate Professor, 1977-81; Professor, 1981-present; Director of Graduate Studies in Biology, 1981-86.
Ecologist, Office of Biological Services, U.S. Fish and Wildlife Service, 1979-80.
Visiting Assistant Professor of Botany, University of North Carolina at Chapel Hill, Summer 1976.
Research Associate, Center for Aquatic Sciences, University of Florida, Summer 1971.
Fisheries Biologist, Peace Corps, Turrialba, Costa Rica, 1967-69.

Selected Publications

- Brinson, M.M. 1993. Gradients in the functioning of wetlands along environmental gradients. Wetlands 13:65-74.
- Brinson, M.M. 1993. A hydrogeomorphic classification for wetlands. Technical Report WRP-DE-4, Waterways Experiment Station, Army Corps of Engineers, Vicksburg, Mississippi.
<http://el.erdc.usace.army.mil/wetlands/pdfs/wrpde4.pdf>
- Moorhead, K.K. and M.M. Brinson. 1995. Response of wetlands to rising sea level in the lower coastal plain of North Carolina. Ecological Applications 5:261-271.
- Brinson, M.M., R.R. Christian, and L.K. Blum. 1995. Multiple states in the sea-level induced transition from terrestrial forest to estuary. Estuaries 18:648-659.
- Brinson, M. M. and R. Rheinhardt. 1996. The role of reference wetlands in functional assessment and mitigation. Ecological Applications 6:69-76.
- Michener, W.K., E.R. Blood, K. L. Bildstein, M. M. Brinson, and L.R. Gardner. 1997. Climate change, hurricanes and tropical storms, and rising sea level in coastal wetlands. Ecological Applications 7(3):770-801.
- Brinson, M. M., B. E. Bedford, B. Middleton, and J.T.A. Verhoeven. 2008. Temperate freshwater wetlands: Response to gradients in moisture regime, human alterations and economic status. Pages 127-140. In N. Polunin (editor). Aquatic Ecosystems – Trends and Global Prospects. Cambridge University Press, Cambridge, UK.
- Rheinhardt, R.R., M.C. Rheinhardt, M.M. Brinson, and K.E. Faser, Jr. 1999. Application of reference data for assessing and restoring headwater ecosystems. Ecological Restoration 7(3):241-251.
- Richardson, J.L. and M.M. Brinson. 2000. Chapter 9. Wetland soils and the hydrogeomorphic classification of wetlands. Pages 209-227 in J.L. Richardson and M.J. Vepraskas (editors). Wetland Soils: Genesis, Hydrology, Landscapes, and Classification. Lewis Publishers, Boca Raton, Florida, USA.

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- Brinson, M.M. and A.I. Malvárez. 2002. Temperate freshwater wetlands: types, status, and threats. *Environmental Conservation* 29(2):115-133. Abstract at: <http://www.icef.eawag.ch/abstracts/temperateswamp.pdf>
- Kroes, D. and M. M. Brinson. 2004. Occurrence of riverine wetlands on floodplains along a climatic gradient. *Wetlands* 24:167-177.
- Rheinhardt, R.D., K.H. Miller, R.R. Christian, G.F.R. Meyer, C.W. Bason, E.C. Hardison, and M.M. Brinson. 2005. Applying Ecological Assessments to Planning Stream Restorations in Coastal Plain North Carolina. Report to the Ecosystem Enhancement Program, North Carolina Department of Environment and Natural Resources, Raleigh, NC. 101 pp.
- Brinson, M.M. 2006. Cómo puede la ciencia contribuir al manejo del los ecosistemas ribereños (How can science contribute to the management of riparian ecosystems?), pp. 27 – 42. In J. Peatán and J. Cappato (compilers). *Humedales Fluviales de América del Sur: Hacia un manejo sustentable*. Proteger Ediciones, Argentina.
- Rheinhardt, R., M. Brinson, R. Brooks, M. McKenney-Easterling, J. Masina-Rubbo, J. Hite, and B. Armstrong. 2007. Development of a reference-based method for identifying and scoring indicators of condition for Coastal Plain riparian reaches. *Ecological Indicators* 7:339-361
- Rheinhardt, R.D., M.M. Brinson, R.R. Christian, K.H. Miller, and G.F. Meyer. 2007. A reference-based framework for evaluating the ecological condition of stream networks in small watersheds. *Wetlands* 27:524-542.
- Pratolongo, P., P. Kandus, and M. M. Brinson. 2007. Net aboveground primary production and soil properties of floating and attached freshwater tidal marshes in the Rio de la Plata estuary, Argentina. *Estuaries and Coasts* 30:618-626.
- Smith, L.M., N.H. Euliss, Jr., D.A. Wilcox, and M.M. Brinson. 2008. Application of a geomorphic and temporal perspective to wetland management in North America. *Wetlands* 28:563-577.
- Perillo, G., E. Wolanski, D. Cahoon, and M. Brinson (editors). 2009. *Coastal Wetlands: An Integrated Ecosystem Approach*. Elsevier B.V., Amsterdam, The Netherlands. 941 pp.
- Brinson, M.M. In press. Chapter 22. The United States HGM (hydrogeomorphic) approach. Pages 486-512. In E. Maltby and T. Barker. *The Wetlands Handbook*. Blackwell Publishing, Oxford, UK.

Synergistic Activities

- Testimony before Subcommittee on Environmental Protection of the Committee on Environment and Public Works, U.S. Senate, April 9, 1991. (S. Hrg. 102-69); Testimony before Committee on Interior and Insular Affairs, U.S. House of Representatives, February 26, 1992
- Committee member on Wetlands Characterization, National Research Council, National Academy of Sciences (1993-1995) ; Chair of Committee on Riparian Areas: Functions and Strategies for Management, National Research Council, National Academy of Sciences (2000-2002).
- Society of Wetland Scientists (Vice President 1989-90; President 1990-91; Publications Committee Chair 2005-); SWS Merit Award (1998)
- American Institute of Biological Science, Board of Directors, Chair of Public Policy Review Committee (1998-2000)
- Wetlands Award for Science Research cosponsored by the Environmental Law Institute and the Environmental Protection Agency (1995)

APPENDIX B: TAT Members' Abbreviated Biographies (Continued)

Joshua N. Collins

Education

Graduated University of California at Berkeley; B.S. in Conservation and Resource Studies; Ph.D. in Entomological Sciences.

Employment

1987-1990: Post Doctoral Research Fellow, Department of Geography, University of California at Berkeley and Institute of Ecology, University of California at Davis.

1989-1993: Consulting Ecologist in private practice for wetlands design and management.

1993-1997: Research Fellow, Department of Geography, University of California at Berkeley.

1993-1999: Environmental Scientist, Founding Director of Programs in Wetlands Science, Watershed Science, Historical Ecology, and Geographic Information Systems, San Francisco Estuary Institute, Richmond. CA.

2000-present: Program Director and Senior Environmental Scientist, Wetlands Science Program, San Francisco Estuary Institute, Oakland, CA.

SELECTED EXTRA-CURRICULAR ACTIVITIES

Federal Recovery Teams for California Clapper Rail, Light-footed Clapper Rail, and Salt Marsh Harvest Mouse; Office of the Regional Director, US Fish and Wildlife Service, Seattle, WA

Science Coordinator, Bay Area Regional Wetlands Ecosystem Goals Project

Comprehensive Monitoring and Research Team, CALFED Bay-Delta Program

Principal Investigator for Geomorphology Pacific Estuarine Ecological Indicators Research Center, University of California at Davis, Bodega Marine Laboratory CA

Science Panel, Ecosystem Services in San Francisco Bay, Global Change Research Program, National Center for Atmospheric Research, Boulder CO.

Science Team of the South Bay Salt Pond Restoration Project, Oakland CA

National Wetlands Monitoring and Assessment Working Group, USEPA, Washington DC

Selected Reports

Collins, J.N. and T.C. Foin. 1992. Evaluation of the impacts of aqueous salinity on the shoreline vegetation of tidal marshlands in the San Francisco Estuary. In: Managing freshwater discharge to the San Francisco Bay/San Joaquin Delta Estuary: the scientific basis for an estuarine standard, J.R. Schubel (ed). San Francisco Estuary Project, U.S. Environmental Protection Agency, San Francisco CA.

Monroe, M., P.R. Olofson, J.N. Collins, R. Grossinger, J. Haltiner, and C. Wilcox. Baylands Ecosystem Habitat Goals. 1999. U.S. Environmental Protection Agency, San Francisco CA.

Draft TAT description Version 5

- Collins, J.N. and R.M. Grossinger. 2004. Syntheses of scientific knowledge for maintaining and improving functioning of the South Bay ecosystem and restoring tidal salt marsh and associated habitats over the next 50 Years at pond and pond-complex scales. Draft report to the Science Team of the South Bay Salt Pond Restoration Project.
- Collins, Joshua N., Martha Sutula, Eric Stein, Mami Odaya, Eric Zhang, and Kristen Larned. 2006. Comparison of Methods to Map California Riparian Areas. Prepared for the California Riparian Habitat Joint Venture. San Francisco Estuary Institute, Oakland CA.

SELECTED PAPERS

- Collins, J.N. 1986. Wetland hydrology and functional assessment: a Pacific Coast regional perspective. In: Proceedings of the Pacific Coast Wetlands Workshop. J.S. Larson (ed.). National Wetlands Technical Council, The Environmental Institute, Amherst, MA.
- Collins, J.N., L.M. Collins, L.B. Leopold, and V.H. Resh. 1986. The influence of mosquito control ditches on the geomorphology of tidal marshes in the San Francisco Bay Area: evolution of salt marsh mosquito habitat. Proceedings and Papers of the California Mosquito and Vector Control Association 54:91-95.
- Collins, L.M., J.N. Collins, and L.B. Leopold. 1987. Geomorphic processes of an estuarine tidal marsh: preliminary results and hypotheses. In: International Geomorphology 1986 Part I. V. Gardner (ed.). John Wiley and Sons, LTD.
- Collins, J.N. and V.H. Resh. 1989. Guidelines for the ecological control of mosquitoes in non-tidal wetlands of the San Francisco Bay Region. Special Publication of the California Mosquito and Vector Control Association, Sacramento CA
- Bergey, E. A., S. F. Balling, J. N. Collins, G. A. Lamberti and V. H. Resh. 1992. Bionomics of invertebrates within an extensive *Potamogeton pectinatus* L. bed of a California marsh. Hydrobiologia 234: 15-24.
- Leopold, L. B., J. N. Collins, and L. M. Collins. 1993. Hydrology of some tidal channels in estuarine marshlands near San Francisco, Catena 20: 469–493.
- Foin, T.C., E.J. Garcia, R.E. Gill, S.D. Culberson and J.N. Collins. 1997. Recovery strategies for the California clapper rail (*Rallus longirostris obsoletus*) in the heavily urbanized San Francisco estuarine ecosystem. Landscape and Urban Planning 38:229-243.
- Byrne, R., B.L. Ingram, S. Starratt, F. Malamud-Roam, J.N. Collins, and M.E. Conrad. 2001. Carbon-isotope, diatom, and pollen evidence for late Holocene salinity change in a brackish marsh in the San Francisco Estuary. Quaternary Research 55: 66-76.
- Davis, J.A., D. Yee, J.N. Collins, S.E. Schwartzbach, and S. Luoma. 2003. Potential for increased mercury accumulation in the estuary food web. San Francisco Estuary and Watershed Science. <http://repositories.cdlib.org/jmie/sfews/vol1/iss1/art4/>
- Culberson, S.D., Foin, T.C., and Collins, J.N. 2004. The role of sedimentation in estuarine marsh development within the San Francisco Estuary, California, USA. Journal of Coastal Research, 20(4): 970-979.
- Stein, E.D., A.E. Fetscher, R.P. Clark, A. Wiskind, J.L. Grenier, M. Sutula, J.N. Collins, and C. Grosso (2009- in press). Validation of a Wetland Rapid Assessment Method: Use of EPA's Level 1-2-3 Framework for Method Testing and Refinement. Wetlands 29(2).

APPENDIX B: TAT Members' Abbreviated Biographies (Continued)

J. LETITIA GRENIER

San Francisco Estuary Institute, Conservation Ecology Program
7770 Pardee Lane, 2nd Floor, Oakland, CA 94726, 510-746-7388, letitia@sfei.org

Education

- 2004 Ph.D. Environmental Science, Policy and Management. University of California, Berkeley.
- 1994 B.A. Biology and Film/Video. Middlebury College, Vermont.

Relevant Publications

- Robinson, A., A. Cohen, B. Lindsey, and J. L. Grenier. *In review*. Distribution of macroinvertebrates across a tidal gradient in the China Camp State Park salt marsh, Marin County, CA. Invited paper for San Francisco Bay National Estuarine Research Reserve book.
- Stein, E., A. E. Fetscher, R. P. Clark, A. Wiskind, J. L. Grenier, M. Sutula, J. N. Collins, and C. Grosso. 2009. Validation of a wetlands rapid assessment method: Application of EPS's level 1-2-3 framework for method testing and refinement. *Wetlands*. In press.
- Grenier, J. L., and R. Greenberg. 2006. Trophic adaptations in sparrows and other vertebrates of tidal marshes. (Invited paper for the Vertebrates of Tidal Marshes Symposium, Patuxent Wildlife Research Center, Maryland, 2002). *Studies in Avian Biology* 32:130-139.
- Takekawa, J. Y., I. Woo, H. Spautz, N. Nur, J. L. Grenier, K. Malamud-Roam, J. C. Nordby, A. N. Cohen, F. Malamud-Roam, S. E. Wainwright-De La Cruz. 2006. Environmental threats to tidal marsh vertebrates of the San Francisco Bay Estuary. *Studies in Avian Biology* 32:176-197.
- Latif, Q., J. L. Grenier, S. Heath, G. Ballard, and M. E. Hauber. 2006. First evidence of conspecific brood parasitism and egg ejection in song sparrows, with comments on methods sufficient to document these behaviors. *Condor* 108:452-458.
- Grenier, J. L. and R. Greenberg. 2005. A biogeographic pattern in sparrow bill morphology: parallel adaptation to tidal marshes. *Evolution* 59, 1588-1595.
- Davis, J. A., J. L. Grenier, and R. Grossinger. 2005. Water quality concerns related to the South Bay Salt Pond Restoration Project. *The Pulse of the Estuary: Monitoring and Managing Water Quality in the San Francisco Estuary*. SFEI Contribution 411. San Francisco Estuary Institute, Oakland, CA.
- Grenier, J. L. and S. R. Beissinger. 1999. Variation in the onset of incubation in a Neotropical parrot. *Condor* 101:752-761.

Recent Grants and Awards

- 2009 *Alameda County Flood Control District*. Develop monitoring plan for invasive *Spartina* to continue monitoring in the Eden Landing area of the South Bay Salt Pond Restoration Project after the Invasive *Spartina* Project sunsets in the coming years. \$30,000.
- 2007 *California State Coastal Conservancy*. Assessment of the ecological risk associated with restoring managed salt ponds to tidal marsh, using marsh birds, fish, and invertebrates as biosentinels for mercury. \$110,000.
- 2007 *San Francisco Foundation: San Francisco Bay Fund*. Application of biosentinel wildlife species as ecological risk assessment and adaptive management tools for tidal marsh restoration. \$50,000.
- 2006 *California State Coastal Conservancy*. Development of biosentinel wildlife species of birds, fish, and invertebrates to assess the ecological risk of mercury bioaccumulation associated with restoring salt ponds to tidal marsh. \$270,000.
- 2005 *San Francisco Foundation: San Francisco Bay Fund*. Development of wildlife as adaptive management tools for mercury in tidal marshes. \$40,000.
- 2002 *Budweiser Conservation Scholarship*. Research on tidal marsh sparrow trophic and behavioral ecology. \$10,000.
- 2002 *Garden Club of America Award in Coastal Wetlands Studies*. Research on the influence of the tidal marsh gradient on the food web and marsh bird behavior. \$5,000.
- 2001 *San Francisco Foundation: San Francisco Bay Fund*. Research on the structure of the tidal marsh food web. \$15,000.

Professional and Research Experience

- 2004- *San Francisco Estuary Institute, Oakland, CA*
- Present Scientist. Conduct research and manage projects in estuarine science, particularly in the areas of wildlife conservation, tidal marsh ecology, and food-web contamination. Develop wildlife biosentinels as tools for adaptive management of mercury bioaccumulation in the food web of wetlands.
- 1999- *University of California, Berkeley, CA*
- 2004 Doctoral Student. Designed and implemented an independent research project on tidal marsh food webs and Song Sparrow behavioral ecology. Developed scientific ideas, collected data, secured grants and permits, fostered collaborations, administered project, trained field assistants, analyzed data, and published results.

Science Advisory Roles

Technical Advisory Team for California State Wetlands and Riparian Protection Policy

Technical Review Team, Contaminants Review Team, High-Marsh Design Team for Montezuma Wetlands Restoration Project

San Francisco Bay Regional Water Quality Control Board Wetland Monitoring Group

APPENDIX B: TAT Members' Abbreviated Biographies (Continued)

Cliff Harvey

State Water Resources Control Board
1001 I Street, 15th Floor
Sacramento, CA 95814
(916) 558-1709

Cliff Harvey is an Environmental Scientist with the 401 Certification and Wetlands Unit of the State Water Resources Control Board's Division of Water Quality. He represents the Water Board's Wetland Policy Development Team on the TAT (along with Mr. Livsey).

Mr. Harvey holds a B.S. in Biology from Bethany Nazarene College (Bethany, OK), and an M.S. in Natural Resources from Humboldt State University (Arcata, CA). Cliff is a Certified Professional in Erosion and Sediment Control (CPESC #3431).

Prior to his arrival at the State Water Board in 2008, he spent 9 years working with local stakeholder-led watershed groups in Northeastern California, where he helped in the leadership of watershed planning and water quality monitoring projects. He also designed and implemented numerous stream and wetland restoration projects for many public and private stakeholder-partners as part of these assignments.

Cliff has conducted NEPA/CEQA review and site inspection duty for the Department of Fish and Game's oversight of large linear utility construction projects. He has also conducted numerous assignments with various state and federal agencies around the west, including watershed restoration project design and implementation, biological surveys, and outdoor recreation management projects.

APPENDIX B: TAT Members' Abbreviated Biographies (Continued)

Terry Huffman

Huffman-Broadway Group, Inc
Address: 828 Mission Avenue
San Rafael Ca 94901
Phone: 415-925-2000

Dr. Huffman has a unique combination of in-depth experience with ecological research and the environmental regulatory process. Prior to starting Huffman & Associates, Inc., he was the U.S. Army Corps of Engineers' (Corps) chief wetlands scientist responsible for the development of technology directed toward assisting the Corps Regulatory Program. While at the Corps' Environmental Laboratory in Vicksburg Mississippi, Dr. Huffman developed the wetlands definition currently in use by the Corps and the U.S. Environmental Protection Agency (EPA). He also conducted research and development activities which pioneered the use of multiple field indicators to determine the presence or absence of wetlands vegetation, soil and hydrology conditions. This seminal work led to the development of the wetland delineation methodology in use by the Corps today. As noted in the preface to the Corps' 1987 *Wetlands Delineation Manual*, Part II of the Manual is based on Dr. Huffman's 1980 paper, entitled *Multiple Parameter Approach to the Field Identification and Delineation of Wetlands*. Dr. Huffman also played a major role in developing the language pertaining to wetlands in the EPA 404(b) (1) project alternatives analysis, and was instrumental in the initial development of the Corps' long standing wetlands research and training programs. His 30-plus years of work with the Corps and as a private consultant has provided Dr. Huffman with extensive on-site experience with virtually all types of aquatic and wetland environments and a unique understanding of the environmental permitting and compliance process.

Dr. Huffman has served as a project manager and principal investigator for multi-million-dollar nationally-oriented research programs to aid in the implementation of federal and state policies and regulations, including the Rivers and Harbors Act of 1899, the National Environmental Policy Act of 1968, the Clean Water Act of 1972 and relevant Presidential Executive Orders. His experience has also included studies of plant communities and their relation to inundated soil conditions, assistance in the development of federal and state environmental regulations, development of field and remote sensing techniques for the identification and delineation of critical habitats, and the development of methods for habitat restoration for purposes of mitigating project impacts.

In addition to his research, Dr. Huffman has extensive hands-on experience in the application of his expertise. As a consultant he has also worked closely with both state and federal agencies on numerous occasions, as well as with members of the private sector, conducting wetland boundary determinations using various agency required methodologies (Corps, Department of Fish and Game and California Coastal Commission), review and development of regulatory programs and procedures, development of evidence for litigation, coordination and preparation of expert witnesses for testimony, problem solving and negotiation during the Corps, US Fish and Wildlife Service (ESA Sections 7 & 10a), National Marine Fishery Service (ESA Sections 7,&10a / EFH) US Environmental Protection Agency, US Coast Guard, State Lands Commission, San Francisco Bay Development and Conservation Commission, California Coastal Commission, California Department of Fish and Game and State/Regional Water Quality Boards environmental authorization processes, preparation and review of wetlands mitigation and restoration plans, performing or reviewing assessments of wetlands values and impacts, constructing aquatic and wetland habitats for mitigation, evaluation and permitting for various types of development projects.

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These projects have ranged from residential/commercial and industrial development, resort development, transportation, farming operations, telecommunications, aviation, aggregate mining, gas pipeline and electric transmission line construction, hydro electric power, marine shipyard, dredging to merchant power development.

APPENDIX B: TAT Members' Abbreviated Biographies (Continued)

Todd Howe Keeler-Wolf

Todd Keeler-Wolf is the Senior Vegetation Ecologist for the California Department of Fish and Game and leads the Vegetation Classification and Mapping program for the Department. Todd is a leading authority on California and western US Vegetation and plant ecology. He is co-author with John Sawyer of *A Manual of California Vegetation* and with Michael Barbour of the *Terrestrial Vegetation of California, third edition*. He has been active as an ecologist in California for over 30 years.

Work Address:

Vegetation Classification and Mapping Program, Biogeographic Data Branch
California Department of Fish and Game
1807 13th Street, Rm 202
Sacramento, CA 95811
(916) 324-6857
tkwolf@dfg.ca.gov

Education:

University of California, Santa Cruz 1969-1974 B.A. (with honors) Natural History
University of California, Santa Cruz 1976-1982 Ph.D. Biology.

Career Related Employment Experience:

Plant Collector for the Arboretum of the University of California, Santa Cruz.
Australasian Region and the southwestern Pacific Basin, August 1974 to July 1975.

Lecturer at University of California, Santa Cruz: College Eight Field Biology, The Natural History of California, Spring 1976, Spring 1977.

Consulting Ecologist at Large. Contracting with US Forest Service, The Nature Conservancy, Trust for Public Lands and individual companies preparing ecological surveys and rare plant surveys throughout California 1985-1991.

Vegetation Ecologist, Natural Diversity Data Base, Natural Heritage Division,
California Department of Fish and Game, Sacramento. June 1991 to July 2000

Lecturer, University of California Davis, Department of Plant Biology spring 2007
California Plant Communities (PLB 147)

Senior Vegetation Ecologist, Vegetation Classification and Mapping Program, Biogeographic Data Branch, California Department of Fish and Game, July 2000 to present

Selected Publications:

Keeler-Wolf T., and V. Keeler-Wolf. 1984. The Yolla Bolly Mountains of California: New records and phytogeographical notes. *Madroño* 31:57-60.

Keeler-Wolf, T. 1986. The barred antshrike (*Thamnophilus doliatus*) on Trinidad and Tobago: habitat niche expansion of a generalist forager. *Oecologia* 70:309-317.

Draft TAT description Version 5

- Keeler-Wolf, T. 1988. The role of *Chrysolepis chrysophylla* (Fagaceae) in the Pseudotsuga-hardwood forests of the Klamath Mountains of California. *Madroño* 35:285-308.
- Keeler-Wolf, T. 1990. Ecological surveys of Forest Service Research Natural Areas in California. U.S.D.A. Forest Service General Technical Report PSW-125, 177pp.
- Keeler-Wolf, T. 1993. Rare Community Conservation in California. In Keeley, J. (ed.) *Proceedings of the Symposium: Interface between ecology and land development*. Southern Californian Academy of Sciences.
- Keeler-Wolf, T. 1993. Conserving California's rare plant communities. *Fremontia* 22(3):14-22.
- Keeler-Wolf, T. 2006. The manual of California Vegetation, second edition. *Fremontia* 34: 7-17.
- Keeler-Wolf, T. 2007. The history of vegetation classification and mapping in California, Chapter 1. In: Barbour, M.G., T. Keeler-Wolf and A. Schoenherr (eds.) *Terrestrial Vegetation of California*, Third Edition. University of California Press. Berkeley and Los Angeles.
- Barbour, M.G., T. Keeler-Wolf and A. Schoenherr (eds.) 2007. *Terrestrial Vegetation of California*, Third Edition. University of California Press. Berkeley and Los Angeles.
- Ornduff, R, P. Faber, and T. Keeler-Wolf. 2004. Introduction to California Plant Life. *California Natural History Guide* 69. University of California Press.
- Sawyer, J.O., T. Keeler-Wolf, and J. Evens. 2009 (in press). *A manual of California Vegetation*, Second edition . California Native Plant Society. Sacramento.
- Thorne, J.H., J. Kennedy, J. F. Quinn, M. McCoy, T. Keeler-Wolf and J. Menke. 2004 A vegetation map of Napa County using the Manual of California vegetation classification and its comparison to other digital vegetation maps. *Madrono*, 51:343–363.

Reports relevant to wetland research:

- Keeler-Wolf, T., K. Lewis, C Roye. 1996. The definition and location of Sycamore Alluvial Woodland in California. Report for the California Department of Water Resources, Sacramento.
- Todd Keeler-Wolf, Diane R. Elam, Kari Lewis, and Scott A. Flint. 1998 California Vernal Pool Assessment Preliminary Report. available on following website:
- Keeler-Wolf, T., C. Roye, and K. Lewis. 1998. Vegetation mapping and classification of the Anza-Borrego Desert State Park, California. Unpublished report on file at California Dept Fish and Game, Natural Diversity Database, Sacramento.
- Keeler-Wolf, T., M. Vaghti & A. Kilgore. 2000. Vegetation Mapping of Suisun Marsh, Solano County – A Report to the California Department of Water Resources. Unpublished administrative report on file at Wildlife and Habitat Data Analysis Branch, California Department of Fish and Game, Sacramento.

Draft TAT description Version 5

Classification of the Vegetation of Yosemite National Park and Surrounding Environs in Tuolumne, Mariposa, Madera and Mono Counties, California

Classification of the Vegetation of Point Reyes National Seashore Golden Gate National Recreation Area, Samuel P. Taylor, Mount Tamalpais, and Tomales State Parks, Marin, San Francisco, and San Mateo Counties, California Association for Biodiversity Information In Cooperation with The California Native Plant Society and California Heritage Program Wildlife and Habitat Data Analysis Branch California Department of Fish and Game 1307 R Street, Room 202 Sacramento, CA 95814 Revised June 2003

Vaghti, M. and T. Keeler-Wolf. 2004. Suisun Marsh Vegetation Mapping Change Detection 2003. A Report to the California Department of Water Resources Unpublished report Wildlife Habitat Data Analysis Branch Department of Fish and Game, Sacramento.

Hickson D. and T Keeler-Wolf, 2006 Sacramento-San Joaquin River Delta Vegetation and Land Use Mapping and Classification Project. BIOS website

Professional Committees:

Chair of California Native Plant Society Vegetation Committee and Program Director of Vegetation Program (since 1995) See CNPS website:

Chair: California State Interagency Vegetation Memorandum of Understanding Committee on Vegetation mapping and classification standardization (see ceres website)

Member: International Vegetation Hierarchy Working Group since 2003

Member: Ecological Society of America; Vegetation Panel since 2006

APPENDIX B: TAT Members' Abbreviated Biographies (Continued)

Ben Livsey

San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Su. 1400
Oakland, CA 94612
(510) 622-2300

EDUCATION

Master of Environmental Science and Management (June 2005)

Water Resources Management Specialization

Donald Bren School of Environmental Science & Management – University of California, Santa Barbara

Group Thesis: Use of Bioassessment to Evaluate Aquatic Ecosystem Conditions and Responses to Anthropogenic Activity in Los Padres National Forest

Related Courses: Watershed Analysis, River Systems, River Restoration, Environmental Impact Analysis, Water Law and Policy, Ecology of Running Waters, Sustainable Watershed Quality Management, Data Analysis for Environmental Science and Management, Economics of Environmental Management

Bachelor of Arts in Environmental Studies and Geography (August 2001)

University of California, Santa Barbara

EXPERIENCE

Environmental Specialist, San Francisco Estuary Project, Oakland, CA (9/05 – present)

- Acting as project manager to develop stream, wetland, and riparian area protections for the North Coast and San Francisco Bay Regional Water Quality Control Boards.
- Researching and developing supporting environmental documents (including draft Basin Plan amendment language, scientific justification, economic analysis, and CEQA analysis).
- Presenting information to the public, organizing public meetings, and responding to stakeholder inquiries.
- Coordinating stream and wetland protection efforts with state and federal agencies.
- Reviewing and commenting on state policies and local plans, ordinances, and CEQA documents.

Fisheries Biologist, Questa Engineering Corporation, Santa Barbara, CA (12/04 – 9/05)

- Assisted in developing a restoration project prioritization method for anadromous Tri-County streams.
- Prioritized fish passage barrier restoration projects for Tri-County streams.
- Conducted fish passage barrier and habitat assessment surveys.
- Developed water quality summary and supporting GIS maps for City of Santa Barbara Watershed Plan.

Biologist, US Forest Service, Los Padres National Forest, Santa Barbara, CA (6/04 – 9/04)

- Performed data analysis on bioassessment survey data to determine the condition of 40 Los Padres streams.
- Analyzed bioassessment results to evaluate land use effects on watershed conditions in Los Padres.
- Determined the suitability of 2 separate bioassessment models for use in the Los Padres National Forest.
- Conducted macroinvertebrate and habitat assessment surveys in Los Padres streams.

Biologist, Lake Cachuma Operations and Maintenance Board, Santa Barbara, CA (6/01 – 7/02)

- Assisted biologists in monitoring populations of endangered Southern Steelhead and habitat conditions in the Santa Ynez River downstream of Bradbury Dam.
- Proficient on proper Salmonid handling techniques (measuring length, removing scales, and collecting tissue samples) for the Lake Cachuma migrant trapping/biological assessment data collection program.
- Conducted habitat surveys, snorkel surveys, bank surveys, flow surveys, water quality surveys, spawning surveys, and redd surveys.

APPENDIX B: TAT Members' Abbreviated Biographies (Continued)

Chad Roberts

EDUCATION

Bachelor of Arts (honors) in zoology; December 1969. Humboldt State College, Arcata, California.
Doctor of Philosophy in ecology; September 1976. University of California, Davis, California.

Professional Certifications

Senior Ecologist, Ecological Society of America Board of Professional Certification. Certified 1982; recertified 1987; recertified 1992; recertified 1997; recertified 2002; recertified 2007.

Professional Wetland Scientist (No. 268); certified by the Society of Wetland Scientists Professional Certification Program 1995; certification renewed 2007.

Professional Affiliations

Ecological Society of America (life); Society of Wetland Scientists (life); Cooper Ornithological Society (life); American Ornithologists' Union; American Association for the Advancement of Science; Pacific Seabird Group (life); Society for Conservation Biology; California Native Plant Society (life); Coastal and Estuarine Research Federation.

Professional Experience

Planner, Humboldt Bay Harbor, Recreation and Conservation District. The District Planner is an appointed officer of the District, responsible to the Board of Commissioners and the Executive Director for selected environmental and procedural elements of District business. September 2006 to present.

North Coast Regional Team Leader, California Wetland Demonstration Project. Statewide ambient estuarine wetland survey project of the California Resources Agency and the U.S. Environmental Protection Agency. June 2007 to December 2008.

President, Western Chapter, Society of Wetland Scientists (SWS); ex officio voting member, SWS Board of Directors. January 2001 to June 2007.

Member, Ad Hoc SWS Committee to Develop White Paper Regarding Wetlands and West Nile Virus. Society of Wetland Scientists. March 2004 to June 2007.

Chair, California Steering Committee, Pacific Coast Joint Venture, North American Waterfowl Management Plan. May 1991 to July 1998.

Instructor, Resources Planning, Humboldt State University, Arcata, California. Coursework covered (a) the application of landscape and conservation ecology to resources planning and (b) environmental documentation practices. January 1997 to May 1998.

Selected Papers and Presentations

Sutula, M, JN Collins, R Clark, C Roberts, E Stein, C Grosso, A Wiskind, C Solek, M May, K O'Connor, E Fetscher, JL Grenier, S Pearce, A Robinson, C Clark, K Rey, S Morrisette, A Eicher, R Pasquinelli, and K Ritter. 2008. *California's Wetland Demonstration Program Pilot – A Final Project Report to the California Resources Agency.* Tech Rep 572, Southern California Coastal Water Research Project, Costa Mesa, CA.

Roberts, RC. 2003. *Reconciliation ecology and wetlands.* Bulletin of the Society Wetland Scientists 20(3):29-30.

Hydrology and floodplain ecology, Mill Creek, McKinleyville, Humboldt County. Presented session paper at the Riparian Habitat Joint Venture/TWS-Western Section 2001 Riparian Habitat and Floodplains Conference, Sacramento. March 2001.

Approaches for dealing with the effects of runoff intensification in urbanizing watersheds. Presented session paper, Second Western Regional Urban Streams Conference, San Luis Obispo. April 1999.

Roberts, RC. 1997. ***Planning as if watershed conditions mattered.*** Watershed Management Council Networker 7(1): 7, 13.

Ray, D, W Woodroof, and RC Roberts. 1984. ***Management of riparian vegetation in the North Coast region of California's coastal zone.*** Pages 660-672 in: R.E. Warner and K. Hendrix (ed.); *California Riparian Systems*; University of California Press.

Selected Technical Reports and Environmental Documents

Humboldt Bay Management Plan and Environmental Impact Report (EIR). The Plan addresses port-related, recreation, and natural-environment setting and policy sections that provide a 20-year planning framework for Humboldt Bay. Included EIR (see below). Prepared for the *Humboldt Bay Harbor, Recreation and Conservation District*. April 2005 to April 2006.

Reconnaissance-level biological report – Recycled-Water Seasonal Storage Project. Preliminary biological screening studies for approximately 1200 acres in seven potential recycled-water reservoir locations and connecting pipeline routes in a landscape region covering approximately 50 square miles in western El Dorado and eastern Sacramento counties. Prepared for *El Dorado Irrigation District*. November 2004.

Draft EIR for the *Martin Slough Interceptor Project*; 16,000 feet of new collector line from 16 existing lift stations, new 11,100-foot gravity interceptor, new lift station, and 10,000 feet of new force main, in wetlands in the Martin Slough valley near Humboldt Bay. Prepared for *City of Eureka* Community Development and Engineering Departments. May 2004.

Wetland summary report, Point Saint George Management Plan. Prepared for the *County of Del Norte* and the *California State Coastal Conservancy*. August 2003.

Draft EIR, Lake Earl Management Plan. Programmatic environmental document covering the Management Plan's implementation, which proposed formally adopting a "managed" elevation of eight feet (8') for the lagoon surface for the 5,600-acre Lake Earl Wildlife Area. Prepared for the *California Department of Fish & Game*. June 2003.

Draft EIR, wetland delineation, and mitigation design for the *Mad River Water Pipeline Rehabilitation Project*; seven miles of new pipeline in seasonal wetlands (with three miles of new pipeline in uplands and two miles of pipeline lining in uplands). Prepared for *City of Eureka* Community Development and Engineering Departments. December 2001.

Technical and procedural CEQA services for the *Coast Seafoods oyster mariculture program*, including programmatic study process for a 5-year impact analysis review. Prepared for the *Humboldt Bay Harbor, Recreation and Conservation District*. May 1999 through ultimate project approval in July 2007.

Draft EIR, Airport Business Park, McKinleyville. Included onsite and offsite biological and hydrological/NPS water quality effects, for 53-acre business/industrial park. Prepared for the *Humboldt County Planning Department*. June 1997.

Report on hydrology and aquatic/floodplain ecology in the Mill Creek watershed, McKinleyville. The report provided hydrological assessments for the basin, natural community descriptions, wetland identifications, and recommendations for maintaining these features. Prepared for the *California Department of Fish & Game*. March 1995.

APPENDIX B: TAT Members' Abbreviated Biographies (Continued)

Eric Stein

Principal Scientist
Southern California Coastal Water Research Project
Costa Mesa, California, 92626

Phone: (714) 755-3233
Fax: (714) 755-3299
Email: erics@sccwrp.org

EDUCATION:

D.Env. Environmental Science and Engineering, University of California, Los Angeles, 1995
M.Ed. Science Education, University of California, Los Angeles, 1988
B.S. Biology, University of California, Los Angeles, 1987

EXPERTISE:

As head of the Watershed Department at the Southern California Coastal Water Research Project (SCCWRP), Dr. Stein oversees a variety of projects related to stormwater and mass emissions monitoring, remote sensing, watershed and water quality model development, hydromodification assessment, regional monitoring, and assessment of wetlands and other aquatic resources. Before joining SCCWRP Dr. Stein worked as both a private consultant and for the Regulatory Branch of the Los Angeles District Corps of Engineers on issues related to wetlands and water quality management and regulation. Dr. Stein's experience includes wetland delineation, design of mitigation and restoration projects, development of monitoring programs, establishment of mitigation banks, and landscape-scale assessment.

EXPERIENCE:

2002 – Present	Principal Scientist - Southern California Coastal Water Research Project
1998 – 2002	Adjunct Associate Professor - California State University, Los Angeles, Department of Geography and Urban Analysis
1998 – 2002	Principal Ecologist, Associate Principal - PCR Services Corporation
1993 – 1998	Biologist, Senior Project Manager - U.S Army Corps of Engineers, Los Angeles District,

PROFESSIONAL SERVICE:

- Southern California Wetlands Recovery Program Science Advisory Panel (1999-Present).
- NOAA National Estuary Eutrophication Workgroup (2006)
- NOAA Water Quality Synthesis & Assessment (SAM) Technical Advisory Committee (2006-Present)
- Society of Wetland Scientists, Western Chapter President (2006-Present)
- US Army Corps of Engineers – National Workgroup on Arid Stream Assessment (2007)
- California State Stream and Wetland Protection Policy Science Advisory Team (2009)

SELECTED JOURNAL PUBLICATIONS:

Stein, E.D., A.E. Fetscher, R.P. Clark, A. Wiskind, J.L. Grenier, M. Sutula, J.N. Collins, and C. Grosso (2009 in press). Validation of a Wetland Rapid Assessment Method: Use of EPA's Level 1-2-3 Framework for Method Testing and Refinement. *Wetlands*, 29(2).

Stein, E.D. and D.B. Cadien (2009 in press). Ecosystem Response to Regulatory and Management Actions: the Southern California Experience in Long-term Monitoring. *Marine Pollution Bulletin*.

- Tiefenthaler, L.L, E.D. Stein, and G.S. Lyon (2009 in press). Fecal Indicator Bacteria (FIB) Levels During Dry Weather from Southern California Reference Streams. *Environmental Monitoring and Assessment*.
- Lyon, G.S. and E.D. Stein (2009 in press) How Effective Has the Clean Water Act Been at Reducing Pollutant Mass Emissions to the Southern California Bight over the Past 35 Years? *Environmental Monitoring and Assessment*.
- Nezlin, N.P., K.K. Kamer, J. Hyde, and E.D. Stein. 2009. Dissolved Oxygen Dynamics in a Eutrophic Estuary, Upper Newport Bay, California. *Estuarine, Coastal and Shelf Science* 82:139-151.
- Yoon, V.K. and E.D. Stein. 2008. Natural Catchments as Sources of Background Levels of Storm Water Metals, Nutrients, and Solids. *Journal of Environmental Engineering* 134(12):961-973.
- Stein, E.D. and B. Bernstein. 2008. Integrating Probabilistic and Targeted Compliance Monitoring for Comprehensive Watershed Assessment. *Environmental Monitoring and Assessment* 144:117-129.
- Ackerman, D. and E.D. Stein. 2008. Evaluating the Effectiveness of Best Management Practices Using Dynamic Modeling. *Journal of Environmental Engineering* 134(8):628-639.
- Stein, E.D. and V.K. Yoon. 2008. Dry Weather Flow Contribution of Metals, Nutrients, and Solids from Natural Catchments. *Water Air and Soil Pollution* 190:183-195.
- Ackerman, D. and E.D. Stein. 2008. Estimating the Confidence of Land Use and Imperviousness Relationships at a Regional Scale. *Journal of the American Water Resources Association* 44(4):996-1008.
- Nezlin, N.P., K. Kamer, and E.D. Stein. 2007. Application of Color Infrared Aerial Photography to Assess Macroalgal Extent in an Eutrophic Estuary, Upper Newport Bay, California. *Estuaries and Coasts* 30(5):855-868.
- Stein, E.D. and D. Ackerman. 2007. Dry Weather Water Quality Loadings In Arid, Urban Watersheds of the Los Angeles Basin, California, USA. *Journal of the American Water Resources Association* 43:398-413.
- Stein, E.D. L.L. Tiefenthaler, and K. Schiff. 2006. Watershed-Based Sources Of Polycyclic Aromatic Hydrocarbons (PAH) In Urban Storm Water. *Environmental Toxicology and Chemistry* 25:373-385.
- Sutula, M.A., E.D. Stein, J.N. Collins, and A.E. Fetscher. 2006. Key Considerations For Developing a Wetlands Rapid Assessment Method: California's Experience. *Journal of the American Water Resources Association* 42:157-175.
- Nezlin N.P, P.M. DiGiacomo, E.D. Stein, and D. Ackerman. 2005. Stormwater Runoff Plumes Observed by SeaWiFS Radiometer in Southern California Bight. *Remote Sensing of Environment* 98:494-510.
- Stein, E.D., and L.L. Tiefenthaler. 2005. Dry-Weather Metals and Bacteria Loading in an Arid, Urban Watershed: Ballona Creek, California. *Water, Air, and Soil Pollution* 165:367-382.
- Nezlin, N.P. and E.D. Stein. 2005. Spatial and Temporal Patterns of Remote-sensed and Field-measured Rainfall in Southern California. *Remote Sensing of the Environment* 96:228-245.
- Stein, E.D., M. Mattson, A.E. Fetscher, and K.J. Halama. 2004. Influence of Geologic Setting on Slope Wetland Classification and Hydrodynamics. *Wetlands* 24:244-260.
- Stein, E.D. and R.F. Ambrose. 2001. Landscape-Scale Analysis and Management. of Cumulative Impacts to Riparian Ecosystems: Past, Present, and Future. *Journal of the American Water Resources Association* 37:1597-1614.
- Stein, E.D., F.T. Tabatabai, and R.F. Ambrose. 2000. Wetland Mitigation Banking: A Framework for Crediting and Debiting. *Environmental Management* 26:233-250.
- Stein, E.D. and R.F. Ambrose. 1998. A Rapid Impact Assessment Method for Use in a Regulatory Context. *Wetlands* 18:379-392.
- Stein, E.D. and R.F. Ambrose. 1998. Cumulative Impacts of Section 404 Clean Water Act Permitting on the Riparian Habitat of the Santa Margarita, CA Watershed. *Wetlands* 18:393-408.

Draft TAT description Version 5

- Stein, E.D., Y. Cohen, and A.M. Winer. 1996. Environmental Distribution and Transformation of Mercury Compounds. *Critical Reviews in Environmental Science and Technology* 26:1-43.
- Stein, E.D. and J.M. Diamond. 1989. Do Dietary Levels of Pantothenic Acid Regulate its Intestinal Uptake in Mice? *Journal of Nutrition* 119:1973-1983.
- Stein, E.D., S.D. Chang, and J.M. Diamond. 1987. Comparison of Different Dietary Amino Acids as Inducers of Intestinal Amino Acid Transport. *American Journal of Physiology* 252:626-635.

COLLABORATORS (within the last 36 months):

B. Bledsoe (Colorado State University), R. Ambrose (UCLA), K. Stolzenbach (UCLA), B. Jones (USC), T. Longcore (USC), S. Dark (Ca. State University Northridge), T. Hogue (UCLA), J. Warrick (USGS), J.H. Dorsey (Loyola Marymount University)

THESIS ADVISOR & POSTGRADUATE-SCHOLAR SPONSOR: I. Irvine (UC Irvine), B. Hawley (Colorado State University), V. Yoon (UCLA), S. Lee (UCLA), D. Cummings (CSULA), L. Morales (CUSLA)

APPENDIX B: TAT Members' Abbreviated Biographies (Continued)

Ralph W. Tiner

UNIVERSITY ADDRESS

Department of Plant, Soil, and Insect Sciences
Stockbridge Hall
University of Massachusetts
Amherst, MA 01003
rtiner@pssci.umass.edu

FEDERAL AGENCY ADDRESS

U.S. Fish and Wildlife Service
Northeast Region (ES/NWT)
300 Westgate Center Drive
Hadley, MA 01035
Ralph_Tiner@fws.gov

EDUCATION

University of Connecticut, B.A. Biology (1970)
College of Liberal Arts & Sciences, Storrs, CT

University of Connecticut, M.S. Marine Biology (1974)
Marine Science Program, Storrs, CT

Harvard University, M.P.A. Environmental Policy and Public Agency Management (1981)
Kennedy School of Government, Cambridge, MA

University of Massachusetts, Additional upper graduate level coursework
Department of Forestry and Management, Amherst, MA

PROFESSIONAL EXPERIENCE (Non-Federal)

- | | |
|--------------|--|
| 2005-Present | Adjunct Professor, Virginia Polytechnic Institute and State University, Crop and Soil Environmental Sciences, Blacksburg, VA. Assist in preparing research proposals and conducting wetland-related studies. |
| 1992-Present | Adjunct Professor, Department of Plant & Soil Sciences, University of Massachusetts, Amherst, MA. Teaches courses in wetland delineation, classification, plant identification, and ecology and advises graduate students. |
| 1994 - 1996 | Wetland Scientist, Massachusetts Wetlands Restoration & Banking Program, Executive Office of Environmental Affairs, Boston, MA. Provided scientific expertise to establish state's watershed-based wetlands restoration program. |
| 1975 - 1977 | Section Leader, Environmental Evaluations for South Carolina Wildlife and Marine Resources Department, Charleston, SC. Directed state review of state and federal permit applications for proposed construction activities in wetlands and coordinated an inventory of coastal wetlands. |
| 1970 - 1975 | Team Member, Tidal Wetlands Survey for the University of Connecticut, Biological Sciences Group, Storrs, CT. Mapped boundaries for regulatory purposes of the Connecticut tidal wetlands. |

PROFESSIONAL EXPERIENCE (Federal Service)

1977 to Present Regional Wetland Coordinator, U.S. Fish and Wildlife Service Northeast Region, Hadley, MA. Directs the National Wetlands Inventory Program in the Northeast-covering 13 states. Responsible for wetland mapping, trends analysis reporting, conducting watershed and wetland assessments using remote sensing and prepares numerous scientific reports on findings and presents results at various symposia, conferences, and workshops.

Professional Society Membership: Society of Wetland Scientists (professional wetland scientist).

Research: Four primary areas of interest: watershed assessment, soil-vegetation-hydrology interrelationships in wetlands and adjacent nonwetlands, intraspecies plant tolerances of wetness, and wetland trends analysis.

Other Notable Accomplishments: Member of the Federal Interagency Committee for Wetland Delineation that developed the 1989 federal interagency wetland delineation manual – the first technical manual to be authorized for nationwide use by the U.S. Army Corps of Engineers and the U.S. Environmental Protection to identify wetlands subject to the Clean Water Act. Served as wetland expert (2000-2002) on Fresh Waters Work Group by the Heinz Center for Science, Economics, and The Environment to help develop indicators for The State of the Nation’s Ecosystems (2002): the first national report prepared by experts from the government, private sector, environmental organizations, and academia to produce information for decision-makers and the public on how the nation’s ecosystems are changing. Served as Associate Editor for WETLANDS - the Journal of the Society of Wetland Scientists (2000-2002).

Currently serves as U.S. Fish and Wildlife Service’s technical wetland expert on national federal interagency committees dealing with wetland delineation and wetland vegetation and also as a member of the Wetlands Subcommittee of the Federal Geographic Data Committee.

Author of over 200 scientific publications on wetlands including several field guides to wetland identification. Latest book – “Field Guide to Tidal Wetland Plants of the Northeastern United States and Neighboring Canada” (University of Massachusetts Press 2009).

APPENDIX C:
California Wetland Monitoring Workgroup
CHARTER
August 18, 2008

Mission

To improve the monitoring and assessment of wetland and riparian resources through increased coordination and cooperation among state and federal agencies, as well as non-governmental organizations. The workgroup will strive to provide review of the technical and policy aspects of wetland monitoring tool development, implementation and use of data to improve wetland management in California.

Need for the CWMW

The need for comprehensive wetlands monitoring and assessment is articulated by the National Research Council's report on "Compensating for Wetland Losses under the Clean Water Act" (NRC 2001), which called for wetland managers to: 1) conduct ambient monitoring and assessment; 2) create tools to better inform the regulatory and management processes to make them more adaptive and performance-based; 3) provide mechanisms to engage all regulatory programs via consistent approaches and tools; 4) conduct assessment to provide a regional context for decision-making, including evaluation of cumulative impacts; 5) develop a consistent approach to assessment project performance; and 6) provide a common framework and platform for data management and dissemination.

In California, this no single agency has authority over aquatic resources. Regulation and management of wetlands and streams falls under the authority of six state and federal agencies. To add to this complexity, multiple programs within an agency may have authority or regulatory control over wetlands. A need exists to implement standardized monitoring and assessment tools and approaches within state and federal agencies in California. The resultant data can be used to better manage wetland and riparian resources, evaluate program efficacy, and facilitate improved coordination and communication within and between agencies.

Background and Description

The Wetland Monitoring Workgroup (WMW) evolved from a statewide steering committee formed to coordinate among agencies and advise on the development, implementation and routine use of standardized wetland and riparian monitoring tools. This assessment toolkit, standardized statewide, addresses the three tiered framework advocated by USEPA in their Elements: Level 1: Habitat inventory and landscape tools, Level 2: rapid, field-based assessments of condition, and Level 3: intensive measures of condition. As state and federal agencies in California move toward implementation of the toolkit, improved coordination is needed to ensure smooth implementation and maximum utility of data collected.

The WMW, now a subcommittee of the California Monitoring Council, will provide the mechanism for coordination and cooperation among State and Federal Agencies and non-governmental organizations (NGOs) involved in tool development and implementation. The activities of the CWMW will be coordinated with the California Monitoring Council and the

State Water Boards' Surface Water Ambient Monitoring Program (SWAMP), as well as other related efforts.

Membership

Representatives from local, state, tribal and federal agencies, and NGOs participate on the Workgroup. Meetings will be open, informal and consensus driven. The CWMW is lead by three chairs, one each from a state and federal agency and one from a participating NGO.

Scope, Objectives and Anticipated Activities

The CWMW will provide feedback on comprehensive, watershed-based, and cross-programmatic monitoring and associated linkages with resource and regulatory programs involving wetlands and riparian areas. Objectives and anticipated activities for the CWMW are listed below

Objectives

- Evaluate approaches to assess progress towards California's "No Net Loss" policy.
- Enhance coordination, communication and collaboration among various tracking and monitoring programs for data collection, data management, data sharing and assessment.
- Provide concepts and approaches to enhance the collection of consistent and scientifically defensible wetland monitoring data.
- Evaluate performance-based approaches for making decisions regarding investment of resources to improve wetland management in California.
- Evaluate Documentation of the extent and effectiveness of wetland decision making.
- Foster goal-oriented monitoring that supports wetland management.
- Provide suggestions to strengthen project monitoring including evaluations made at impact sites, compensatory mitigation sites, mitigation banks, in-lieu fee programs, and restoration projects.
- Review approaches for establishing a state wetland monitoring strategy.
- Evaluate mechanisms to correlate land use activities and wetland status and trends.
- Review the use of new monitoring and assessment methods and techniques, as appropriate (e.g., probabilistic sampling, bioassessment, etc.).
- Evaluate compensatory mitigation compliance through site visits and increased review of mitigation reports, including providing feedback to agencies and posting results for public review.

Anticipated Activities

The CWMW will provide feedback on efforts to:

- Inventory of existing monitoring, tracking, and assessment programs.
- Develop a comprehensive wetland and riparian area monitoring strategy.
- Prepare an annual report based on tracking and monitoring data, and in so doing, identify data gaps and monitoring and assessment needs.
- Coordinate implementation of the new Compensatory Mitigation Rule under the Clean Water Act Section 404 program in a manner that is integrated with 401 water quality certifications.
- Integrate local and volunteer monitoring with state/regional programs.
- Enhance data management, exchange and compatibility.

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- Coordinate use of environmental indicators.
- Leverage resources for wetland-related projects..
- Advocate for wetland monitoring needs at various levels.

Establish quality review teams to oversee implementation of new methods (e.g., CRAM) and to assess compensatory mitigation site compliance.