



DEPARTMENT OF ECOLOGY & EVOLUTIONARY BIOLOGY
UNIVERSITY OF CALIFORNIA
1156 HIGH STREET
SANTA CRUZ, CALIFORNIA 95064

September 18, 2010

Direct Contact: Adelia L. Barber
adelia@biology.ucsc.edu

Julie Engell
331 Dry Creek Road
Monterey, CA 93940

Dear Mrs. Engell:

At your request, I have performed several acreage calculations on maps of the Monterey County Water Resources Agency (MCWRA) Assessment Zones. I have worked analyzing land use using GIS for the last 7 years and I have included my CV with this letter.

MCWRA did not make GIS data available for this project, thus all my calculations were performed on published maps that were in PDF format. Although my calculations would have been more precise if GIS data had been made available, fairly accurate numbers can be derived from the PDF maps.

I used three documents as source material:

- 1- A PowerPoint presentation available on the MCWRA website titled "MCWRA Reservoirs: What Was, What is, and What Will Be" and dated Sept. 2007. Slides 11, 12, and 13 of this presentation show outlines of zones 2, 2A, and 2C.
<http://www.mcwra.co.monterey.ca.us/SVWP/Presentations/NacSAinformation09192007.pdf>
- 2- A PDF document on the MCWRA website titled "Zone 2B Proposition 218 Engineers Report" and dated November 2007. A map of zone 2B appears on page 2-3.
http://www.mcwra.co.monterey.ca.us/SVWP/Final_Engr_Rpt_NOV07.pdf
- 3- A PDF document on the MCWRA website titled "2009 Ground Water Summary Report" and dated August 2010. Figure 1 on page 2 of this report includes a map of the combined zones 2, 2A and 2B.
http://www.mcwra.co.monterey.ca.us/Agency_data/GEMS_Reports/2009%20Summary%20Report.pdf

Each of the maps mentioned above were converted to JPEG images and overlaid onto Google Earth aerial imagery using Google Earth PRO 5.0. The coastal and county boundaries were aligned with a Monterey County boundary map that was obtained from GIS staff at the Monterey County Planning Office. The boundaries of each map were aligned to within 100 meters. A higher level of precision would have been available with actual GIS data, however a 100-meter offset is negligible given the large size of Monterey County and the assessment zones. Figure 1 (attached) shows an example of how these images were aligned, using the Zone 2B as an example.

Next, the boundaries of each zone (2, 2A, 2B & 2C) were traced. The resulting polygons were imported into ArcGIS 9.3, converted into shapefile format, and total acreage was calculated.

According to these calculations, there are **69,812** acres included in Zone 2C that are NOT within the boundaries of Zones 2, 2A or 2B. Figure 2 shows a map of these areas. Given the inherent errors in the process of overlaying multiple images and tracing zone edges, each boundary I have drawn is likely within 1000-meters of the true boundary. This leads to a potential error of about $\pm 4\%$ for the calculation described above, thus the true number of acres outside of zones 2, 2A and 2B but inside of zone 2C is likely between **67,019** and **72,604** acres.

Please feel free to contact me with questions.

Sincerely,

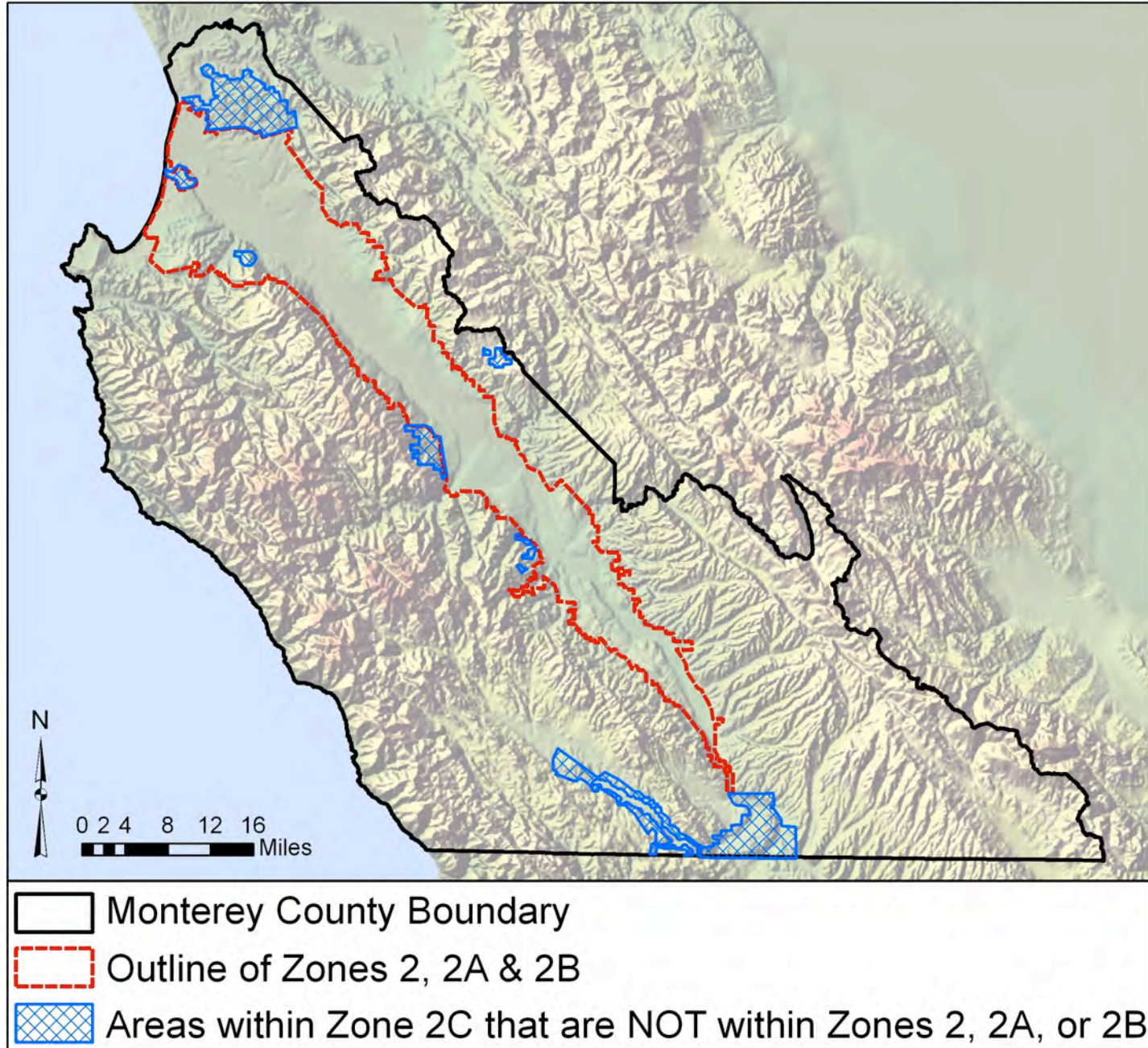
A handwritten signature in black ink, appearing to read 'Adelia L. Barber'. The signature is fluid and cursive, with a long horizontal flourish at the end.

Adelia L. Barber
PhD. Candidate
University of California, Santa Cruz
Department of Ecology and Evolutionary Biology

Figure 1: Zone 2B map overlaid on aerial imagery



Figure 2: Areas that are within the boundaries of Zone 2C but not within the boundaries of 2, 2A, or 2B



CURRICULUM VITAE

ADELIA L. BARBER

Department of Ecology and Evolutionary Biology

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University of California, Santa Cruz
Santa Cruz, CA 95062**

adelia@biology.ucsc.edu

ACADEMIC HISTORY

PhD. Candidate in Ecology and Evolutionary Biology, University of California, Santa Cruz
Advisor: Dan Doak (2004 - current) *Advanced to Candidacy April 2007*

Brown University: Providence, RI (1997 - 2002)
4.0 GPA B.S. in Environmental Science
Magna cum laude with Honors

School for International Training, Arusha, Tanzania (2000)
Certificate in Wildlife Ecology

RESEARCH INTERESTS

Population dynamics and modeling of long-lived tree species, theory and empirical studies of plant life-histories, ecology of the genus *Pinus*, taxonomy of the genus *Trifolium*, dendrochronology, matrix modeling theory, conifer leaf physiology, spatial modeling using GIS

PROFESSIONAL AND TEACHING EXPERIENCE

- California State Coordinator of GLORIA - Global Observation Research Initiative in Alpine Environments, operated by the US Forest Service the University of CA (2009 – current)
- Co-Instructor for Biology 20B, Structure and Function of Organisms (305 students, 2007)
- Teaching Assistant for Plant Ecology, UC Santa Cruz, Professor Ingrid Parker (Fall 2006)
- Teaching Assistant for Quantitative Conservation Biology, UCSC, Prof. Doak (Winter 2005)
- Assistant Agricultural Researcher, UC Cooperative Extension Monterey (2003- 2004)
- Teaching Assistant for Conservation Biology, Brown University, Prof. Hughes (Fall 2001)
- Mentor and Trip Leader, Providence Outdoor Leadership Project (Fall, 1999- Fall 2001)
- Teaching Assistant for Applied Plant Ecology, Brown University, Prof. Schmitt (Spring 2001)
- Teaching Assistant for Environmental Science, Brown University, Prof. Hamburg (2001)
- Teaching Assistant for Plant Systematics, Brown University, Prof. Schmitt (Fall 2000 & 2001)
- Vegetation Researcher, Ndarakwai Wildlife Reserve, Tanzania (Fall 1999- Summer 2000)
- Laboratory and Field Technician, United States Geological Survey (Summer 1999)

- Seminar Coordinator for the Center for Environmental Studies, Brown Univ. (1998-1999)
- Intern for California State Assemblyman Fred Keeley, Santa Cruz, CA (Summer 1998)

GRANTS AND AWARDS

2010 UC Santa Cruz GAANN Fellowship
2009 ARCS Foundation Scholarship
2009 California Desert Research Fund Grant
2009 Elvander Scholarship from the California Native Plant Society
2008 NSF Doctoral Dissertation Improvement Grant
2008, 2007, & 2006 White Mountain Research Station Graduate Student Grant
2004 STEPS Fellow in Interdisciplinary Environmental Research, MRC Greenwood Fellowship
2004 National Science Foundation Graduate Research Fellow
2004 UCSC President's Cota-Robles Scholarship
2001 Brown University Royce Fellowship Continuation Grant
2000 Brown University Royce Fellowship Grant (for work on the Santa Cruz Tarplant)

GUEST LECTURES & PRESENTATIONS

Invited Presentations:

Barber, A.L. "A Natural History of *Pinus longaeva*." San Francisco Chapter of the California Native Plant Society. Santa Cruz, CA (September 2010)

Barber, A.L. "A Natural History of *Pinus longaeva*." Santa Cruz Chapter of the California Native Plant Society. Santa Cruz, CA (January 2010)

Barber, A.L. "Seven Millennia of Population Dynamics in a High-Altitude Population of Bristlecone Pine." California Native Plant Society Conservation Conference. Sacramento, CA (January 2009)

Barber, A.L. "Population Ecology of Long-Lived and Long-Dead Charismatic Megaflora." Climate, Ecosystems and Resources in Eastern California (CEREC) Symposium. Bishop, CA (November 2008)

Barber, A.L. "The Bristlecone Pine Ecosystem." White Mountain Research Station Open House, Barcroft Station. (August 2008)

Barber, A.L. "The Bristlecone Pine Ecosystem." Clark County Ecosystem Health Workshop, Desert Research Institute. Las Vegas, NV (January 2008)

Contributed Presentations and Guest Lectures:

Maher, C. and Barber, A.L. "The Effects of Herbivory and Habitat Amelioration on bristlecone pine (*Pinus longaeva*) Seedlings" Poster, STEPS Institute Annual SLGS Meeting. Santa Cruz, CA.

(February 2009) also displayed at Climate, Ecosystems and Resources in Eastern California (CEREC) Symposium. Bishop CA (November 2008)

Barber, A.L. "Modeling The Early Life-Stages of *Pinus longaeva*." UC Santa Cruz Plant Symposium. Santa Cruz, CA (January 2009)

Garcia, J. and Barber, A.L. "The Effect of mammalian and avian seed caching on bristlecone pine populations." Climate, Ecosystems and Resources in Eastern California (CEREC) Symposium. Bishop CA (November 2008)

Barber, A.L. "Population Ecology of Long-Lived and Long-Dead Charismatic Megaflores." Ecological Society of America Annual Meeting. San Jose, CA (July 2007) (also given to UC Davis Ecology Odyssey Field Course, White Mountain Research Station. September 2007 AND an ecology field course from Victor Valley College, White Mountain Research Station. August 2007)

Barber, A.L. "The Basics of Dendrochronology for Paleoclimate Reconstruction." The Fossil Record. UC Santa Cruz. Winter 2007

Barber, A.L. "Matrix Modeling for Plant Populations and Metapopulation Analysis." Plant Ecology, UC Santa Cruz. Fall 2006

Barber, A.L. "Environmental and demographic stochasticity in matrix modeling." Quantitative Conservation Biology, UC Santa Cruz. Winter 2006

Barber, A.L. "Long Term Population Dynamics: Competition and Facilitation in Bristlecone and Limber Pines." Stanford – UCSC Species Interaction Workshop. Santa Cruz, CA (December 2006)

Barber, A.L. "Mustard Cover Crops for Weed Control." Western Grower's Association Meeting. Salinas, CA. December 2003.

Barber, A.L. "Population Trends for the Santa Cruz Tarplant." The Coastal Training Program's Santa Cruz Tarplant Recovery Workshop, Monterey, CA. August 2003

Barber, A.L. "A Grower's Guide to Grass Identification." Salinas Valley Grower's Meeting. July 2003.

PUBLICATIONS & REPORTS

Barber, A.L. *IN PREP* "Five decades of recruitment in a high-altitude population of Bristlecone Pine". Will be submitted to Ecology in July 2010

Barber, A.L. and M.E. Barber. *Requested, In PREP* "A novel borer extraction device for field use." Will be submitted to Tree-Ring Research, July 2010

Morgan, R., Barber, A.L., and Velzy, J. *IN PREP* “*Trifolium piokowskii* (Leguminosae, Papilionoideae): A new species of clover from Northern California.” Will be submitted to *Novon* in July 2010

Sattherthwaite, W. H., K. D. Holl, G. F. Hayes, and A. L. Barber. 2007. Seed Banks in Plant Conservation: Case Study of the Santa Cruz Tarplant Restoration. Biological Conservation 135:57-66.

Hane, E. N., S. P. Hamburg, A. L. Barber, and J. A. Plaut. 2003. Phytotoxicity of American beech leaf leachate to sugar maple seedlings in a greenhouse experiment. Canadian Journal of Forest Research 33: 814-821

A. L. Barber. 2001. Conservation of a Rare California Wildflower: A Case Study of the Santa Cruz Tarplant. Senior Thesis, Brown University Center for Environmental Studies.

A. L. Barber. 2000. The land-use and land-cover of Ndarakwai Wildlife Reserve: Vegetation change over ten years. Report Submitted to Ndarakwai Private Wildlife Reserve, Northern Tanzania

PUBLIC SERVICE, OUTREACH, SKILLS

- Google Earth Case Study: Ecological Research on the Ancient Pines (this case study is displayed on the Google Earth webpage and included in the downloadable program). http://earth.google.com/outreach/case_studies.html
- Graduate Student Member on the faculty search committee for the Dept. of Ecology and Evolutionary Biology, UC Santa Cruz (2009)
- Graduate Student Representative for the Dept. of Ecology of Evolutionary Biology, UC Santa Cruz (2007-2008)
- Volunteer Consultant for The Mountain Resources Group, Save the Bohemian Grove, and Neighbors Against Irresponsible Logging (2005-2009)
- Volunteer, Annual GLORIA Plant Surveys in Tahoe and the White Mountains (Global Observation Research Initiative in Alpine Environments) 2005-2008
- Proficient in Kiswahili and Spanish
- Reviewer for *Acta Oecologia*
- Alumni Interviewer for Brown University (2000 – 2009)
- Professional Societies: Ecological Society of America, California Native Plant Society

MENTORING EXPERIENCE (STUDENTS AND VOLUNTEERS)

Supervisor of Senior Theses 2008-2010

- Scott Jorgensen: “Abiotic limitations of the distributions of *Pinus flexilis* and *Pinus longaeva* in the White Mountains, California.” Advised by Adelia Barber and Ingrid Parker 2010

- Meagan Oldfather: “Elevation-dependent Population Growth Rates of bristlecone pines (*Pinus longaeva*) as an indicator of a Changing Treeline in the White Mountains, California” Advised by Adelia Barber and Ingrid Parker 2010
- Rebecca Byrnes: “Making a usable data base for *Trifolium fucatum*.” Advised by Adelia Barber 2010
- Colin Maher: “The Effects of Herbivory and Habitat Amelioration on bristlecone pine (*Pinus longaeva*) Seedlings.” Advised by Adelia Barber and Prof. Ingrid Parker 2009
- Jeffrey Garcia: “The Effect of mammalian and avian seed caching on bristlecone pine populations.” Advised by Adelia Barber and Prof. Daniel Doak 2009
- Marcos Grabiell: “Somatic Mutations in Bristlecone Pines: A Unique, Precise Approach.” Advised by Adelia Barber and Prof. Kathleen Kay 2008
- Elizabeth Hoosiar: “A Shadow in Time: Using fallen cones to assess the long-term fecundity of *Pinus longaeva*.” Advised by Adelia Barber and Prof. Mark Carr 2008

3 Non-Thesis Independent Study Students (2007 – 2009)

10 Elderly and Citizen Science Volunteers (2006 – 2009)

7 Other Student Volunteers (2007 – 2009)

MEDIA COMMENTARIES

- The Good Times Weekly, Santa Cruz. September 17, 2008. “Pining for the Bristlecone” <http://www.gtweekly.com/20080917249727/good-times/covers/pining-for-the-bristlecone>
- Los Angeles Times. September 25, 2006 “A Top Spot for Higher Education”
- San Francisco Chronicle. August 2, 2006 “Performing High-Altitude Research on Global Warming”