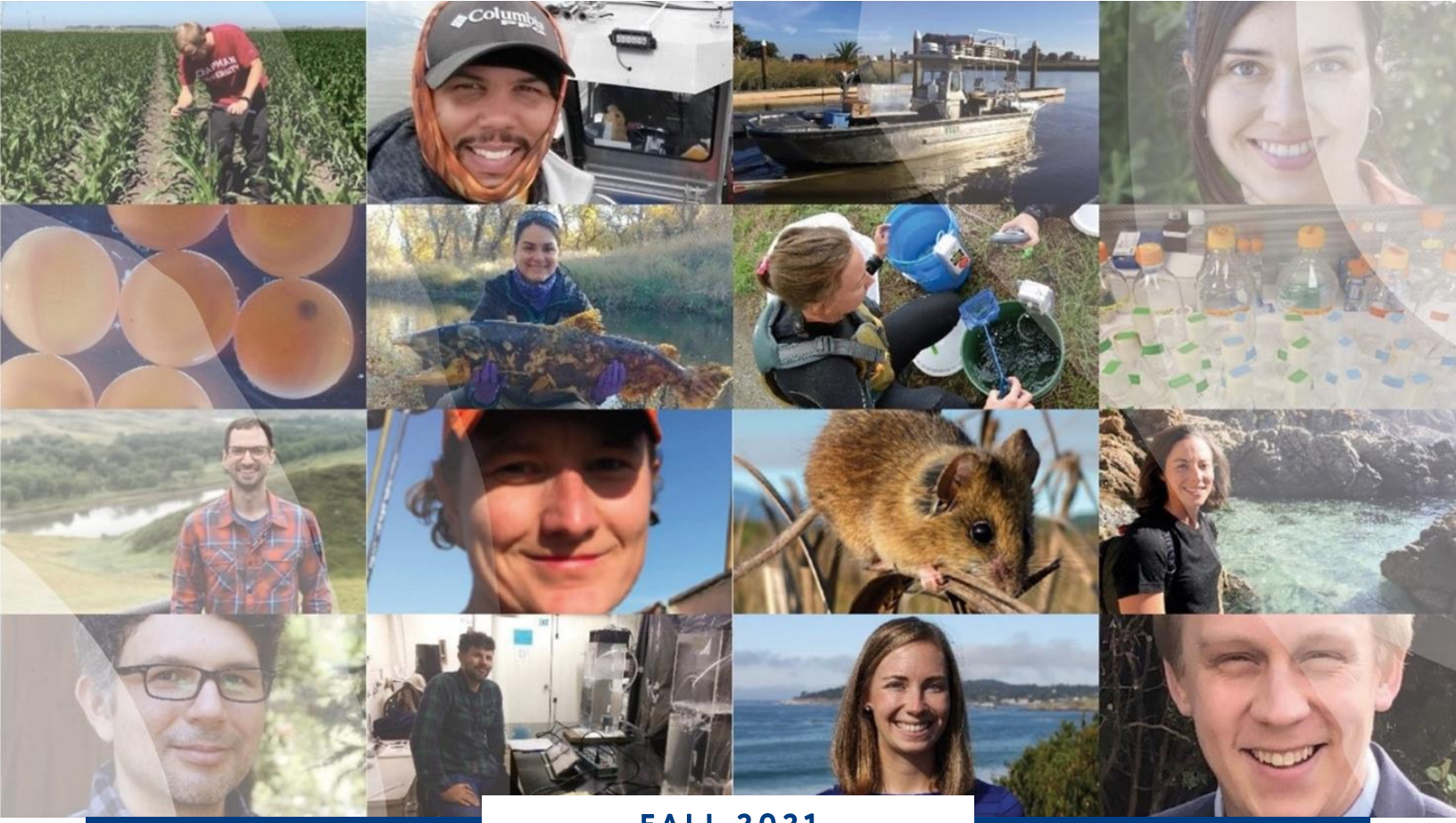


FALL 2021

Delta Breeze

A quarterly newsletter by the Delta Science Program

Delta Lead Scientist "Dear Colleagues"

It is hard to believe that a whole quarter has already passed since our inaugural issue of the Delta Breeze! Here at the Delta Science Program, it has been all-hands-on-deck to get contracts issued for the 2021 Delta Science Proposal Solicitation awards, finalize our curated list of the Delta science community's top priorities for future funding (i.e., the draft 2022-2026 Science Action Agenda, available for public comment through January 21, 2022), and gear up for the 2022 Delta Science Fellowship request for applications.

TOP SCIENCE NEWS

- Dear Colleagues
- Science News
- Events on the Horizon
- #SciComm Corner

Delta Science Program

DELTA STEWARDSHIP COUNCIL

This issue focuses specifically on some of our past Delta Science Fellows and what they have done with their work. The Delta Science Fellowship, administered by the Delta Science Program in partnership with California Sea Grant, is one of our flagship programs and a source of great pride and joy. It endows successful fellows (master's students through postdoctoral scholars) with two years of support for their living, research, and related expenses while connecting them with the broader community of Sacramento-San Joaquin Delta scientists and practitioners. For many of our awardees, it provides wings to let their ideas soar and allows them to establish themselves as researchers who are independent yet connected to broader community needs and goals.

Empowering early-career researchers with funding support is pivotal to the growth of the Delta science community. Previous Delta Science Fellows have gone on to establish labs that are central to interagency science/policy management conversations and have competed successfully in other Delta Science Program funding opportunities. A great example is Dr. Levi Lewis and his Otolith Geochemistry and Fish Ecology Laboratory, profiled in this issue. Outside the boundaries of the Delta, in my discipline of hydrology, I have observed how transformative the empowerment of students can be for the science community. For example, the American Geophysical Union established the Hydrology Section Student Subcommittee (H3S) as part of its organizational structure in 2014. By simply creating this space and platform for students, I have seen explosive growth in the visibility and activity of the student community. Outcomes have included a new Student and Early Career Scientist Conference; the formation of a new Young Hydrologic Society; active engagement of students in issues of Justice, Equity, Diversity, and Inclusion; and a vibrant social media community. Student leaders of H3S have gone on to become leaders in the academic community, and I find myself repeatedly looking to their labs as some of the greatest hubs of innovation in hydrology.

Innovation likewise characterizes the Delta Science Fellows. The students and postdoc researchers profiled in this issue have evaluated how adaptive agricultural practices may combat global climate change, prompted scientists to rethink how nutrients in fertilizer might directly control the bioavailability of mercury, a powerful neurotoxin, and have used tiny bones in the ears of fish to understand which areas of the Delta fish are using. The have also won contests for proposing solutions to grand environmental challenges. Read on for the details (see page 4)!

It has been widely acknowledged that our science community needs to do a better job of growing and supporting the social science disciplines. To that end, I am excited to announce that when our request for Delta Science Fellowship applications goes out in early 2022, it will contain a separate track for social science research, with a dedicated review panel. We look forward to great things from this upcoming class of Delta social science fellows!

Stay tuned this winter for announcements via our website, listserv, and social media about the 2022 Delta Science Fellows request for applications and the online seminar for crafting a successful application. In the meantime, check out the recording from my November 1 Delta Lead Scientist Ask Me Anything Instagram live, which focused on the Delta Science Fellowship and was co-hosted by two-time Delta Science Fellow Dr. Denise Colombano.

Finally, I want to call attention to the release of the draft 2022-2026 Science Action Agenda (SAA) since it is so important to the Delta science funding landscape. The SAA is developed by and for the Delta science community. The draft SAA identifies 25 priority science actions that, if addressed, could help reduce the biggest scientific uncertainties underlying management decisions in the Delta. Working on one of those science actions ensures that our collective work will apply to management in the Delta. Such relevance is required for research projects funded by the Delta Science Program. The previous SAA (i.e., the 2017-2021 SAA) guided science investments to the tune of $35 million by State and federal agencies! Anyone who conducts or has an interest in conducting research in the Delta should take the time to become familiar with the draft 2022-2026 SAA and, if so motivated, seize the opportunity to submit comments to SAA@deltacouncil.ca.gov or to 715 P Street, 15-300, Sacramento, CA 95814 during the public comment period, which ends at 5:00 PM PST on January 21, 2022.

As always, please stay in touch with us! Happy holidays to all, and I will see you in 2022!

Dr. Laurel Larsen
Delta Lead Scientist

Science News

2018 Delta Science Fellows – Where Are They Now?

Since 2003, the Delta Science Program and California Sea Grant have sponsored the Delta Science Fellows Program to foster the next generation of researchers who will advance science that informs the management of the Delta. It is designed to build collaborations across disciplines and between scientists and managers. As fellows plan and conduct their research, they must work with a research mentor, such as a graduate advisor, as well as a community mentor, typically a scientist or engineer involved with Delta programs, agencies, and issues.

Graduate students and postdoctoral researchers are invited to compete for the fellowship. In addition to demonstrating academic excellence, applicants must produce high-quality research proposals that address priority science needs identified in the SAA. Applications are evaluated by panels of academic and agency subject matter experts chaired by the Delta Lead Scientist; fellows are selected based on the applicant's qualifications, the intellectual merit of the application, and the expected ability of the research to address pressing issues in the Delta.

More than 100 scientists have received support through the Delta Science Fellows Program over the past 18 years. Many have continued to work in the San Francisco Estuary, becoming highly-regarded academic and agency scientists who have fundamentally advanced our understanding of the complex natural and human dynamics in the Delta system. Some have become movers and shakers in other places, bringing with them the insight and unique perspectives afforded by the fellowship experience. All have contributed to collaborative, informed management of the Delta system along the way.

This section describes the 2018 Delta Science Fellows projects and significant updates, including new results, publications, and career transitions. It is followed by a recap of our recent conversation with 2016 Delta Science Fellow, Dr. Julie Hopper.

Soil type as a driver of agricultural climate change response in the Sacramento-San Joaquin Delta

Tyler Anthony[1], Whendee Silver[1*], Steven Deverel[2†]

[1]University of California Berkeley

[2]Hydrofocus, Inc.

[*]Research mentor

[†]Community mentor

California's Delta was drained for agriculture over 100 years ago, creating a mix of carbon-rich peatlands rich in organic matter and denser, clay-based soil. The cycling of nutrients through soil is vital for sustaining agricultural production, and understanding nutrient cycling is important for determining greenhouse gas emission pathways from soils. This study aimed to better understand the carbon and nitrogen cycles in drained peatland soils across different agricultural land uses to support adaptive agriculture management practices for a changing climate and to provide data to improve the potential land-based climate mitigation efforts across Delta land uses. This study produced one of the most extensive datasets of greenhouse gas fluxes from drained peatland soils, finding that greenhouse gas emissions varied by year, land use type, and soil mineral content.

Dr. Tyler Anthony is now a postdoctoral scholar at the University of California, Berkeley.

Selected Fellowship Publications

Anthony, T.L, and Silver, W. L. 2021. Hot moments drive extreme nitrous oxide and methane emissions from agricultural peatlands. *Glob. Chang. Biol.*, gcb.15802.

Anthony, T.L., and Silver, W. L. 2020. Mineralogical associations with soil carbon in managed wetland soils. *Glob. Chang. Biol.* 26, 6555–6567.

Hemes, K.S., Chamberlain, S.D., Eichelmann, E., Anthony, T., Valach, A., Kasak, K., Szutu, D., Verfaillie, J., Silver, W.L., and Baldocchi, D.D. 2019. Assessing the carbon and climate benefit of restoring degraded agricultural peat soils to managed wetlands. *Agriculture and Forest Meteorology* 268:202-2014.

Reevaluating ecosystem functioning and carbon storage potential of a coastal wetland through the integration of lateral and vertical carbon flux estimates

Matthew Bogard[1], David Butman[1*], Lisamarie Windham-Myers[2†]

[1]University of Washington

[2]US Geological Survey

[*]Research mentor

[†]Community mentor

In addition to providing important habitat to aquatic and terrestrial plants and animals, coastal brackish wetlands are an important carbon sink. Wetland plants extract carbon from the atmosphere and incorporate it in vegetation and roots, eventually packaging it into sediments. The carbon-rich soil in coastal wetlands has led to great interest in wetland restoration projects for carbon storage. But coastal wetlands also leak carbon out to the ocean in dissolved form, so the extent to which they can store carbon long-term is unclear. This study aimed to produce a more refined model of carbon cycling in the San Francisco Bay-Delta region. An additional goal of this study was to evaluate the role of zooplankton in energy and organic carbon transfer to lower levels of aquatic food webs. Results suggest that brackish tidal marshes play dual roles in carbon cycling: approximately half of the atmospheric carbon dioxide absorbed was stored in wetland soils and half was transported to aquatic environments in the estuary via tidal fluxes. Results also indicate that zooplankton release organic matter into aquatic environments. Together, these results provide insight to help explain how Delta aquatic food webs cycle carbon and nutrients.

Dr. Matthew Bogard is now an Assistant Professor at the University of Lethbridge and serves as a Canada Research Chair.

Fellowship Publications

Johnston, S.E., Finlay, K., Spencer, R.G.M., Butman, D.E., Metz, M., Striegl, R., and Bogard, M.J. *(In press)*. Zooplankton release dissolved organic matter to aquatic environments. *Biogeochemistry.*

Bogard, M.J., Bergamaschi, B., Butman, D.E., Anderson, F., Knox, S., and Windham-Myers, L. 2020. Hydrologic export is a major component of coastal wetland carbon budgets. *Global Biochemical Cycles* 34(8): e2019GB006430.

Vacon, D., Sadro, S., Bogard, M.J., Baulch, H., Lapierre, J.F., Rusak, J., Laas, A., Denfeld, B., Staehr, P., Weyhenmeyer, G., Obrador, B., and del Giorgio, P.A. 2020. Coupled O2-CO2 dynamics in surface waters as integrative insights on lak ecosystem functioning. 2020. *Limnology and Oceanography Letters* 5(4): 287-294.

Multiple stressors in the San Francisco Estuary and watershed: effects of high temperature and low oxygen on the survival and physiology of early life stage Chinook salmon

Annelise Del Rio[1*], Anne Todgham[1*], Rachel Johnson[2†], Ben Martin[2†], Josh Israel[3†],

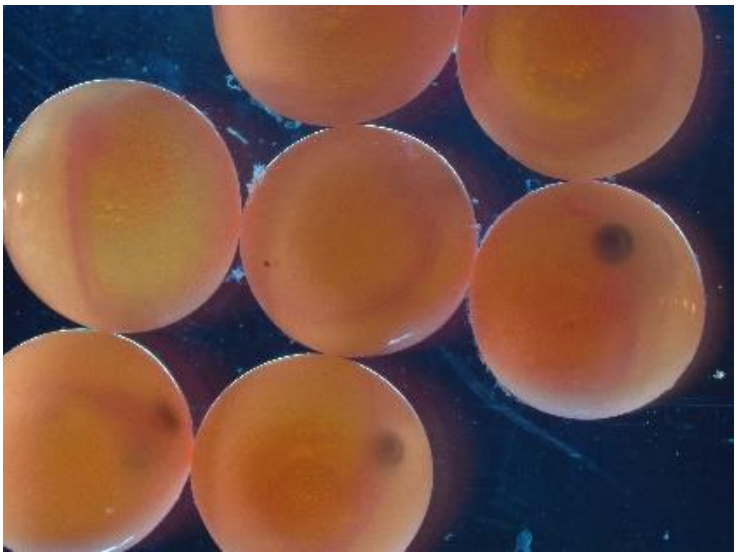
[1]University of California Davis

[2]NOAA Southwest Fisheries Science Center

[3]US Bureau of Reclamation

*Research mentor

†Community mentor



Chinook salmon in California's Central Valley are at risk of extinction and face multiple challenges including competition with humans for water, habitat loss, watershed degradation, and negative effects of hatchery propagation. Climate change is expected to add a new set of stressors for Chinook salmon, including higher water temperatures and decreased oxygen concentrations in waterways. For natural resources managers to help support salmon recovery, it will be important to understand how these climate-related factors interact to affect salmon. Results of field and laboratory experiments indicate that egg quality, temperature, and oxygen chiefly influence spawning success. Elevated temperature and low oxygen negatively impacted embryonic stages with lasting physiological and developmental effects on larval and juvenile stages of salmon progeny.

Dr. Annelise Del Rio is now a scientist with the Puget Sound Partnership.

Fellowship Publication

Del Rio, A.M., Mukai, G.N., Martin, B.T., Johnson, R.C., Fangue, N.A., Israel, J.A., and Todgham, A.E. 2021. Differential sensitivity to warming and hypoxia during development and long-term effects of developmental exposure in early life stage Chinook salmon. Conserv Physiol 9(1): coab054.

Do light, nutrient, and salinity interactions drive the "Bad Suisun" phenomenon? A physiological assessment of biological hotspots in the San Francisco Bay-Delta

Alexis Fischer[1], Raphael Kudela[1*] James Cloern[2†], David Senn[3†]

[1]University of California Santa Cruz

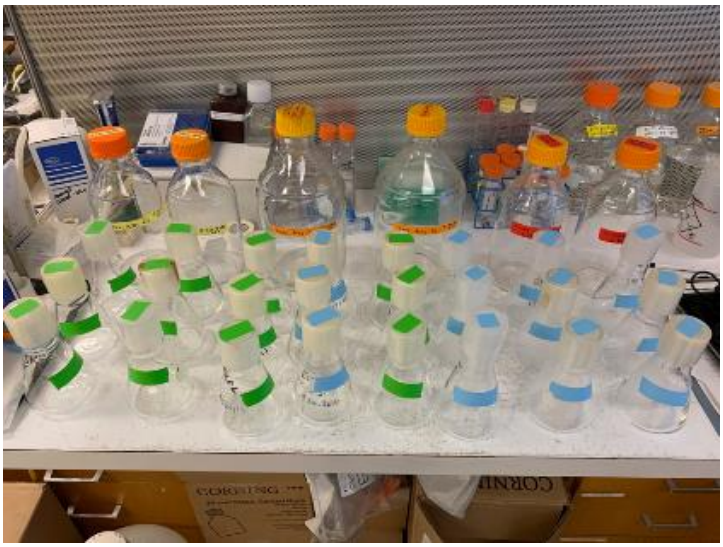
[2]US Geological Survey

[3]San Francisco Estuary Institute

*Research mentor

†Community mentor

The San Francisco Bay-Delta ecosystem has experienced a dramatic decline in pelagic fish since 2001, particularly in Suisun Bay (a phenomenon known as "Bad Suisun"). Research suggests that this decline is caused by reduced phytoplankton biomass, initially attributed to high ammonia concentrations in wastewater effluent and invasive clams that consume phytoplankton. This study also indicates that salinity tolerances of different phytoplankton play an important role in determining regions of high and low biomass. As work moves forward to reduce wastewater nitrogen pollution, understanding the complex mechanisms underlying "Bad Suisun" is important to restoring ecosystem health. Using a combination of historical data analysis and laboratory experiments, this study found that intermediate salinity in Suisun Bay phased out dominant freshwater and marine diatoms, resulting in a phytoplankton "dead zone". Further, the intermediate salinity zone varies seasonally and annually due to differential Delta outflow.



Dr. Fischer is now an Associate Scientist at the University Corporation of Atmospheric Research and a Visiting Scientist at the NOAA Northwest Fisheries Science Center.

Fellowship Publication

Fischer, A.D., Berg, G.M., Hayashi, K., and Kudela, R.M. (In prep). Spatial and seasonal patterns of environmental variables and Phytoplankton photosynthetic efficiency from the Sacramento River to Suisun Bay, California.

Simulating methylmercury production and transport at the sediment-water interface to improve the water quality in the Delta

Stefanie Helmrich[1], Peggy O'Day[1*], Charles Alpers[2†]

[1]University of California Merced

[2]US Geological Survey

[*]Research mentor

[†]Community mentor

Mercury pollution in the Bay-Delta is deep-rooted, dating back to the California Gold Rush. Elevated levels of methylmercury – a dangerous form of mercury that gets concentrated as it moves up the food web – have been detected in birds and fish, including sport fish. To protect wildlife and human health, resource managers need an improved understanding of how environmental conditions influence the formation of methylmercury. This study sought to improve basic knowledge of mercury cycling and aid the management of methylmercury production in the Delta. By creating a model to describe and quantify mercury cycling in Delta sediments, this study found that major elements such as sulfur and iron influence methylmercury production. Contrary to previous research, this study found that more sulfide in the environment increases mercury availability and methylmercury production.

Stefanie Helmrich is a Ph.D. Candidate at the University of California Merced.

Fellowship Publication

Helmrich, S., Vlassopoulos, D., Alpers, C.N., and O'Day, P. (*In Press*). Critical review of mercury methylation and methylmercury demethylation rate constants in aquatic sediments for biogeochemical modeling. *Critical Reviews in Environmental Science and Technology.*

Defining habitat quality for young-of-year Longfin Smelt: Historical otolith-based reconstructions of growth and salinity history in relation to geography, climate, and outflow

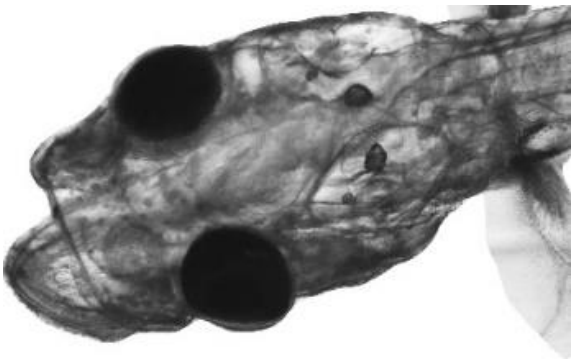
Levi Lewis[1], James Hobbs[1*], Randy Baxter[2†]

[1]University of California Davis

[2]California Department of Fish and Wildlife

[*]Research mentor

[†]Community mentor



Recent population declines in threatened Longfin Smelt have been tied to a variety of factors, including reduced freshwater outflow and food availability. However, more information is needed on the early life stages of these fish and how growth and survival are impacted by environmental conditions. New methods that link age and chemical analyses of otoliths allow for detailed reconstructions of the environmental conditions experienced by even long-dead specimens. These new approaches enable researchers to gain extensive information on an individual fish's prior movements and life history. Using new otolith-based tools on archived Longfin Smelt specimens from the San Francisco Estuary, this study found that Longfin Smelt in the Estuary exhibited several life-history strategies. Specifically, while most migrated from freshwater to higher salinity water after hatching, there was wide variation in the locations and the salinity of waters where they hatched or were reared.

Dr. Levi Lewis is now a Professional Researcher and Principal Investigator of the Otolith Geochemistry and Fish Ecology Laboratory at the University of California, Davis.

Selected Fellowship Publications

Lewis, L.S, Denney, C., Willmes, M., Xieu, W., Fichman, R., Zhao, F., Hammock, B., Schultz, A., Fangue, N.A., and Hobbs, J.A. 2021. Otolith-based approaches indicate strong effects of environmental variation on growth of a critically endangered estuarine fish. *Marine Ecology Progress Series* 676:37-56.

Lewis, L.S., Willmes, M., Barros, A., Crain, P., and Hobbs, J. 2020. Silicon Valley's threatened Longfin Smelt: evidence of spawning and recruitment in a restored tidal wetland. *Bulletin of the Ecological Society of America*. 101(1): e01628.

Lewis, L.S., Willmes, M., Barros, A., Crain, P., and Hobbs, J. 2019. Newly discovered spawning and recruitment of threatened Longfin Smelt in restored and under-explored tidal wetlands. *Ecology* 101(1): e02868.

Habitat, hatcheries, and non-native predators interact to affect juvenile salmon behavior and survival

Megan Sabal[1], Eric Palkovacs[1*], Steve Lindley[2†]

[1]University of California Santa Cruz

[2]NOAA Southwest Fisheries Science Center

[*]Research mentor

[†]Community mentor

Chinook salmon are an economically, culturally, and environmentally significant species in California. In the Sacramento River, the winter-run Chinook population is endangered, and there is strong interest in restoring these populations. To do so, resource managers need to better understand the pressures on wild populations such as predation, which is not fully quantified. Managers need information on how predators affect juvenile salmon behavior, how behaviors might vary under different conditions, and how they scale up to affect populations. This study used a combination of field and modeling approaches to explore how non-native bass affect hatchery and wild juvenile salmon behavior on the Lower Mokelumne River. Results showed that wild, but not hatchery, salmon reacted to bass predator replicas, and the strength and timing of predator avoidance behaviors depended on habitat structure. Further, modeling results indicate that predation responses during migration can have downstream effects on ocean arrival timing, energetic condition, and adult salmon returns.

Megan Sabal is a Ph.D. Candidate at the University of California Santa Cruz.

Selected Fellowship Publications

Sabal, M.C., Workman, M.L., Merz, J.E., and Palkovacs, E.P. 2021. Shade affects magnitude and tactics of juvenile Chinook salmon antipredator behavior in the migration corridor. *Oecologia* 197: 89-100.

Sabal, M.C., Boyce, M.S., Charpentier, C.L., Furey, N.B., Luhring, T.M., Martin, H.W., Melnychuk, M.C., Srygley, R.B., Wagner, C.M., Wirsing, A.J., Ydenberg, R.C., and Palkovacs, E.P. 2021. Predation landscapes influence migratory prey ecology and evolution *Trends in Ecology and Evolution* 36(8): 737-749.

Sabal, M.C., Merz, J.E., Alonzo, S.H., and Palkovacs, E.P., 2020. An escape theory model for directionally moving prey and an experiment test with juvenile Chinook salmon. *Journal of Animal Ecology* 89(8): 1824-1836.

Investigation of the resilience of the salt marsh harvest mouse and best management practices in response to climate change

Katherine Smith[1], Douglas Kelt[1*], Laureen Barthman-Thompson[2†]

[1]University of California Davis

[2]California Department of Fish and Wildlife

[*]Research mentor

[†]Community mentor

The salt marsh harvest mouse is an endangered species that lives in San Francisco Estuary marshes. It is primarily threatened by habitat loss, and while millions of dollars are spent performing tidal restoration every year, there is little data on how the species responds to restoration. Further, little is known about how climate change, including extreme annual climate cycles and sea-level rise, will affect the mouse. This study aimed to investigate the responses of the mouse to these stressors in order to inform the creation of upland refuge during tidal restoration. Survey efforts during king tides throughout the estuary failed to reveal evidence of the long-assumed mass exodus of mice into uplands. This new knowledge motivated several new field efforts that sought to determine effective and feasible methods of creating refuges on the marsh plain, such as elevated refuges that are resistant to colonization by more aggressive upland competitors. Dr. Smith has partnered with the USFWS to analyze range-wide data and develop the first-ever comprehensive tidal marsh restoration guidelines for the mouse.

Dr. Katherine Smith is now a Wildlife Biologist at WRA Inc. Environmental Consultants and an Affiliate Researcher at the University of California, Davis.

Selected Fellowship Publications

Smith, K.R., Riley, M.K., Barthman-Thompson, L.M., and Estrella, S.A. (*In press*). Saving the incredible salt marsh harvest mouse! *Frontiers for Young Minds.*

Trombley, S., Barthman-Thompson, L., Riley, M., Estrella, S., Smith, K., Clifford, D., Foley, P., Foley, J., and Kelt, D. (*In press*). Parasites of an endangered harvest mouse (*Reithrodon tomys raviventris halicoetes*) in a northern California marsh. *Journal of Wildlife Disease.*

Smith, K.R.,and Kelt, D.A., 2019. Waterfowl management and diet of the salt marsh harvest mouse. *Journal of Wildlife Management* 83(8): 1687-1699.

Effects of copper exposure on the olfactory response of Delta Smelt (*Hypomesus transpacificus*): Investigating linkages between morphological and behavioral anti-predator response

Pedro Alejandro Triana-Garcia[1], Swee J. Teh[1*], Shawn Acuña[2†]

[1]University of California Davis

[2]Metropolitan Water District of Southern California

[*]Research mentor

[†]Community mentor

The Delta Smelt population has declined dramatically and has been declared critically endangered. A potential contributing factor to the decline is that pollutants disrupt the fish's sensory ecology and make them more susceptible to predation. Since fish rely on their olfactory system to assess predation risk and avoid predators, this could have serious consequences on the survival of the species. This study aimed to evaluate how water-borne copper, a common pollutant, can affect the ability of Delta Smelt to detect predator-related odorants and perform anti-predator behaviors. Results indicate that Delta Smelt are highly susceptible to copper pollution. When fish were exposed to ambient concentrations of copper, physical alterations in the olfactory organ and impairment of olfactory-mediated anti-predator behavior were observed. Further, this research produced a characterization of the Delta Smelt olfactory organ structure and a standardized odorant-response curve.

Pedro Alejandro Triana-Garcia is a Ph.D. Candidate at the University of California Davis.

Fellowship Publication

Triana-Garcia, P.A., Nevitt, G.A., Pesavento, J.B., and Teh, S.J. 2021. Gross morphology, histology, and ultrastructure of the olfactory rosette of a critically endangered indicator species, the Delta Smelt, *Hypomesus transpacificus. J. of Comp. Phys. A* 207: 597-616.

Effect of temperature and salinity on physiological performance and growth of Longfin Smelt: Developing a captive culture for a threatened species in the Sacramento/San Joaquin Delta

Yuzo Yanagitsuru[1], Nann Fangue[1*], Randall Baxter[2†]

[1]University of California Davis

[2]California Department of Fish and Wildlife

[*]Research mentor

[†]Community mentor

Delta Smelt and Longfin Smelt have declined to historical lows in the Bay-Delta. To aid their recovery, managers need to understand how multiple environmental factors such as temperature and salinity interact with fish physiology. While Delta Smelt, a federally-listed endangered species, has been heavily studied, much less is known about the Longfin Smelt, which is listed as a threatened species under the California Endangered Species Act. This project aimed to improve our understanding of stressor responses and the physiological requirements for Longfin Smelt survival and reproduction to inform captive Longfin Smelt culture. This study tested the effects of temperature, salinity, and turbidity on Longfin Smelt larvae, identifying optimal levels of these environmental factors to maximize larval survival in culture as well as the upper limits of these factors for the species.

Yuzo Yanagitsuru is a Ph.D. Candidate at the University of California Davis.

Fellowship Publication

Yanagitsuru, Y.R., Main, M.A., Lewis, L.S., Hobbs, J.A., Hung, T.C., Connon, R.E. and Fangue, N.A.. 2021. Effects of temperature on hatching and growth performance of embryos and yolk-sac larvae of a threatened estuarine fish: Longfin Smelt (Spirinchus thaleichthys). *Aquaculture* 537:736502.

Catching up with 2016 Delta Science Fellow, Dr. Julie Hopper

What drew you to pursue post-graduate research in the Delta back in 2016?

I was drawn to pursue post-graduate research in the Delta for both logistical and scientific reasons. My husband was still finishing up his master's degree at San Francisco State University, and so I was trying to stay in the area. I also wanted to pursue applied research on the control of invasive species. It was appealing to be able to collaborate with academic and governmental scientists in efforts to minimize the negative effects of invasive species in the Delta.

Tell us more about your Delta Science fellowship research. What was the focal question you sought to answer, and why was is it important to pursue it?

Several biological control agents, including two herbivorous beetles, were introduced into the Delta in the 1980s to naturally control an invasive aquatic weed, water hyacinth. However, it soon became clear that these biocontrol agents were not substantially decreasing this weed. Our research sought to examine the potential factors that limited the effectiveness of these biocontrol agents as well as potential solutions.

What was the biggest finding from your research and how might it inform management in the Delta?

Our research demonstrated that both beetle species are still present in the Delta and its associated tributaries more than 30 years after introduction. Using genetics and morphological attributes, we determined that the rarer beetle is confined to the warmer tributaries and that populations of both species are primarily limited by low temperatures and flooding events.

What have you been up to since the fellowship ended?

I have since moved to Los Angeles and currently work at the University of Southern California (USC). As a researcher at USC, I investigated parasite-host interactions in phytoplankton communities; then I transitioned to a teaching position. Currently, I teach undergraduate classes in ecology and environmental studies. I have also been involved in many sustainability-focused efforts, including beach cleanups and the 2021 Scripps-Rady Ocean Plastic Pollution Challenge. In that challenge, I helped to analyze and map plastic pollution data along coastal San Diego County as a member of team "SD Zero." Our team won the challenge through our proposed solution to combat plastic pollution by implementing plastic-free event mandates. Please visit our website to support us and follow our progress.

What piece of advice would you give to someone thinking about applying to the Delta Science Fellowship?

First, just go for it! I almost didn't apply because I was so overwhelmed at the time, but I'm glad that I did! Remember: time spent toward your future self is never wasted! Second, it is key to identify great project mentors and research advisers and to line up regular meetings with them (ahead of the deadline) to really carve out a great proposal. Both Dr. Paul Pratt (USDA) and Dr. Ted Grosholz (UC Davis) were tremendously helpful during my brainstorming and proposal writing process, as well as great sources of support during the fellowship. Third, make sure that you are passionate about whatever you are proposing to research.

To learn more about Dr. Hopper, visit her website.

Fellowship Publications

Hopper J.V., Pratt P.D., Reddy A.M., McCue K.F., Rivas, S.O. Grosholz E.D. 2021. Abiotic and biotic influences on the performance of two biological control agents, Neochetina bruchi and N. eichhorniae, in the Sacramento-San Joaquin River Delta, California (USA). Biological Control 153: 104495 doi.org/10.1016/j.biocontrol.2020.104495.

Hopper J.V., McCue K.F., Pratt P.D., Duchesne P. Grosholz E.D., and Hufbauer R.A. 2019. Into the weeds: matching importation history to genetic consequences and pathways in two widely used biological control agents. Evolutionary Applications 12: 773– 790.

Reddy A.M. Pratt, P.D., Hopper J.V., Cibils X., Walsh G.C., Mc Kay, F. 2019. Variation in cool temperature performance among populations of Neochetina eichhorniae (Coleoptera: Curculionidae) and implications for the biological control of water hyacinth, Eichhornia crassipes, in a temperate climate. Biological Control 128, 85–93.

Hopper J.V., Pratt P.D., McCue K.F., Pitcairn M.J., Moran P.J., and Madsen J.D. 2017. Spatial and temporal variation of biological control agents associated with Eichhornia crassipes in the Sacramento-San Joaquin River Delta. Biological Control. 111, 13-22.

Recent Press

Solutions for Ocean Plastic Pollution: Moving Solutions from Blind Spots to Innovation (ECO Magazine 2021)

Events on the Horizon

December 2021

- Delta Interagency Invasive Species Coordination Team (DIISC) Symposium – Early Detection and Rapid Response
  December 15 at 9:00 AM (flyer)

- Delta Lead Scientist Ask Me Anything Digital Office Hours on Instagram Live
  December 20 at 12:00 PM (flyer)

January 2022

- Delta Independent Science Board Meeting
  January 12-13 (time TBA)

- Delta Lead Scientist Ask Me Anything Digital Office Hours on Instagram Live
  January 31 at 12:00 PM

February 2022

- Delta Science Program Symposium: Adapting Restoration for a Changing Climate
  February 2-3 at 9:00 AM (flyer, information sheet, and registration)

- Delta Independent Science Board Meeting
  February 10 (time TBA)

- Delta Lead Scientist Ask Me Anything Digital Office Hours on Instagram Live
  February 28 at 12:00 PM

March 2022

- Delta Science Program Salinity Management Workshop
  Date and time TBA

- Delta Independent Science Board Meeting
  Date and time TBA

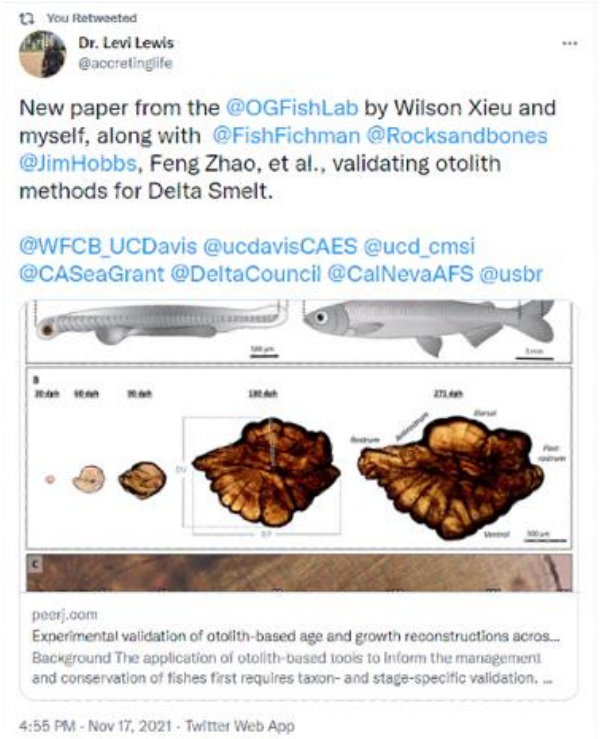
- Delta Interagency Ecological Program (IEP) Annual Workshop
  March 22-24 at 8:30 AM

- Delta Lead Scientist Ask Me Anything Digital Office Hours on Instagram Live
  Date TBD at 12:00 PM

#SciComm Corner

Eva Bush @bushzoo1
Promotes the public review period for the 2022-2026 SAA.

Dr. Levi Lewis @accretinglife
Shares a new paper on validating otolith methods for Delta Smelt.



Estuary News Magazine @ESTUARYnews
Celebrates its 30th birthday.

IEP On the Water @IOnthewater
Captures the Midwater Trawl scene.

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