Abstracts from Additional Conference Speakers

(in order of presentation at the conference)

Vernal Pools: Evolving Legal Protections and an Uncertain Future

DANIEL ROHLF
Lewis & Clark Law School
10015 S.W. Terwilliger Boulevard, Portland, OR 97219
rohlf@lclark.edu

Federal laws protecting vernal pools and their associated plant communities and other species are in a state of flux. The Trump Administration is actively attempting to reduce the scope of wetlands protected under the Clean Water Act, and has acted to weaken requirements to mitigate or compensate for impacts on wetlands and other natural resources. Protections for endangered species are also under fire in both Congress and administrative agencies. The courts will also continue to play an important role in defining protections crucial for vernal pools and the life forms they support. For example, a crucial Ninth Circuit decision limits the value of critical habitat designation for protecting vernal pools, and the U.S. Supreme Court may be poised to place further limitations on designating critical habitat. Nevertheless, federal law still provides important protections for vernal pools, as well as means for concerned citizens to enforce those protections.

Landscape Structure and Geophysical Parameters that Control the Hydrology of Vernal Pools

NIALL MCCARTEN
Institute for Ecohydrology Research, 1213 Carriage Drive, Woodland, CA 95776
nmccarten@ecohydrology-research.org
and Department of Land, Air, and Water Resources, University of California, One Shields Avenue, Davis, CA 95616
nfmccarten@ucdavis.edu

The physical landscape, including topography and soil types, represent the setting that interacts with annual rainfall to form vernal pools. The area, shape, and elevation gradient of the catchment surrounding vernal pools are physical variables that determine how precipitation intercepted outside a pool basin can increase pool water. The effect of the surrounding catchment can lead to 20% up to 60% or more of a pools' water. The presence and depth of a soil water-restricting layer contributes to having a seasonal, perched water table and the amount of surface water in a pool. The amount of water stored in the soil is often 30% up to 90% of water stored within a pool and affecting the amount of surface water. Landscape information gathered from topographic and soil data were used to create models of natural vernal pools. These physical models were then evaluated using hydrological analyses to determine individual pool hydrology. Research on pools from different soils and landscape in California are presented. This approach was then used to evaluate sites for potential vernal pool restoration. Examples for vernal pool restoration projects in Sacramento Valley and Coastal Southern California are presented including the steps taken in the evaluation of the site, the method of hydrological engineering and predicting outcomes. Methods using global positioning systems, Lidar, and ground-penetrating radar are shown as important tools for the understanding of the physical environment of vernal pools. The variability of annual rainfall is briefly mentioned to demonstrate how it influences natural and restored vernal pool hydrology.

The United States Versus Duarte Nursery: A Summary of the Hydrological and Biological Effects of the Tillage as Assessed by the Federal Expert Team, and Description of the Final Settlement Agreement

RICHARD LIS
California Department of Fish and Wildlife, 2440 Athens Avenue, Redding, CA 96001
Richard.Lis@wildlife.ca.gov

Duarte Nursery Inc. owns a parcel of property, approximately 450 acres in area, approximately 5 miles south of Red Bluff, Tehama County, California. In November 2012, ground disturbing operations were observed that were being undertaken without permits from the Army Corps of Engineers (ACOE). A cease and desist order was issued by the ACOE for violations of Section 404 of the Clean Water Act (CWA), for discharge of a pollutant (soils) into waters of the United States which have significant nexus with traditionally navigable waters under the CWA. Duarte Nursery Inc. initially sued the U.S. and then the U.S Department of Justice (DOJ) countersued Duarte Nursery. The DOJ convened an Expert Team which assessed the Duarte property for effects to hydrology, soils, vegetation, and violation of the CWA. The Expert Team identified 43.9 acres of waters/wetlands, a substantial portion of which were depression wetlands (vernal pools) and 9.82 miles of streams on the site. The Expert Team identified eight direct impacts to waters/wetland area and ecosystem functioning, and indirect, cumulative, and temporal impacts to hydrologic, soil, plant community, and faunal support/habitat resources. The case reached settlement immediately prior to the planned start date of the trial in August 2017. Primary elements of the settlement agreement were: (a) a civil penalty of $330,000.00; (b) No disturbance to the 43.9 acres of waters/wetlands plus a setback of 35 feet for 10 years except for grazing and weed control; (c) permanent protection for Coyote Creek on the property and one major stream; (d) remediation to 22 acres of wetlands; and (e) off-site mitigation compensation of $770,000.00.

Diversity Above and Below Ground: The Genetics of Vernal Pool Plants and Seed Banks

MOLLY STEPHENS (SPEAKER), DANNISE RUIZ RAMOS, DANIEL TOWES, and JASON SEXTON
School of Natural Sciences, 5200 North Lake Road, University of California, Merced, CA 95343
mstephens3@ucmerced.edu

Habitat conversion has greatly reduced vernal pool lands over the past century, with eastern Merced County among the hardest hit. Identifying vernal pool species, both common and threatened, in these communities is essential for understanding their ecology, evolution, and conservation needs; however, species surveys require time, expertise, and proper timing to ensure adequate identification. We describe research underway at the UC Vernal Pool and Grassland Reserve using a soil environmental DNA analysis approach to identify and understand plant diversity. We are currently piloting different soil sample processing methodologies to determine the effects of sampling volume, depth, and sample processing (sieved versus whole soils) on species identification. We will be comparing our above-ground surveys of vegetation to eDNA soil sampling in three inundation zones (pool bottom, edge, and upland) and correlating species diversity (alpha, beta, and genetic) with soil type, hydrology, and spatial structure. Our efforts sampling soils with [volunteer group] CALeDNA citizen scientists have already identified plant and animal species in five pools, including some federally listed plants. Additional research is also underway to create single nucleotide polymorphism (SNP) markers for four Orcuttieae species: *Neostapfia colusana, Orcuttia inaequalis, O. pilosa,* and *Tuctoria greenei*; these markers will be used in a population genetics of *N. colusana,* for which we have obtained rangewide population samples. We have sequenced a reference genome for *N. colusana* that is 2.2GB in size and approximately 87% complete that will be useful for marker development and for future efforts to understand neutral and adaptive genomic variation in native plants.

Soil Effects on an Endemic Vernal Pool Annual Plant, *Limnanthes douglasii* ssp. *rosea* (Meadowfoam)

DANIEL J. TOEWS
School of Natural Sciences, 5200 North Lake Road, University of California, Merced, CA 95343
dtoews@ucmerced.edu

The heterogeneity of soil environments found across vernal pool landscapes makes the question of adaptation to local conditions relevant to understanding population biology and conservation of vernal pool plant taxa. To examine the plant-soil relationship in *Limnanthes douglasii* ssp. *rosea* (Meadowfoam), an endemic vernal pool annual plant, I employed a common garden experiment in a greenhouse and assessed plant fitness of plants grown among Corning, Keyes and Redding soil types from nine populations across a large intact vernal pool landscape, including three local populations to each soil type. Phenotypic trait measurements indicative of plant fitness (e.g. reproductive output, and plant size) of the reciprocally transplanted populations reveal statistically significant soil type effects. We found that on average all plants from each soil type performed best on Keyes soil and that plants grown on Redding soil had the poorest performance. Additionally, plants originating from Keyes soil displayed higher fitness than all other plants when transplanted across Corning and Redding soil types. Aside from Keyes derived plants, local populations never performed best in their home soils, however, Corning and Keyes populations are the top two performers in each soil treatment. Our findings indicate that fitness variation of Meadowfoam is significant across a landscape scale continuum of high and poor quality soils. This work suggests that vernal pool plant populations distributed among small-scale soil gradients could conceivably be adapted to local conditions.

State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State

ANA MARIA SAENZ
Water Quality Certification and Wetlands Program, California State Water Resources Control Board,
1001 I Street, Sacramento, CA 95814
Anamaria.saenz@waterboards.ca.gov

The State Water Board is proposing the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (Procedures), for inclusion in the forthcoming Water Quality Control Plan for Inland Surface Waters and Enclosed Bays and Estuaries and Ocean Waters of California. The Procedures consist of four major elements: 1) a wetland definition; 2) a framework for determining if a feature that meets the wetland definition is a water of the state; 3) wetland delineation Procedures; and 4) procedures for application submittal, and the review and approval of Water Quality Certifications and Waste Discharge Requirements for dredged or fill activities. The Procedures are being developed to address several important issues. First, current regulations need to be updated to ensure adequate wetland protection and prevention of losses in the quantity and quality of wetlands in California. The Regional Water Boards may have different requirements and levels of analysis with regard to the issuance of water quality certifications. The Procedures will provide consistent requirements across the Water Boards for discharges of dredged or fill material and strengthen protection of wetlands no longer protected under the CWA due to U.S. Supreme Court decisions. The Procedures will also provide a single accepted definition of wetlands at the Water Boards. The proposed wetland definition represents the various forms or kinds of landscape areas in California that are likely to provide wetland functions, beneficial uses, or ecological services.

Landowner-led Strategies for Conserving Vernal Pool Rangelands

JOHN HUNT and PAUL KIRK
Northern California Regional Land Trust, 580 Vallombrosa Avenue, Chico, CA 95926
john@landconservation.org pkirk@landconservation.org

The Northern California Regional Land Trust works with landowners to identify acceptable practical means of permanently conserving private lands and natural resources. The Land Trust serves as a hub to coordinate a frequently complex array of conservation partners, diverse perspectives, and overlapping objectives to accomplish this work. Land Trust staff will provide an overview of this work and how the insight gained can expand the rate of substantive conservation of vernal pool landscapes.