AMERICAN FISHERIES SOCIETY

DAVIS SUBUNIT

DAVIS FISH TALES

Fall 2014

Myfanwy Johnston

AFS Davis Subunit 2014-2015 Officers

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For submission information contact Emily Miller at eamiller@ucdavis.edu

Our mission is to encourage the exchange of regional fisheries information among American Fisheries Society (AFS) Davis Subunit members, fisheries professionals, members of the California-Nevada Chapter, and greater AFS. The Subunit promotes professional development of students, student research opportunities, networking with fisheries professionals, and service to our local aquatic habitats.

Membership is open to all students, alumni, faculty, and staff within California and Nevada. To become an AFS member visit: http://fisheries.org/membership

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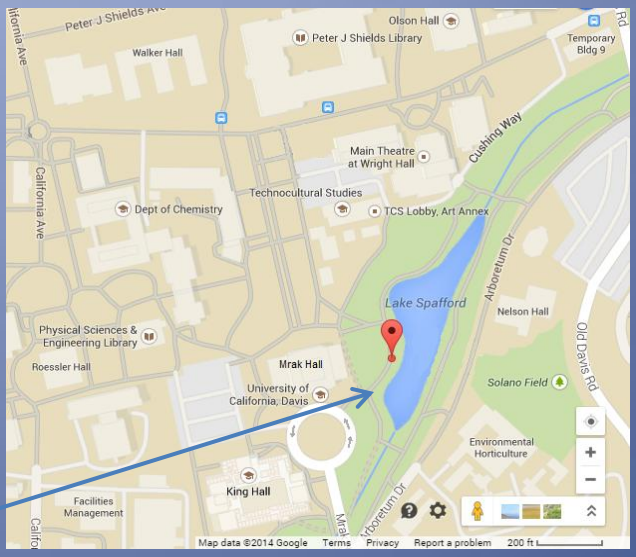
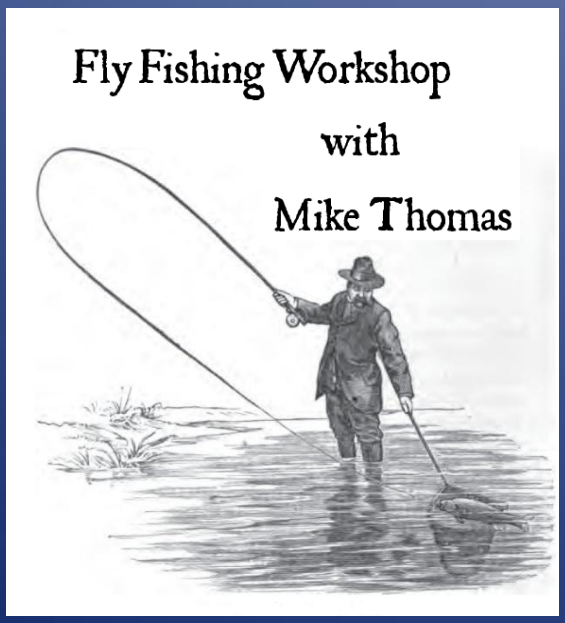
Davis Subunit Fall 2014 Quarter Activities

Oct 10th



Oct 21st Fall Quarter Meeting - 6:00pm at Woodstock's Pizza in downtown Davis

Nov 2nd and 9th



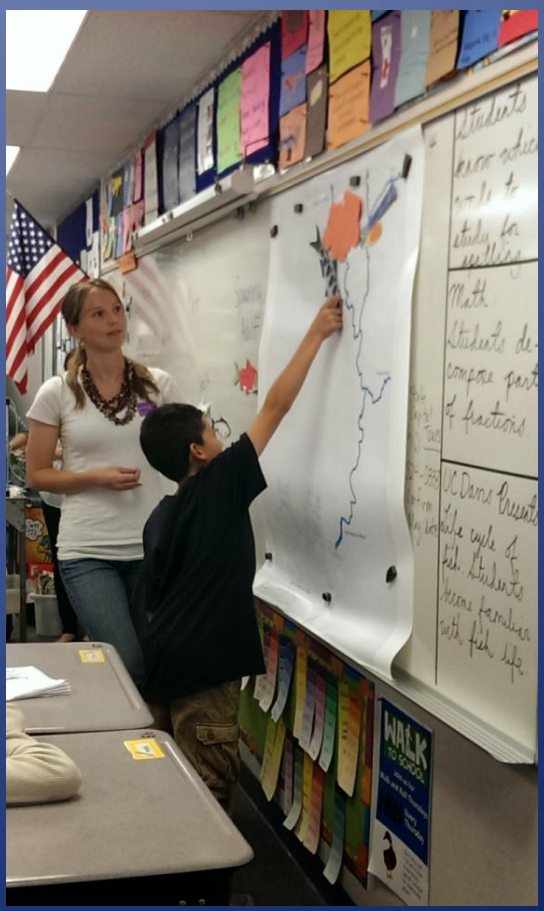
This two day workshop will include one classroom day and one field day learning to cast. Must be a member to participate. Come to the Oct 21st meeting to hear more.

To join the AFS Davis subunit listserv or learn more about membership, email **afs.davis.sacramento@gmail.com** and join www.facebook.com/groups/AFSSacDavis/

Davis Subunit Outreach

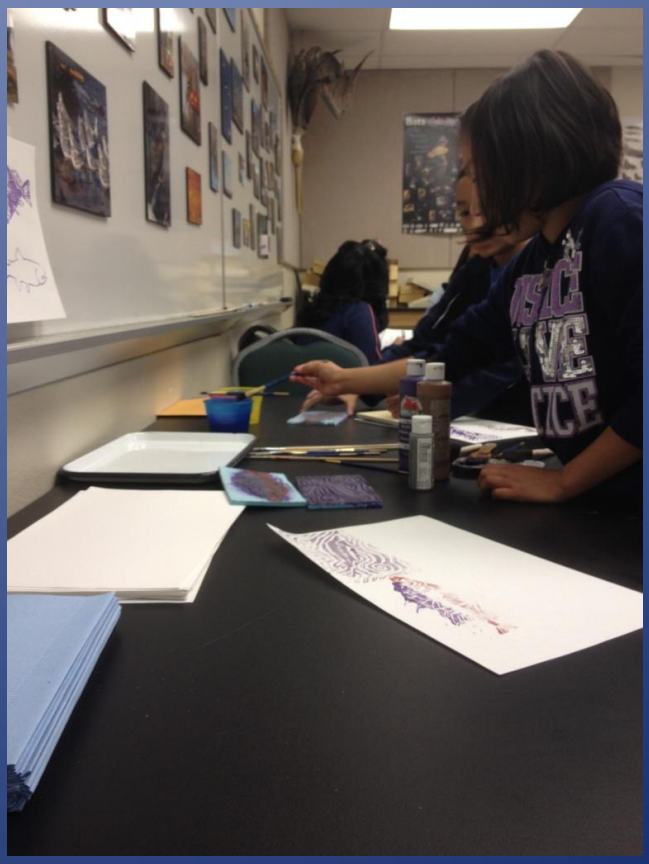
In spring 2014, the Outreach Committee visited a fourth grade class in West Sacramento. We taught the students about the salmon life cycle taking place in the American River near their school. We brought in live white sturgeon, preserved specimens of salmon at various life stages, and taxidermied salmon predators from the U.C. Davis Bohart Museum.

On another visit the students participated in an interactive salmon life cycle game. Some students were salmon and others were predators. Salmon began as eggs upriver and had to run to the ocean without being tagged by predators. In the ocean they collected resources to become adults and then had to make it past predators to the spawning grounds. Their migration path was then hindered by the construction of a 'dam' and then aided with the modification of a 'fish ladder'. If you are interested in joining the outreach committee in 2015 contact Emily at eamiller@ucdavis.edu or Myfanwy at merowlands@ucdavis.edu.



U.C. Davis Picnic Day

Every year the AFS Davis Subunit has a Picnic Day display. The public can view live native fishes and make fish art. If interested in volunteering in 2015, stay tuned for updates on the Subunit listserv.



U.C. Davis Researcher Profiles

Sarah Longo
post-doc Wainwright Lab

I am broadly interested in using phylogenetic and morphological approaches to understand the patterns and processes shaping the remarkable diversity of fishes. In particular, I am interested in studying the evolution of novel and complex functional and morphological traits. My dissertation research focuses on the Syngnathiformes (seahorses, pipefish, trumpetfish, etc.) which all possess a long snout that rotate quickly during feeding, an unusual and novel strategy called pivot feeding. In addition, previous work by other researchers has shown that seahorses and pipefish have power amplified head rotation, resulting in feeding strikes that are faster than possible by muscle activity alone. I am collecting high-speed videos of various syngnathiforms and related fishes to determine which lineages use pivot feeding and power amplification, how these feeding mechanisms work (their kinematics), and how this differs from other suction feeding fishes. I am also using micro-CT scans to investigate the three-dimensional feeding morphology in these lineages. This comparative dataset will allow me to reconstruct the evolutionary history of pivot feeding and power amplification. I am also working on a large molecular phylogeny for this group to study their morphological diversification in more detail.

I am very aware of how important undergraduate research experiences were in my own (continuing) development as a scientist and encourage motivated and hard-working undergraduates in our area to contact me if they are interested in helping me learn about this strange group of fish! email: sjlongo@ucdavis.edu website: http://sarahjlongo.wordpress.com

Matthew Savoca
Grad Group in Ecology, Nevitt Lab

Plastic debris in the world's oceans has been increasing over the past 50 years and plastic production is on pace to increase exponentially over the next two decades at minimum. The ingestion of marine plastic debris by a variety of marine taxa including fish, whales, birds, and sea turtles has been documented for over 40 years and has become a major conservation issue. Despite this, current research is not focused on the core question: why are organisms choosing to ingest plastic at all? My work focuses on the myriad of sensory cues (e.g. visual and olfactory) emanating from plastic debris that marine organisms may use when mistaking plastic items for food. Does plastic debris look like food? Does it taste or smell like food? Many researchers have speculated, but few have ever addressed these questions directly.

Currently, I am using Shiner Perch (*Cymatogaster aggregata*) caught in the Bodega Harbor as a model organism to investigate this problem. Working at the Bodega Marine Laboratory during the summer of 2014, I will alter the various sensory cues associated with plastic debris to determine why fish are confusing plastic for food. Through this fish-feeding experiment, I aim to integrate sensory ecology and analytical chemistry to understand the problem of marine plastic ingestion at a mechanistic level. If we can thoroughly address this problem, scientists and managers will be able to better inform mitigation strategies and address the issue of plastic ingestion at its source. Depending on the results from this season's experiments, I may have the need for research assistants in the coming months. If you are interested in this project or my research in general, please visit my website (matthewsavocaecology.weebly.com) or contact me at mssavoca@ucdavis.edu.

Lauren Yamane
Grad Group in Ecology, Botsford Lab

As a PhD student in Dr. Lou Botsford's lab, I help to generate and build on existing mathematical models of fish populations. These models incorporate both demographic differences across age classes and the effects of important factors like fishing and changes in the environment on population behavior over time. A major motivation for my research stems from the desire to understand what caused the record low returns of California Chinook (king) salmon spawning adults to Central Valley rivers in 2007, leading to the fishery's first commercial and recreational closure the following two seasons. In collaboration with several National Marine Fisheries Service biologists, I am investigating potential causes of the low spawner returns and the mechanisms underlying the observed high variability in these populations. Central Valley Chinook salmon populations are also an interesting study group in that they are fished but at the same time are heavily supplemented by fish released from local hatcheries. Much of my research so far has been trying to understand how fishing may magnify variability in the populations and if, or to what extent, this variability may be reduced through the regular addition of hatchery fish. Another facet of my work has been conducted at a broader scale, to consider how variability in the Central Valley Chinook stock as a whole depends on synchrony among individual component populations that comprise the stock. Although I do not currently have work for undergraduate assistants, I may have some in the future, so please contact me at: layamane@ucdavis.edu if you are interested in gaining some quantitative and modeling experience!

Photo credit: USGS - http://www.usgs.gov/features/lewisandclark/ChildrenWebSites.html

Lisa Komoroske
Grad Group in Ecology, Fangue Lab

Climate change is expected to increase both water temperatures and salinities in the San Francisco Estuary-Delta, and may drastically change the habitat conditions for many sensitive species. I am a Ph.D. student working under Nann Fangue in the Graduate Group in Ecology. I am examining potential consequences of climate change to the endangered Delta Smelt, a flagship fish species in danger of extinction. My mentors and I conducted experiments to determine the smelt's tolerances and physiological responses to warm and salty waters that might occur in the future. We also developed a microarray specific to Delta Smelt, which is a slide with DNA sequences from the smelt's "transcriptome," the small percent of the genetic material that is involved in making proteins. We then used this to understand how the fish physiologically respond as water temperatures and salinities approach tolerance thresholds and to identify when they become stressed.

Examining different life stages of Delta Smelt and comparing their responses to water temperatures in the Delta, my colleagues and I discovered that juvenile smelt are likely to be the most vulnerable stage to climate change. This is in part because Delta Smelt often have a one year life cycle, and the juveniles are the stage that occur in the late summer and early fall when water temperatures are highest. I am now taking the results and collaborating with U.S. Geological Survey climate model scientists to understand what this means for climate change predictions. Linking the knowledge we've gained about Delta Smelt temperature sensitivity with what is forecasted for the Delta will really help us understand where good, stressful, or completely unsuitable habitat will likely be for Delta Smelt as well as other sensitive native fishes in the next 50-100 years.

I recently received funding from the National Science Foundation to do an extension project comparing Delta Smelt with Menidia, an invasive fish that can survive in much higher water temperatures. "By comparing the genetic and physiological differences between the species, we can perhaps understand the adaptations that help one species thrive in conditions that are very stressful for others." My research has been published in the online, open-access peer-reviewed journal, Conservation Physiology Komoroske et al., 2014.

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Jose Tavera
post-doc Wainwright Lab

I am a marine biologist interested in building and using phylogenetic hypotheses as a framework to search and understand the processes driving evolutionary and ecological patterns, using marine fishes as a model system. I seek to explore how functional innovations and/or constraints may affect morphological and lineage diversification. My current focus is on Haemulidae (grunts, sweetlips), a group of marine fish with different habitat preferences, and circadian rhythms. My recent work, from molecular and morphological data, indicates that differences in grunts lineages and morphological diversification depend, in some extent, on habitat choice. Future works includes exploring speciation and extinction analyses; searching for signatures of morphological modifications associated with changes in activity levels during the diurnal cycle; and investigate phylogenetic signal and evolution of sound production, a remarkable, but unexplored feature within this family of fish.

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Carson Jeffres, Lab Director Watershed Sciences

Frequently inundated large floodplains are functionally extinct in the Central Valley as such, many of the ecological benefits have been lost to riverine species. One of the exceptions to the river-floodplain disconnection is the Yolo Bypass, a 59,000 acre flood bypass. During large flood events, juvenile Chinook salmon have been found to benefit from rearing on the flooded bypass. But large floods that provide adequate duration and timing of flooding are not common so we sought out to study if during non-flood years we could manage for surrogate floodplain habitat within an agricultural matrix in the Yolo Bypass. Since 2012 we have been studying if flooded post-harvest rice fields can act as a surrogate for this lost habitat. To study this question, nine replicate fields were constructed with the ability to study various management actions and have replication for our study design. Within each field we place about 5000 juvenile Chinook and depending on the year's treatment and study objectives they remain in the fields for approximately six weeks. In three years of studies we have found that juvenile Chinook salmon on flooded rice fields grow at some of the fastest freshwater growth rates (.95mm/day) of juvenile salmon ever found in California. We also studied both infield and imported invertebrate production. Results show that invertebrate densities peak near 176,000 individuals/m^3 in the water column. This robust food resource was able to provide abundant food resources to the juvenile salmon. At the end of each study year, the fish are released into the drainage ditches that connect to the Sacrament River. Some of the fish have been tagged with JSAT acoustic tags and monitored through the Golden Gate.

A primary goal of this study is to integrate agricultural lands and ecosystem services into a functioning landscape for both agriculture and the environment. From January through March we are conducting fieldwork. If you are interested in fieldwork opportunities please contact Carson Jeffres (cajeffres@ucdavis.edu). Also check out project website other fun projects at watershed.ucdavis.edu.

Jesus Vargas
WFCB Major, Moyle Lab

Hello AFS!

Currently our crew, lead by Rebecca Quiñones, is sampling fish in several watersheds across California. We are collecting data regarding fish absence/presence and water quality in order to analyze habitat degradation as a result of climate change. Sites are based off of areas that were previously sampled using similar methods for comparative research. Most of these sites were sampled by Peter Moyle and his colleagues as far back as the 1970s or as recently as the 1990s. Fish samples are collected using backpack electrofishing methods and later measured. Fortunately, in the sites we have recently sampled (within the Navarro River watershed), we found only native species including prickly sculpin, coastrange sculpin, Navarro roach, stickleback, and some lamprey! However, our team has come across areas that are severely infested with alien species such as large mouth bass. Concurrently, our team tests the streams for pH levels, dissolved oxygen, temperature, conductivity, turbidity, and flow rates. These readings are intended to interpret how fish communities change over time, more specifically targeting the droughts to observe changing stream conditions. Due to its similar climate, Dr. Quiñones is collaborating with colleagues from Portugal. Hopefully, the data collected in this survey will help us understand how to adjust conservation needs in a Mediterranean climate.

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Matthias Hasenbein, School of Veterinary Medicine & WFCB Dept Connon and Fangue Lab

My name is Matthias Hasenbein, and I am a 4th year Ph.D. candidate at University of California, Davis. My Ph.D. project is a collaboration between the Technische Universitaet Muenchen, Germany, and the University of California, Davis. My research is conducted in California since my work deals with the endangered fish species Delta smelt (*Hypomesus transpacificus*). I am working on defining the fundamental niche for turbidity and salinity for all three life stages (Larvae, Juvenile, and Adult). The Delta smelt is endemic to the San Francisco Bay Delta System and has been in decline for the past decades. Turbidity and salinity are considered to be very important habitat parameters for its distribution in the delta on the one hand and for the completion of its life cycle on the other hand. The Delta smelt is very sensitive to any kind of habitat change and thus considered to be an indicator species for the ecosystems health. I utilize environmentally relevant and extreme turbidity and salinity ranges as single stressors and in combination to determine how the fish are affected and respond physiologically. Measuring stress related endpoints such as cortisol levels as well as molecular biomarkers and feeding behavior allows me to assess the optimal range and the tolerance limits for those two parameters for this fish species and determine the fundamental niche comprehensively. With my research I aim to help resource managers in making informed decisions in support of delta smelt conservation. Right now I am in the process of finishing my Ph.D. and mainly can be found working at my computer doing data analysis and writing.

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Mandi Finger
Project Scientist, May Lab

I am a project scientist in the Genomic Variation Lab (GVL), and the majority of my research directly involves fish. Generally, my work involves using molecular tools to contribute to the conservation and management of threatened and endangered species, primarily in California or the American west.

My main project is in collaboration with the UC Davis Fish Culture and Conservation Lab (FCCL) in Byron, California. The FCCL operates and manages the Delta Smelt refuge population, founded in 2006. My role in this operation is the genetic management of the hatchery population, and my goals are to maximize wild fish input, prevent inbreeding, and maintain overall genetic diversity in the cultured population. The purpose of this refuge population is to provide an insurance policy in the event of extinction of Delta Smelt in the wild. This work has spawned numerous side projects, including a study where we indirectly observed "natural" spawning behavior using genetic analysis (LaCava et al. *in review, North American Journal of Aquaculture*).

Additional projects I work on are genetic management of an introduction of the threatened Paiute cutthroat trout to its native habitat, using environmental DNA samples to detect nonnative trout species in Silver King Creek, California. Past projects include conservation genetics of the Owens pupfish (Finger et al. 2013), a desert fish endemic to the Owens Valley, California, and an analysis of the population structure and diversity of Lahontan tui chubs in the Lahontan Basin (Finger et al. *in review, Conservation Genetics*).

There are numerous opportunities for undergraduate volunteers either with me or with other project scientists in the GVL. One of my past volunteers, Melanie LaCava, is lead author on the aforementioned Delta Smelt natural spawn project and now works at the San Diego Zoo. One of my current undergraduate volunteers, Alyssa Benjamin, is doing her senior thesis on conservation genetics of the Arroyo chub, a species of concern in the Los Angeles area. Her work may contribute to a listing petition for this species as endangered at the state or federal level.

email: ajfinger@ucdavis.edu

website (new website coming soon!)
http://animalscience.ucdavis.edu/gvl/Conservation_Genetics_Fund/Mandi_Finger.html

Fish Artist Spotlight

Clockwise from top left: delta smelt, desert pupfish, Sacramento sucker, and green sturgeon

Rosemary Hartmann is a recent UCD Ecology graduate and stained glass artist who specializes in California species and landscapes.

View, purchase her work, or contact her for custom pieces at her store, Rosie's Colored Glasses:

https://www.etsy.com/shop/RosiesColoredGlasses
https://www.facebook.com/RosiesColoredGlasses

Photos from the Field

Submissions

Want to make your fish research visible? Undergraduates, graduates, post-docs, research staff and faculty are invited to submit research profiles to Davis Fish Tales.

We also welcome fish-related submissions including:

- event announcements
- job and volunteer opportunities
- photography
- art

Contact Emily Miller: eamiller@ucdavis.edu

This quarterly newsletter will be sent out on U.C. Davis student and faculty listservs at the beginning of each quarter.

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