



Letter from the President

Hello NorCal SETAC Community, this is your 2010 President, writing to you from a break in the weather in almost-drought-free San Francisco...

When I ran for the NorCal Board of Directors more than two years ago, I had no idea what my duties as assigned would be. I just knew it was time to pay back the Chapter for the good it had done me since I graduated from UC Santa Cruz (1989), looking for work that would combine my love of biology (algal cell biology, in particular) with advocating for environmental protection - the field in which I'd been working since the late 60's and which inspired me to go back to school.

I imagined environmental toxicology and found that it really existed, as evidenced by the exciting Society for Environmental Toxicology and Chemistry meetings I started to attend as a member of the environmental consulting community. When the Northern California chapter formed, I joined immediately and tried to make sure I supported the organization by paying my dues, and attending meetings as I could, sometimes as an audience member, sometimes giving a talk, sometimes taking a class. Whatever my interaction with the NorCal SETAC community, it was always positive and long-lasting; I came away having learned something, met an old friend or made a new contact.

As a Board Member and now President, I've learned even more: what it takes to put on an Annual Meeting; how to think about an organization and its future; how to run an organization on a shoestring by telephone, email and a website. My teachers have been the wonderful and generous volunteers who sit on the Board with me - students, professors, consultants and government workers - taking the time to keep NorCal SETAC not only alive, but kicking.

The highlight of our work together is the 2010 Annual Meeting, at UC Berkeley Clark Kerr Campus on May 12-13 (see the flyer announcement for details). The theme, "Chemicals of Emerging Concern: Challenge of the 21st Century", highlights traditional and new toxicological and chemical methods to assess the subtle and not-so-subtle changes we have made to our environment, as a result of our discharge of endocrine disrupting chemicals into the environment - water, directly, and soil and air perhaps less directly, but still with troubling consequences.

Participants in this year's meeting, in the plenary session, the short courses, and platform and poster sessions, will show us not only where environmental toxicology has been, but where it is going. I look forward to seeing you there!



Eugenia McNaughton
EPA Region 9

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annual meeting

May 12-13, UC Berkeley Clark Kerr Campus



“Contaminants of Emerging Concern: Responding to a 21st Century Challenge”

May 12 Short Courses

Morning Sessions (8:30 am – 12:00 pm)

- Selenium Criteria for Aquatic and Aquatic Dependent Wildlife: Development and Implementation
- PPCPs and EDCs: Strategies for Evaluating the Biological Effects of EDCs to Aquatic Life

Afternoon Sessions (1:00 - 4:30 pm)

- Demystifying Toxicity Tests: Understanding, Interpreting and Using Bioassay QA/QC Results
- Advances in Analytical Methods: Pharmaceutical and Personal Care Products, Brominated Fire Retardants, and Air Analyses

May 13 Plenary, Posters, and Presentations

Registration (opens at 7:30 am)

Plenary Session (9:20 – 11:00 am)

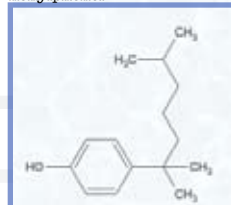
- Dr. Christian Daughton, USEPA, Office of Research and Development, Chief of the Environmental Chemistry Branch, Environmental Sciences Division, Las Vegas, Nevada
- Dr. David Epel, The Jane and Marshall Steel Professor Emeritus of Biological and Marine Sciences, Stanford University, Palo Alto, California
- Dr. Daniel Schlenk, Professor, Aquatic Ecotoxicology, Department of Environmental Sciences, University of California, Riverside

Poster Session (11:00 – 12:00 am)

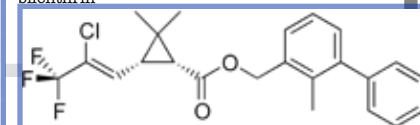
Student – Mentor Lunch (12:00 – 1:00 pm)

Platform Sessions (1:00 -2:30, 3:00 – 4:30 pm)

nonylphenol



bifenthrin



Deadlines

Abstract Submission

- Abstracts submission online (http://www.norcalsetac.org/Abstract_Submission.php)
- Submission and presentation guidelines (http://www.norcalsetac.org/media/2010_NorCal_SETACAbstractGuidelines.pdf)
- Abstracts accepted until **April 16th**
- Notice of acceptance by **April 23rd**

Registration

- On-line registration until **May 11th** (http://www.norcalsetac.org/2010_Meeting.php)
- Discounted pre-registration ends **May 2nd**

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Maternal Transfer And Effects On Larval Striped Bass In The San Francisco Estuary - David J. Ostrach Ph.D.

Aquatic ecosystems around the world face serious threats from anthropogenic contaminants and over the past few decades the world's aquatic environments have been severely impacted by anthropogenic activities. Contaminants from industry, agriculture, urban runoff, and other sources have found their way into the environment affecting all levels of biological organization from the individual to the entire ecosystem (1-3). Consequently, fish species assemblages have shifted (4) and major fish population declines have occurred (5, 6). Understanding the role contaminants play in contributing to these declines is essential and will ultimately help to elucidate their effects on human populations.

Many classes of contaminants can bio-accumulate in muscle and fat tissue. These compounds can affect physiological processes and the overall health and fitness of the individual, possibly leading to population level effects (7). Lipophilic compounds bioaccumulate in fish, wildlife, as well as in human tissues and can be transferred maternally to their offspring producing deleterious effects (8-10). The striped bass (*Morone saxatilis*) population along with other pelagic fish such as delta smelt (*Hypomesus transpacificus*), longfin smelt (*Spirinchus thaleichthys*), and threadfin shad (*Dorosoma petenense*) in the San Francisco Estuary (SFE) have suffered significant declines in the past decades (6, 11).

Striped bass were part of a thriving commercial fishery up to 1935 when striped bass was designated a game fish and restrictions were placed on the sport fishery. The population continued to grow and thrive prior to the first population crash in the 1970's (6), and significant declines followed in the mid 1980's and mid 1990's. The most recent step change raises significant concerns because it has occurred during a period of moderate weather conditions and river flows that typically result in at least minor population recovery (12).

The past three decades of monitoring data and various studies suggest that some factors causing the striped bass population decline occur in the early life stages and prior to the 38mm young of the year index (3, 13, 14), an index that has been used to accurately measure population abundance of striped bass for over 40 years (15).

During this extended period of population decline several factors have been identified as possible causes, indicating that multiple stressors are affecting the aquatic fauna in this dynamic and complex ecosystem: entrainment and death of fish due to water diversions for agriculture and human usage, food limitation and larval starvation, introduced species, climate change, and contaminants (5, 6, 11). However, evidence clearly indicates that starvation is not occurring (14), and that the combined effects of water diversions and introduced species do not account entirely for the recent declines in the population (12).

Contaminant inputs into the San Francisco Estuary are diverse and sources such as agriculture, industry, and urban runoff into the estuary have been well documented for several decades (16, 17). Effects of contaminants on the early life stages of striped bass have been documented since the late 1980s (3, 14), but comprehensive studies investigating contaminant concentrations, exposure, and effects have not been conducted prior to this study.

The study presented here is the first of several ongoing investigations we initiated to determine the contributing effects of timing and route of contaminant exposure, and their physiological and pathological significance on the early life stages of striped bass.

Biologically significant levels of polychlorinated biphenyls, polybrominated diphenyl ethers, and current use/legacy pes-

Dr. Eric Durieux, post-doctoral scholar from France & Tony Vaught of Professional Aquaculture Services holding up a river collected



40 lb. female striped bass post spawning for Ostrach lab maternal transfer and developmental studies.

continued ...

ticides were found in all egg samples from river-collected fish in 1999, 2001 and 2006. Developmental changes previously unseen with standard methods were detected with a novel technique using the principles of unbiased stereology in the studies conducted in 1999 & 2001. The study was repeated using standard morphometric methods due to time and funding constraints in the 2006 & 2007 studies. Abnormal yolk utilization, brain and liver development, and overall growth were observed in larvae from river-collected fish.

Hatchery reared controls from SFE stock cultured striped bass developed normally. Histopathological analyses confirmed and identified developmental alterations in all four years studied. In addition, the more recent studies indicate that problems appear to be getting progressively worse. Severe gross lesions not seen in the earlier studies were found in >90% of 2006 & 2007 larvae from river collected females including; abdominal edema, finfold edema and associated necrosis of the epithelium. Severe histopathological lesions in the brains were also found in >65% of these larvae. None of these gross and histopathological lesions were seen in the control larvae.

This study provides clear evidence of maternal transfer of xenobiotics and their adverse effects on larval striped bass in the San Francisco Estuary. Chemical analysis of unfertilized eggs from Sacramento River collected striped bass indicated that maternal transfer of biologically significant lipophilic compounds occurred in all 35 females in this study (n=12, 2007 egg analysis results are pending). Contaminants found in these eggs included PCBs, PBDEs, current use pesticides, legacy pesticides, and their degradation products.

Our results indicate that pesticides not in use for decades, such as DDT and its degradation products are still persistent in the estuary and are being made bioavailable by recycling through the food chain to apex predators. Concentrations of individual contaminants and mixtures determined in this study have been shown to have adverse effects in a wide



Dr. David Ostrach & Dr. Eric Durieux collecting sperm from a male striped bass for motility and viability studies.

range of animals including mammals, reptiles, amphibians, and fish (20-23). Some of the effects described are: alterations of growth and development (24), poor hatching success (22), alterations of the reproductive and nervous system (25, 26), learning and behavioral deficits retained throughout life (27, 28), abnormalities of the liver and other organ systems (29, 30), and endocrine disruption (29). Studies have also shown that these contaminants in combination can increase adverse effects by several orders of magnitude (32, 33).

In addition to current use pesticides, legacy pesticides, and PCBs, significant levels of PBDEs were also detected in eggs from field-collected female striped bass. This is the first reported finding of maternal transfer of PBDEs in fish in the San Francisco Estuary system, a novel group of environmental contaminants that has recently become the focus of many toxicity studies. PBDEs are used mainly as flame retardants and are found in a variety of materials such as paint, upholstery, carpeting, plastics, textiles, electronic circuits, and insulation (35). Polybrominated diphenyl ethers are now as ubiquitous as PCBs in the aquatic environment, and their levels are rising due to a lack of regulation (35, 36). It is now believed that PBDEs have spread throughout the world's oceans (35, 37), and as a consequence have been found in many aquatic organisms, including fish, where they have bioaccumulated to biologically relevant levels (33).

The San Francisco Estuary is one of the most contaminated aquatic regions worldwide, and studies have shown PBDE levels in breast milk from women living in the San Francisco Bay area up to 100 times greater than those in other regions of the world (8). These compounds have been shown to act as thyroid hormone mimics, induce P450-1A1 and P450-2B2 enzyme systems, have neurotoxic effects, and cause learning and behavioral deficits that remain throughout life in rodents (35). Results presented here support studies indicating PBDE contamination of the San Francisco Estuary (38) and bioaccumulation of these compounds in fish (35). The consequences



Dr. Eric Durieux dissecting field collected female striped bass for health assessment and biomarker studies.

continued ...

of PBDE contamination for wildlife and humans are largely unknown (8, 10) and need to be addressed and mitigated. We concluded that development of river larvae is abnormal, with some processes accelerated (tailfin, notochord, and liver), and others retarded (brain and liver from day three to five post-hatching). Morphometric and histopathological results of yolk, liver, and brain corroborated findings of larval body development. Therefore, just prior to first feeding, these larvae had virtually no source of energy available to search for food or avoid predators. Abnormal liver growth and development in river larvae were extreme.

Chemical analysis of the eggs coupled with the morphometric and histopathological results from the brain and liver indicate that contaminants are maternally transferred, and that compounds may be causing endocrine disruption during early development of the river larvae. Contaminants found in the eggs of river collected females are known endocrine disrupters, and effects observed correspond to endocrine disruption during early development (41, 42).

We suggest that the combination of the abnormal development, yolk deficiency, and an altered shrunken liver devoid of glycogen at day five post-hatching adversely affects subsequent growth and survival of larvae from river-caught females. The findings in the first study were possible through application of a newly developed morphometric method focusing on whole body and organ volumes. Coupled with histopathological analysis, this approach overcomes the shortcomings of other, established methods. It provides much more accurate morphometry, representation of body growth, organ growth, organ development, and organ condition in early-life-stage striped bass larvae.



Dr Eric Durieux & Tony Vaught stripping/collecting eggs from a field captured striped bass to spawn for maternal transfer and developmental studies.

The vast majority of maternal transfer studies in fish have been limited to either analysis of eggs from field-collected animals, or laboratory studies injecting compounds directly into the developing embryo or female (43, 44). These studies are limited to parent compounds, their metabolites, and their effects. These studies fail to reflect the true nature of maternal transfer of complex combinations of xenobiotics affecting fish and wildlife populations. Especially in the aquatic environment today, complex mixtures of xenobiotics, metabolites, and degradation products, not individual compounds, are present and are being bioaccumulated. Accordingly, interactions of complex mixtures detected in the environment may alter effects seen in laboratory studies, and can cause additional problems not observed when compounds are tested individually or in simple mixtures. To understand the effects of maternally transferred xenobiotics in the environment it is vital to determine to what extent these real world complex mixtures are affecting progeny.

These studies demonstrate that complex mixtures of contaminants are being maternally transferred to developing progeny, describes developmental alterations detected using standard methods as well as a new technique, and corroborates these findings with histopathological analyses. Laboratory studies can be designed subsequently to investigate the mechanisms involved and to determine which xenobiotics singly or in combination are causing the observed effects. Decisions can then be made to regulate the use of these compounds and their release into the environment to mitigate problems identified by these studies. The results from this study clearly demonstrate that xenobiotics are adversely affecting early life stage striped bass in the San Francisco Estuary and need to be considered as one of multiple stressors affecting the continuing population decline.

For numbered references, please refer to:

Ostrach, D. J., J. M. Low-Marchelli, et al. (2008). "Maternal transfer of xenobiotics and effects on larval striped bass in the San Francisco Estuary." *Proceedings of the National Academy of Science* 105: 19353-19358.



Water Board Updates – Chris Beegan

Sediment quality objectives for enclosed bays and estuaries were adopted and became effective September 25, 2009 (http://www.swrcb.ca.gov/water_issues/programs/bptcp/sediment.shtml). The State Water Board (SWB) is soliciting data and information regarding water quality conditions of surface waters in California for the development of California's 2012 Integrated Report (http://www.swrcb.ca.gov/water_issues/programs/tmdl/integrated2012.shtml) and initiating the process to develop biological objectives for freshwater streams and rivers in California (http://www.swrcb.ca.gov/plans_policies/biological_objective.shtml#mtg).

On May 4, 2010, the State Water Resources Control Board (State Water Board) plans to consider adopting a statewide policy governing use of coastal and estuarine waters for power plant cooling (once-through cooling policy) (http://www.waterboards.ca.gov/water_issues/programs/npdes/cwa316.shtml#otc).

The State Water Board has developed a new web based information and data sharing portal for California water quality monitoring data and assessment information (<http://www.waterboards.ca.gov/mywaterquality/>). For information about other programs and efforts at the State Water Board please visit: <http://www.swrcb.ca.gov/>

Updates on California Ecotoxicology Biological Technical Assistance Group's (BTAG) New Avian Toxicity Reference Value for Cadmium – Beckye Stanton

The BTAG group has updated the avian toxicity reference value (TRV) for cadmium recommended for use in screening level ecological risk assessments in California. Details on the updated TRV are available on the internet as an "EcoNote" on Department of Toxic Substances Control's Assessing Ecological Risk page (http://www.dtsc.ca.gov/AssessingRisk/eco.cfm#EcoNOTE_6_-_Cadmium), a poster presented at North American SETAC annual meeting (http://www.dfg.ca.gov/ospr/about/science/brac-cercla_posters.html), and a forthcoming publication in Human and Ecological Risk Assessment (accepted for publication February 2010).

student scholarships

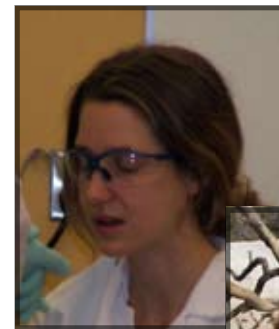


Over a dozen graduate students applied for our 2010 Student Scholarship award, and we are pleased to announce awards were given to Amber Roegner of UC Davis for her proposal "The Evaluation of Comparative Microcystin Congener Acute Toxicity in Freshly Isolated Fish Hepatocytes" and to Priya Ganguli for her proposal titled "Biogeochemical and Hydrological Controls on Mercury Speciation and Transport at the Land-Sea Margin." Amber received \$2,000 and Priya received \$1,000 from NorCal SETAC to assist in their research.



Priya Ganguli

congratulations !



Amber Roegner



career & scholarship opportunities

Individuals Looking for Job or Internship? Companies/Agencies looking for an Employee or Intern? Please send your information to webmaster@norcalsetac.org for posting to this site. Posting is done as a courtesy to our members; information is not verified by the NorCal SETAC Board.

Student Internship, UL Environment, San Jose, CA. The internship is posted at UL.com under careers. The requisition is IRC47411, but if you search the keyword "toxicology" that should pull it up too. This is a good opportunity for someone interested in risk assessment, public health issues, and/or air pollution. We are developing chemical specific exposure limits and I am working on some risk assessment methodology for product emissions testing. Someone considering a career in the public sector might find this to be an exciting position where they can develop skills that will make them more competitive for jobs after graduation

Student Award for Presentations at the Society for Risk Analysis (SRA) Annual Meeting

The SRA Dose-Response Specialty Group (DRSG; <http://www.sra.org/drsg>) is pleased to offer a merit award to a student conducting graduate research in dose-response assessment. The research may be on any topic broadly related to dose-response assessment, including but not limited to laboratory investigation, methods development, comparative analyses, novel applications, studies on strengthening the role of dose-response assessment in risk assessment, uncertainty analysis, harmonization, dosimetry, genetics, and molecular biology. In addition to the peer recognition of the student's scientific accomplishment, the award includes a registration fee waiver to the 2010 SRA Annual Meeting, an engraved plaque, and a \$500 honorarium. The DRSG award winner will present his/her results and receive his/her award at the annual meeting. The award is merit based and competitive. All abstracts must be submitted for presentation at the 2010 SRA Annual Meeting, 5-8 December 2010, in Salt Lake City, Utah following normal SRA guidelines for abstract submission (visit www.sra.org/events_2010_meeting.php for meeting dates, guidelines, and deadlines). A pdf file is available at http://www.sra.org/drsg/DRSG_Student_Award_2010.pdf, for further information, a link to examples of winners' abstracts from previous years, and what must be completed by the abstract submission deadline. Questions concerning the DRSG award procedures should be addressed to Paul Schlosser, PhD, Vice-Chair, DRSG, U.S. Environmental Protection Agency: 919-541-4130; email: schlosser.paul@epa.gov.

NorCal SETAC board of directors



NEW BOARD MEMBERS



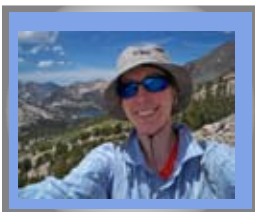
Chris Beegan - State Water Resources Control Board

Chris began his career as a chemistry technician at a commercial laboratory while pursuing his B.S. in Geology at CSULB. In 1990, Chris moved to Sacramento and joined the consulting firm Harding Lawson Associates. There he worked on a wide variety of projects through out California and Nevada stepping away only briefly to work for a small recycling company in the mid 90's. In 1999, Chris transitioned from private consulting to the State Water Board where he has been ever since. For the past seven years Chris has been leading one of the State Water Boards most unique and ambitious efforts; the development of sediment quality objectives for enclosed bays and estuaries, mandated by court order and compliance schedule. The SQOs were adopted by the State Board and became effective in August 2009. Currently Chris is working on Phase II SQOs, which addresses contaminants in sediment that bioaccumulate in the food web potentially posing a risk to humans that consume seafood. Chris also provides support for the California Mussel Watch program, the 303(d) Listing Policy program, Ocean Plan Amendments, Southern California Bite Regional Surveys. At the State Board, previously Chris managed the Marine Bioassay Project, transitioned the Ocean Plans technology based acute toxicity limit to a water quality based limit, organized whole effluent toxicity and dilution model training courses for State and Regional Board Staff and assisted permit writers in evaluating minimum initial dilution for marine discharges.



Alex Francisco, ARCADIS U.S., Inc.

I have been a member of SETAC since 2000 and member of NorCal SETAC since 2003 when I moved to the San Francisco Bay Area. I am a Senior Ecologist at ARCADIS U.S., Inc, where I have worked since completion of my Masters of Environmental Management in 2000. At ARCADIS I serve as a senior lead on a variety of project aspects, primarily related to wetland and stream ecology, throughout the United States. My projects encompass work in the field of ecological risk assessment; jurisdictional waters/wetlands delineations and permitting; wetland and stream restoration and monitoring; special status species permitting; habitat characterization; and aquatic and avian community surveys. At Duke University my Masters in Environmental Management focused on environmental toxicology, chemistry and risk assessment, where I studied the effects of soil chemistry on transport of organic compounds. I received my Bachelors Degree in Biology from College of William and Mary, where my studies focused on ecology, animal physiology and development, and chemistry. NorCal SETAC has provided classes and meetings to keep me on the leading edge of issues in ecological risk assessment and monitoring, and has provided fantastic opportunities to meet local colleagues contributing to our field. I look forward to the prospect of supporting an organization that provides so much opportunity for professional development and contributes immensely to the state of the science.



Jennifer Brennan, U.C. Davis

I am currently at University of California, Davis as a doctoral student in Agricultural and Environmental Chemistry. In addition to analytical chemistry, I am interested in reproduction, specifically how environmental conditions affect receptor function. Other interests include farming, teaching, and finding ways to live more compatibly with the environment. I received a B.S. in biology from James Madison University and a M.S. in Avian Sciences from University of California, Davis. As student representative, I thoroughly look forward to serving NorCal SETAC with enthusiasm and dedication and would like to encourage student interaction during my term.

Other Changes with NorCal SETAC Board

- New President: Eugenia McNaughton
- New Past President: Chris Pincetich
- Outgoing Board Members: Bruce Joab and Judy Nedoff

membership information



THANKS TO OUR MEMBERS !!

Thank you to our new and renewing members. In particular, our sustaining members provide the majority of our operating budget for the annual meeting. Our gratitude and appreciation go out to **Sierra Foothill Laboratories, Chevron, Inc.** and **ToxScan, Inc.** for their continued support of 2010 NorCal SETAC activities and missions at the Bronze Level.

INDIVIDUAL MEMBERSHIPS

Individual Memberships will be complimentary with Annual Meeting registration. Please contact NorCal SETAC to become an individual member exclusive of the annual meeting.

SUSTAINING MEMBERSHIPS

Please support our Chapter as a Sustaining Member for the 2010 calendar year

- * Gold Level supporters contribute \$1500/year
- * Silver Level supporters contribute \$750/year;
- * Bronze Level supporters contribute \$350/year.

These funds will be used for:

- * annual spring meeting and associated short courses
 - * dinner meetings
- * administrative costs such as website and newsletters
 - * student awards & scholarships