Project Title: Building Habitat Connectivity for Climate Adaptation

Mayacamas to Berryessa Coast Ranges, California

CA-LCC Place Based Adaptation Projects — Proposal Cover Sheet — March, 2016

Project Leader/Science: Dr. Adina Merenlender, Department of Environmental Sciences, Policy and Management, 160 Mulford Hall, University of California, Berkeley, CA 94720-3114, adina@nature.berkeley.edu, 707-744-1270

Project Leader/Resource Management: Dr. Lisa Micheli, President, Pepperwood Foundation, 2130 Pepperwood Preserve Road, Santa Rosa, CA 95404, lmicheli@pepperwoodpreserve.org, www.pepperwoodpreserve.org, 707-360-5536

Project Duration: Two years **Total Requested Funding**: $194,721

Partners:
Bureau of Land Management, Jim Weigand
Blue Ridge Berryessa Natural Area Partnership, Mary Adelzedeh
Sonoma Land Trust, Wendy Eliot
Terrestrial Biodiversity Climate Change Collaborative (TBC3), David Ackerly
Napa Land Trust, Mike Palladini
Sonoma County Agricultural Preservation & Open Space District, Karen Gaffney
Lake County Land Trust, Cathy Koehler
Audubon Canyon Ranch, Sherry Adams
Sonoma County Permit and Resource Management Division, Sandi Potter
Local Resource Conservation Districts
Pepperwood's Native American Advisory Council and local tribes
Bay Area Open Space Council, Tom Robinson
California Climate Commons, Deanne DiPietro
UC Berkeley, Morgan Gray (postdoctoral researcher)
Data Basin, Tosha Comendant

Geographic Scope: Inner Coast Ranges of Northern California (North Coast)

Partner Contributions/Leveraging: This proposal leverages several sub-regional partnerships including the Sonoma Valley Corridor Initiative, plus Pepperwood's Mayacamas Forum, Wildlife Observer Network and Native American Advisory Council, and the Blue Ridge-Berryessa Natural Areas Partnership. This project also leverages the recent federal designation of the Berryessa Snow Mountain National Monument. The majority of match funds are derived from the Terrestrial Biodiversity Climate Change Collaborative (TBC3, funded by the Gordon and Betty Moore Foundation) and the Climate Ready North Bay initiative (funded by the Coastal Conservancy and local natural resource agencies). We will utilize the Southwest Climate Science Center BCM products for analysis. This project will also leverage Dr. Merenlender's current work on the California Fourth Climate Change Assessment titled *Migration Corridors and Refugia as Adaptation Strategies: Critical Review* and NSF investments into the UC Berkeley Ackerly Lab's research on potential impacts on native vegetation. Partner contributions are also summarized in the Budget and Deliverables worksheet.

Building Habitat Connectivity for Climate Adaptation

Mayacamas to Berryessa Coast Ranges, California

CA-LCC Place Based Adaptation Projects — Main Proposal — March 2016

Project Description

The goal of this project is to tap into recent advances in habitat mapping, threat assessment, and climate change projections to co-produce a scientifically sound multi-county habitat connectivity roadmap for the region spanning from the Mayacamas Mountains to the new Berryessa Snow Mountain National Monument in concert with local land managers. The Inner Coast Ranges project area comprises an approximately 2M-acre landscape recognized as a biodiversity hotspot threatened by both habitat fragmentation and climate change. This project will build on a nascent *Landscape Connectivity Network* facilitated by Pepperwood and comprised of land trusts, parks and open space districts, with state and federal land managers. In partnership with UC Berkeley, the network will build a place-based decision support platform for prioritizing and implementing habitat connectivity projects on the ground across multiple jurisdictions. The product will be a science-based prioritization of critical habitat *pinch-points* co-created with local land managers that identifies threatened linkages in high value habitat corridors. Specific products generated will include a region-wide prioritization of threatened linkages complemented by linkage-specific portfolio reports that evaluate site-specific benefits in terms of climate adaptation, plant and animal species conservation, and watershed integrity. These portfolio reports will provide critical support in advancing on-the-ground funding and implementation, primarily on the part of private land trusts and public open space districts, organizations that play a critical role in securing linkages between large state and federally-owned protected lands. The results will thus empower local agencies to work more effectively on-the-ground to enhance connectivity and climate resilience in the Mayacamas to Berryessa Coast Ranges.

Approach and Scope of Work

This proposal scales up science and management approaches successfully demonstrated in the Sonoma Valley Wildlife Corridor Program implemented by Sonoma Land Trust (SLT). For one element of that program, SLT applied the UC Berkeley Merenlender Lab's novel approach to high resolution mapping of both habitat permeability and climate space in a targeted approach to identify conservation opportunities and quantify climate adaptation benefits of linkage implementation on a specific property. We propose the following actions to extend this approach throughout the region.

1. Building a Landscape Connectivity Network for corridor identification and implementation - We will build on Pepperwood's Mayacamas Forum for land and water managers and the North Bay *Critical Linkages* implementation effort to consolidate a *Mayacamas to Berryessa Landscape Connectivity Network* among organizations and collectives already focused on landscape units within the project area. Pepperwood, both a land manager and science hub, will serve as the *Network* facilitator.

2. Select critical habitat and critical corridor pinch points - The *Network* will advise the UC Berkeley team on selection criteria for identifying *core* habitat patches to provide a foundation for the connectivity strategy. The UC team will help facilitate this process by providing maps of existing continuous wild land areas and riparian zones. On the basis of a UC wildlife permeability assessment and identification of multiple fine scale linkages between identified core habitats, the *Network* and UC team will jointly define criteria for *pinch points* to identify critical locations throughout the project area where continuous habitat zones narrow to a degree where long-term connectivity is threatened. The UC team will map a set of fine-scale linkages capable of maintaining connectivity for each priority pinch point.

3. Apply Climate adaptation benefit assessment and create linkage portfolio reports - The UC team will then conduct an assessment of the potential individual and net climate adaptation benefits of linkage implementation to help prioritize among possible habitat linkage routing options. This phase of the project will tap into a fine-scale climate-hydrology knowledgebase developed by Pepperwood's Terrestrial Biodiversity Climate Change Collective (TBC3 – www.tbc3.org). Linkage climate adaptation benefits will be evaluated in terms of climate heterogeneity, relief from high summer temperatures, and maintenance of low winter temperatures. The project will use recent advances in modeling potential climate impacts on watershed recharge, native vegetation composition, and fire dynamics to identify critical refugia and seed sources. For each prioritized linkage, a *linkage portfolio report* will be generated that identifies the set of parcel-scale linkage alternatives, specifies critical linkage implementation partners, and quantifies the relative climate adaptation and other conservation benefits of each linkage alternative.

4. Messaging project need and communicating best management practices to advance regional implementation - The *Network* will coordinate a communication and stakeholder engagement strategy beginning with a "theory of change" model detailing how outreach efforts will support landowner involvement and adoption of best practices. It will build upon on existing wildlife corridor outreach materials developed by Sonoma Land Trust and draw on their experience working with landowners to implement best practices. The *Network* will also develop a consistent vocabulary for explaining the importance and value of landscape connectivity and best management practices for conserving landscape connectivity. This consistent messaging will help raise public awareness and advance implementation across the project area.

Focal Resources, Top Stressors, and Specific Management Needs

The Mayacamas to Blue Ridge-Berryessa mountain ranges are characterized by globally significant biodiversity, a multi-jurisdictional land management framework, and an engaged scientific community comprised of national leaders in conservation and climate science. The mountains of the North Coast Range provide spines of wilderness that radiate out from rapidly urbanizing regions of the San Francisco Bay Area. Included county, state, federal, and private protected lands have been identified as keystone areas critical to the long-term health of plant and wildlife populations of the region by the Conservation Lands Network (www.bayarealands.org). The study area also includes the new Blue-Ridge Berryessa Snow

Mountain National Monument, a major conservation investment that spans multiple counties. Key focus resources include the incredibly diverse flora of the California Floristic Province and wildlife populations that still feature representation of top trophic level carnivores and meso-carnivores. Top stressors include habitat fragmentation, climate change, drought, and catastrophic fire. Targeted conservation outcomes include the following.

- Scientific resources are leveraged to inform landscape connectivity efforts in the context of climate change adaptation in the Northern California Coast Ranges.
- Public and private land managers benefit from an improved understanding of the role of protected area networks and habitat corridors in climate change adaptation.
- A collective site-specific implementation strategy is defined and launched to conserve ecologically intact areas and to restore connectivity between such areas where practical.

The Mayacamas to Berryessa Landscape Connectivity Network Partnership

In addition to managing its own 3,200-acre reserve in the heart of the Mayacamas Mountains, Pepperwood has served as a center for convening science-management working groups since opening the doors of its Dwight Center for Conservation Science in 2010. Based on its successful coordination of a Mayacamas Forum for land and water managers, Pepperwood was selected to hold two Bay Area Open Space *Critical Linkages* pilot implementation meetings in late 2013. Feedback from the conservation community was that the very coarse scale analysis of the regional *Critical Linkages* project was insufficient for site-specific planning. That discussion led to a series of six follow up meetings that forged this nascent *Landscape Connectivity Network* and resulted in generating this proposal, a version of which was submitted to this grant opportunity in 2014. In 2015, Pepperwood and the Bureau of Land Management (BLM) forged a partnership around climate adaptation, fire mitigation, and forest health whereby Pepperwood facilitates science partnerships to advise on management of the BLM Ukiah Field Office's land portfolio. Since our 2014 submission to this program, we have tightened the spatial scope of this proposal to concentrate just on the Mayacamas to Berryessa region, particularly in light of our new BLM partnership and the establishment of the new National Monument.

Our proposed activities build on the distinctive strengths of our partners who look to Pepperwood to serve as a backbone organization for this effort. The Blue Ridge-Berryessa Natural Area partnership has developed successful collaborative methods to foster teamwork between multiple counties and land trusts in the Blue Ridge-Berryessa Range and recently completed a Conservation Action Plan with the CA Department of Fish and Wildlife for their habitat "core." Work by Pepperwood, Audubon Canyon Ranch, Sonoma Land Trust (SLT), Napa Land Trust, and the Sonoma County Agricultural Preservation & Open Space District is quantifying wildlife occupancy in the central Mayacamas region as a basis for acquisition and stewardship decision-making. This project will facilitate a peer-to-peer transfer of SLT's innovative new easement tools, landowner agreements, landowner outreach, and on-the-ground management strategies to enhance permeability. Pepperwood's Native American Advisory Council, which includes members from multiple native peoples of the region, including Wintun, Pomo, and Wappo tribes, will be the lead on extending an invitation to the more than 14 federally-recognized tribes in the region to participate in the *Network* and the site-specific

prioritization process. We will build capacity throughout the region by refining and sharing best practices through this facilitated process.

Applicability to CA-LCC Priorities and Place-Based Project Criteria

Given the goal of distributing CA-LCC resources across the contained eco-regions, this proposal fills a critical gap of addressing the inland regions of the North Coast, where apparently no CA-LCC projects have been funded to date. Based on the website review, North Coast projects funded to date only address the narrow band of coastal resources including the Redwood zone and adjacent marine resources. Meanwhile, outside of state-wide initiatives, CA-LCC resources have apparently been invested in approximately four Southern California projects, three San Francisco Bay projects, a Central Coast project, two Central Valley projects, and two Sierra Nevada projects. This project therefore fills a critical gap between the Coastal Zone and the Central Valley in the North Coast. One consideration in this region is that the majority of land is privately held, which requires a greater investment in facilitation compared to locations where federal salaries can be provided as a match to project funds. We hope the committee will consider the need to fill this geographic gap, where no CA-LCC place-based investments have been made to date.

We also note that despite a primary objective of the CA-LCC Science-Management Framework being to "promote landscape-scale connectivity and ecological and physical processes that function within current and future ranges of variability to support diverse and thriving ecosystems," this appears to be the first project that would directly address this objective of enhancing connectivity in the North Coast (or elsewhere) in a manner that could be exported to other eco-regions. We encourage the committee to consider the need for a relatively greater investment in project implementation per unit area given the need to facilitate multiple private partners in addition to state and federal land managers.

Applicability to Five Key Criteria of CA-LCC Place-Based Project Objectives

1. Partnership - This project forms an expanded regional partnership among pre-existing collectives and organizations already focused on landscape units within the project area. The goal of the *Mayacamas to Berryessa Landscape Connectivity Network* is to respect the integrity of existing partnerships (including their working agreements, goals, objectives, and knowledge bases) while aiming to add value by forging liaisons across geographic and jurisdictional boundaries.

2. Information - This initiative builds on an existing knowledgebase for the region to build local connectivity action plans. Examples of specific information sources include the following: *Conservation Lands Network* (Bay Area Open Space Council); *SW CSC Basin Characterization Model Climate–Hydrology Futures* (Flint and Flint 2013, TBC3 2014); *Critical Linkages Bay Area and Beyond* (Penrod et al 2013)*; Blue-Ridge Berryessa Natural Resources Area CAP* (BRBNA); *Sonoma County Biodiversity Action Plan* (Community Foundation Sonoma County)*; California Climate Commons resources* (CA–LCC); *Mayacamas Connectivity Report* (SCAPOSD with UC Berkeley*); TBC3 Potential Vegetation Transition Model* (Ackerly et al. 2015); *CDFW Vegetation Assessment* (Thorne et al. 2016); *Climate Ready North Bay* (Pepperwood and TBC3); *Fire and Climate Change Projections* (Krawchuk and Moritz 2012); *Northern California Adaptation*

Project (USFS and BLM with EcoAdapt 2016). These information sources provide state-of-the-art data on natural areas cover, urbanization, and fragmentation threats, current and projected climate stresses, hydrologic connectivity and function, habitat and conservation suitability, potential wildlife energy optimization pathways, vegetation distributions and climate trends, and existing land and water resource planning frameworks. Pepperwood's Native American Advisory Council and participating tribes will bring in Traditional Ecological Knowledge during this facilitated process. This proposal provides the first opportunity for conservation decision makers to engage and integrate this comprehensive knowledgebase with expert mapping support.

3. Decision Support - We will collaborate with Data Basin to create a customized *Mayacamas to Berryessa Habitat Connectivity Data Atlas* as a decision support platform for integrating the diverse data sources listed above (for an example, see http://2c1forest.databasin.org). This will provide partners a decision support framework for the project and beyond using Data Basin's online geo-processing tools. Partners will have access to this flexible knowledgebase during the site-specific implementation phase launched by this project. The spatial information and associated products will remain openly accessible beyond the two-year project timeline.

4. Strategies - This project will formulate a regional climate smart conservation connectivity strategy capable of achieving measurable conservation objectives for our natural resources. This strategy will be overarching in nature, built on a regional consensus regarding goals, objectives, and evaluation measures.

5. Action - This initiative will identify specific geographic zones, presently conceived of as priority "pinch points," which will be the focus of site-specific action plans to be implemented by subsets of the larger *Landscape Connectivity Network* in the context of mutually agreed-upon regional priorities. Site specific action plans will be grounded in applicable best management practices for assessment, acquisition, easements, and a diverse array of approaches to stewardship including Traditional Ecological Knowledge.

Capacity: Pepperwood has a proven track record of successfully engaging science partners, including UC Berkeley, in the development of site-specific conservation action plans. In particular, Pepperwood has collaborated with lead scientist Dr. Adina Merenlender, and supporting advisor Dr. David Ackerly in the context of the Terrestrial Biodiversity Climate Change Collaborative (TBC3), to develop applied science tools to build climate adaptation capacity in the San Francisco Bay Area. The Bay Area Open Space Council, which has been the primary partner in our applied climate adaptation, is extremely supportive of this proposal as a model for application throughout the region.

Timeline: The project period is proposed to range from September 2016 to July 2018. The attached Budget and Deliverables spreadsheet summarizes the project timeline.

Measuring Results: Upon award we will work with partners to design a project work plan that includes SMART (specific, measurable, ambitious, realistic, timebound) objectives including evaluation metrics. At a minimum, in terms of process delivery, we will measure completion of

specific deliverables in the deliverables tables including *Network* meetings conducted and specific data, report, tool, and guidance document deliverable completion by the UC team. In addition, we aim to produce a long-term bio-physical monitoring strategy capable of evaluating measurable ecological outcomes of the project as a whole in concert with this effort.

Budget: The attached budget spreadsheet summarizes project costs. Out of the total, 30% is proposed for Pepperwood salaries, 1% for supplies, 5% for overhead, 1% for facilities, 55% for the UC Berkeley sub-award, and 8% for a contractor to assist with meeting facilitation and documentation. Budget details and timing are provided in the attached spreadsheet.

Products/Data Sharing: The "Products" tab of the Budget and Products spreadsheet identifies products, deliverables, and data resulting from project that will be shared. In addition to the project database to be developed in the Data Basin platform, products developed with this funding will be cataloged in the California Climate Commons and provided for public access. If awarded funding, we will create a Data Management Plan in concert with the CA-LCC. An advantage of funding this project for the CA-LCC is that we will be developing a framework that is transferable to other areas within and outside of the CA-LCC region. The climate data which we are using to develop climate adaptation strategies is now available for the entire CA-LCC region and beyond. Our innovative approach allows for locally-customized climate adaptation and connectivity solutions in the context of mutually established, consistent regional science products and best management practices. Thus the model developed by this project will be a template for how to achieve these goals throughout the nation.

Deliverables/Timeline/Accessibility: The attached deliverables table spells out specific coordination milestones, a timeline for deliverables to be produced, and access to be provided via in person interactions, publications, presentations, Data Basin, and the California Climate Commons.

Attachments: See attached PDF for project leads.

Project Area

Building habitat connectivity for climate adaptation, Mayacamas to Berryessa Coast Ranges
Prepared by Pepperwood and UC Berkeley for the CA-LCC - 25 March 2016

California Landscape Conservation Cooperative 2016 Proposal Budgets

Budget Categories	CA LCC Request	Partner(s) Contribution(s) (monetary)	Partner(s) Contribution(s) (non-monetary value/in-kind)	**Total**
Salaries	$ 59,128.00	$ 390,722.00	$ -	$ 449,850.00
Supplies	$ 2,000.00	$ 3,700.00	$ -	$ 5,700.00
Overhead	$ 9,410.00		$ -	$ 9,410.00
Equipment	$ -		$ -	$ -
Other: Travel	$ 407.00	$ 578.00		$ 985.00
Other: Facility Rental	$ 1,200.00			$ 1,200.00
Other: Partner Agencies			$ 24,000.00	$ 24,000.00
Other: UC Berkeley sub grant	$ 107,726.00			$ 107,726.00
Other: Contractor	$ 14,850.00			$ 14,850.00
Total	$ 194,721.00	$ 395,000.00	$ 24,000.00	$ 613,721.00

Other:

Match Sources:

Cash	**AMT**	**Task support**	**Status**
BLM Internal Funding	$ 50,000	Task 3	Pending
State Coastal Conservancy	$ 100,000	Task 2	Confirmed
Gordon and Betty Moore Foundation: TBC3 Climate Projections	$ 205,000	Task 2	Confirmed
Switzer Foundation: TBC3 Climate Adaptation Coordinator	$ 40,000	Task 3	Confirmed
Cash TOTAL	$ 395,000		
In-kind			
Other partner agencies (estimated)	$ 24,000	Task 3	
In-kind total	$ 24,000		

Building habitat connectivity for climate adaptation, Mayacamas to Berryessa Coast Ranges

Attachment 3.3 - CA-LCC Place Based Adaptation Projects 2016

Prepared by Pepperwood and UC Berkeley for the CA-LCC - 25 March 2016 Project Period: September 1, 2016-June 30, 2018

#	Deliverable Name	Deliverable Type	Expected Delivery Date	Description	How will access to this product be provided? (See examples)	Target Audience (be as specific as possible)
1	Quarterly Financial and Progress Reports	Administrative	Quarterly	These are the quarterly reports required of all projects	Quarterly Financial and Progress Reports emailed to CA LCC	Financial: CA LCC; Progress: CA LCC and Partners
2	Quarterly Landscape Connectivity Network Meetings	Administrative	Quarterly	This core leadership committee will provide consistency in project delivery and review products per the schedule below	Quarterly Progress Reports emailed to CA LCC	CA-LCC and project team
3	Core Habitats ID	Datasets: Vector geodata	2/1/2017	The UC team will deliver a core habitats map based on naturalness mapping and leadership team input	DataBasin website and working group meetings	Project team of land and water managers
4	Climate Space Analysis	Datasets: Vector geodata	3/1/2017	The UC team will deliver a climate space analysis that quantifies climate gradients, provides climate analogs,vegetation and fire anlalyses	DataBasin website and working group meetings	Project team of land and water managers
5	Priority linkage area selection	Datasets: Vector geodata	4/1/2017	The UC team will deliver a summary of potential linkages between idenfitied core areas	DataBasin website and working group meetings	Project team of land and water managers plus CA-LCC community
6	Data Management Plan	Report	5/1/2017	The UC team will develop a data management plan in concert with CA-LCC advisors	California Climate Commons	CA-LCC and project team
7	Methodology for identifying landscape level priorities	Methodology	5/1/2017	This methodology will capture the melded science-management criteria for identifying regional landscape level connectivity priorities.	California Climate Commons	Project team, researchers and land and water managers in study area
8	Year 1 Fact Sheet	Report	9/1/2017	A summary of accomplishments in year one.	CA-LCC	CA-LCC and partners
9	Draft focus area priority locations for connectivity action plans	Adaptation Plan	1/1/2018	Local partner teams will create site-specific adaptation strategies	Internal review by *Landscape Connectivity Network*	Project team, land and water managers in study area, private landowners and agricultural operations.
10	Final focus area priority locations for siting connectivity action plans	Adaptation Plan	2/1/2018	Local partner teams will create site-specific adaptation strategies	Internal review by *Landscape Connectivity Network*	Project team, land and water managers in study area, private landowners and agricultural operations.
11	Draft priority linkage "portfolio reports"	Adaptation Plan	3/15/2018	Linkage portoflio reports will address priority geographic focus areas, provide metrics for linkage alternatives in terms of connectivity and conservation benefits, and define a road map for moving forward in those areas with local partners	Direct access to *Landscape Connectivity Network*	Project team, land and water managers in study area, private landowners and agricultural operations.
12	Final portfolio reports for priority "pinch points"	Adaptation Plan	5/1/2018	Local partner teams will advise on site-specific adaptation strategies to create final portfolio reports	Direct access to *Landscape Connectivity Network*	Project team, land and water managers in study area, private landowners and agricultural operations.
13	Final priority linkage "portfolio reports"	Adaptation Plan	6/30/2018	Linkage portoflio reports will address priority geographic focus areas, provide metrics for linkage alternatives in terms of connectivity and conservation benefits, and define a road map for moving forward in those areas with local partners	Direct access to *Landscape Connectivity Network*	Project team, land and water managers in study area, private landowners and agricultural operations.
14	Year 2 Fact Sheet	Presentation or Poster	6/15/2018	A summary of accomplishments in year two	CA-LCC	CA-LCC and partners
15	Final summary products	Presentation or Poster	6/30/2018	Delivery of a peer-reviewed poster at relevant professional conference, and at CA-LCC meetings as requested.	Conferences and meetings	Peer practitioners, key decision makers capable of using model
16	Final summary products	User Manual or Guidance Document	6/30/2018	Dissemination of project methods and outputs via CA-LCC outlets.	California Climate Commons and other CA-LCC outlets	Peer practitioners, key decision makers capable of using model
17	Final report	Presentation or Poster	6/30/2018	Delivery of a peer-reviewed poster at relevant professional conference, and at CA-LCC meetings as requested.	Conferences and meetings	Peer practitioners, key decision makers capable of using model

Habitat connectivity for climate adaptation, Mayacamas to Berryessa Coast Range

Prepared by Pepperwood and UC Berkeley for the CA-LCC - 25 March 2016

Attachment 3.2 - CA-LCC Place Based Adaptation Projects 2016

Key Tasks and Deliverables*	Year 1	Year 2	Totals	NOTES
Task 1. Backbone Functions/Project Mgt (deliverable #s 1, 8, 14,15, 16, 17)	$ 26,962.00	$ 26,962.00	$ 53,924.00	Pepperwood Staff and expenses
Task 2. Science and Data support (deliverable #s 3-7, 9-13)	$ 63,863.00	$ 43,863.00	$ 107,726.00	Science staff (UCB post-doctoral researcher plus advisors)
Task 3. Land Managers nexus and outreach (deliverable # 2 plus input on all other deliverable)	$ 15,569.00	$ 17,502.00	$ 33,071.00	Land Manager faciliation including Pepperwood contractor
	$ 106,394.00	$ 88,327.00	$ 194,721.00	

**deliverable #s are displayed on the deliverables list*

Relevant Literature

Ackerly, D. D., W. K. Cornwell, S. B. Weiss, L. E. Flint, and A. L. Flint. (2015) A geographic mosaic of climate change impacts on terrestrial vegetation: Which areas are most at risk? *PlosOne* **10**:e0130629.

Burrows M.T., Schoeman D.S., Richardson A.J. *et al.* (2014) Geographical limits to species-range shifts are suggested by climate velocity. *Nature* **507**, 492-495.

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Nunez T.A., Lawler J.J., McRae B.H. *et al.* (2013) Connectivity Planning to Address Climate Change. *Conservation Biology* **27**, 407-416.

Opdam P., Wascher D. (2004) Climate change meets habitat fragmentation: linking landscape and biogeographical scale levels in research and conservation. *Biological Conservation* **117**, 285-297.

Stephenson N.L. (1998) Actual evapotranspiration and deficit: biologically meaningful correlates of vegetation distribution across spatial scales. *Journal of Biogeography* **25**, 855-870.

BIOGRAPHICAL SKETCH

Elisabeth (Lisa) Micheli, PhD
President, Dwight Center for Conservation Science
2130 Pepperwood Preserve Road, Santa Rosa, CA 95404
Phone: (707) 360-5536 Fax: (707) 591-9315
Email: lmicheli@pepperwoodpreserve.org

- **Professional Preparation**

Harvard College, Cambridge, MA	History & Science	AB	1987
King's College, Cambridge University	History & Philosophy of Science	MPhil	1989
University of California, Berkeley, CA	Environmental & Civil Engineering	MS	1996
University of California, Berkeley, CA	Energy & Resources	PhD	2000
University of California, Davis, CA	Geology	Post Doc	2001

- **Appointments**

President, Dwight Center for Conservation Science at Pepperwood, 2009 to present
Responsible for program development, funding and oversight for a private field station sited on a 3200-acre nature preserve run in partnership with the California Academy of Sciences. Currently co-chair of the Terrestrial Biodiversity Climate Change Collaborative (TBC3), a multi-agency effort based at Pepperwood to develop climate change projections and long-term resource monitoring for Bay Area land managers.

Co-principal Investigator, California Academy of Sciences, 2007 to October 2009
Developed and implemented the Water's Edge project, a Bay Area climate-biodiversity adaptation research pilot, with Dr. Healy Hamilton and the Academy's Center for Biodiversity Research Informatics.

Program Manager, Sonoma Ecology Center, 2002 to 2009

Associate Researcher, Department of Geology, UC Davis, 2000 to 2002

Graduate Researcher and Teaching Assistant, UC Berkeley, 1995 to 2000

Environmental Scientist, US Environmental Protection Agency, Region 9, 1989 to 1995

- **Selected Publications**

Heller, N., J. Kreitler, D. D. Ackerly, S. B. Weiss, A. Recinos, R. Branciforte, L. E. Flint, A. L. Flint, and **E. Micheli.** 2015. Targeting climate diversity in conservation planning to build resilience to climate change. *Ecosphere,* **6**:65.

Chornesky, E., D. Ackerly, P. Beier, F. Davis, L. Flint, J. Lawler, P. Moyle, M. Moritz, M. Scoovner, K. Byrd, P. Alvarez, N. Heller, **E. Micheli** and S. Weiss. 2015. Adapting California's ecosystems to a changing climate. *BioScience,* **65**:247–262.

Micheli, L., and D. Ackerly. 2013. *The Terrestrial Biodiversity Climate Change Collaborative (TBC3): An interdisciplinary strategy for advancing science-based conservation.* Dwight Center for Conservation Science at Pepperwood, Santa Rosa, CA.

Micheli, E., L. Flint, A. Flint, M.Kennedy, and S.Weiss. 2012. Downscaling future climates to the watershed scale. *San Francisco Estuary and Watershed Science.* **12**: 1-31.

- **Research Collaborators & Other Affiliations**

Collaborators and Co-editors: David Ackerly (UC Berkeley, Integrative Biology), Alan Flint (USGS, CA Water Science Center), Lorraine Flint (USGS, CA Water Science Center), Nicole Heller (Peninsula Open Space Trust), Adina Merenlender (UC Berkeley, Hopland Research Extension Center), Alicia Torregrosa (USGS, Menlo Park), Susan Townsend (Wildlife Biologist) Sam Veloz (Point Blue Conservation Science), Stuart Weiss (Creekside Center for Earth Observation).

BIOGRAPHICAL SKETCH

Adina Maya Merenlender
Department of Environmental Sciences, Policy and Management
160 Mulford Hall, University of California – Berkeley, CA 94720-3114
Phone: (707) 744-1270 Fax: (707) 744-1040
Email adina@nature.berkeley.edu

- **Professional Preparation**

University of Rochester	Biology	PhD	1993
Advisor: Dr. Andrew P. Dobson, Princeton University.			
Research Areas: The Effects of Sociality on the Demography and Genetic Structure of *Lemur fulvus rufus* (polygamous) and *Lemur rubriventer* (monogamous) & the Conservation Implications.			
University California, San Diego	Biology	MS	1986
University California, San Diego	Biology	BA	1985

- **Appointments**

Cooperative Extension Specialist 1995-present
Adjunct Professor
Environmental Science, Policy, and Management Department
University of California, Berkeley
Post-doctoral Fellowship at Stanford University, Center for Conservation Biology

- **Selected Publications**

Kelly, R.M., Kitzes, J., Wilson, H. and **A.M. Merenlender.** 2016. Habitat diversity promotes bat activity in a vineyard landscape. *Agiculture, Ecosystems and Enviornment,* **223**:175-181.

Gray, M., Wilmers, C.C., Reed, S. E., and **A. M. Merenlender.** 2016. Landscape feature-based permeability models relate to puma occurrence. *Landscape and Urban Planning,* **147**:50-58.

Merenlender, A.M., Ackerly, D., Suding, K., Shaw, R. And Zaveleta, E. 2015. Chapter 41:*Stewardship, Conservation, and Restoration in the Context of Environmental Change*. California Ecosystems UC Press.

Matella, M.K. and **A. M. Merenlender.** 2015. Scenarios for Restoring Floodplain Ecology Given Changes to River Flows Under Climate Change: Case from the San Joaquin River, California. *River Research and Applications*, **31**(3): 280-290.

Kitzes J., **Merenlender A.** 2014. Large Roads Reduce Bat Activity Across Multiple Species. *Plos One*, **9**(5): E96341. Doi:10.1371/Journal.Pone.0096341.

Deitch, M.J. & **Merenlender, A.M**. And S. Feirer. 2013. Cumulative Effects of Small Reservoirs on Streamflow in Northern Coastal California Catchments. Water resources management, **27**(15): 5101-5118.

Merenlender A. And M. Mattella 2013. Maintaining and restoring hydrologic habitat connectivity in mediterranean streams: an integrated modeling framework. *Hydrobilogia*, **719**(1):509-525.

- **Graduate Students**

Completed Ph.D. – Jodi Hilty, Jeff Opperman, Juliet Christian-Smith, Allison Bidlack, Sarah Reed, Adena Rissman, Ted Grantham, Justin Kitzes, Mary Matella Completed M.S. Lori Conzo, Nathan Gove **Post-doctoral fellows** – Sarah Reed, Kathleen Lohse, Leah Beche, Matt Deitch, David Newburn

- **Research Currently Funded by**

Army Corps of Engineers 2010-2013
National Science Foundation 2011-2013
CONICYT Chile 2013-2014