

NAME **ELKE NAUMBURG**

TITLE **Ecohydrologist, Glorieta Geoscience Inc.**

EXPERIENCE SUMMARY 25 Years experience encompassing the following areas:

- Effects of fluctuating groundwater levels on vegetation
- Vegetation responses to environmental stresses such as drought & shade
- Modeling of plant physiological and biomass responses to a range of environmental factors
- Sampling of vegetation conditions & surveys of forest, range & shrub ecosystems
- Evaluation of vegetation dynamics over time
- Chemical analyses of plant tissues for nutritional quality and secondary compounds
- Statistical analyses & data management

SELECTED PROJECT EXPERIENCE

Nye County, Nevada
Project Manager for Nye County, NV Evapotranspiration (ET) analyses in Amargosa Valley, NV. Dr. Naumburg oversees Nye County's portion of development evapotranspiration field studies with the USGS to determine ET contribution to basin perennial yield. 2011

Sideline Dairy, Artesia, NM
Project manager for development of 11,000 ac-ft of irrigation and commercial water rights for PBU determination. 2011

Dairy Discharge Permit Compliance
Development of ground water discharge plans and permit compliance for more than 12 dairies in New Mexico and Nevada. 2006 – date

Phase 1 Environmental Survey
Project manager for Phase 1 Environmental Site Assessment of 11,500 acres for confidential Indian Tribe in New Mexico. 2010

Ecological Consultant to City of Los Angeles in Owens Valley CA, Pacifica Services, Inc.
As part of a large-scale project ensuring future water supply to the city of Los Angeles and the maintenance of healthy vegetation in Owens Valley, Dr. Naumburg managed several tasks within the project: successional vegetation dynamics following agricultural abandonment; relationship between groundwater depth and individual plant species; relationship between vegetation productivity and water availability. Ms. Naumburg managed and budgeted tasks, participated in project meetings, and coordinated with client personnel. She designed experiments and supervised staff, collected and analyzed vegetation dynamics data in relation to groundwater levels, and authored manuscripts, reports and presentations. 2003 - 2005

Visiting Professor and Postdoctoral Research Assistant, University of Nevada, Las Vegas
Analyzed environmental and physiological factors affecting photosynthesis in desert shrubs under ambient and elevated CO₂ to develop seasonal gas exchange model. Designed field and greenhouse experiments and participated in proposal writing. Supervised undergraduate assistants. 2000 – 2002

Ecophysiological Research Assistant, Duke University
Designed and conducted experiments on dynamic photosynthetic responses to changes in light intensity in ambient and elevated CO₂. Coded and parameterized dynamic photosynthesis model. Maintained photosynthesis analyzers, data loggers, "baby-Kucera" sapflow gauges. 1996 – 2000

Ecological Research Assistant, Northern Arizona University
Designed and conducted field study on the relationship between ponderosa

EXPERIENCE (con't)

pine stand structure, light environment and grass species presence and abundance as well as a greenhouse experiment evaluating effect of shade on native grass species. 1994 - 1996

Chemical Research Technician, Northern Arizona University

Set up laboratory and gas chromatographs for resin acid and terpene analysis. Adapted resin acid analysis to ponderosa pine needles. 1994

EDUCATION

PhD Plant Physiological Ecology, Duke University, 2000

MS Forest Ecology, University of Northern Arizona, 1996

BS Forest Management, University of Northern Arizona, 1994

SELECTED PUBLICATIONS

- Pataki, DE; Billings, SE; **Naumburg**, E; Goedhart, CM. 2008. Water sources and nitrogen relations of grasses and shrubs in phreatophytic communities of the Great Basin. *Journal of Arid Environments*, 72: 1581-1593.
- Barker, DH ; Vanier, C; **Naumburg**, E; Charlet, TN; Nielsen, KM; Newingham, BA; Smith, SD. 2006. Enhanced monsoon precipitation and N deposition affect leaf traits and photosynthesis differently in spring and summer in the desert shrub *Larrea tridentata*. *New Phytologist*, 169:799-808.
- Housman, DC; **Naumburg**, E; Huxman, TE; Charlet, TN; Nowak, RS; Smith, SD. 2006. Increases in desert shrub productivity under elevated CO₂ vary with water availability. *Ecosystems*, 9:374-385.
- Naumburg**, E; Mata-Gonzalez, R; Hunter, RG; McLendon, T; Martin, DW. 2005. Phreatophytic vegetation and groundwater fluctuations: A review of current research and application of ecosystem response modeling with an emphasis on Great Basin vegetation. *Environmental Management* 35:726-740.
- Ellsworth, DS; Reich, PB; **Naumburg**, E; Koch, GW; Kubeske, ME; Smith, SD. 2004. A comparison of photosynthetic characteristics and leaf nitrogen responses of 16 species to atmospheric CO₂ across four free-air CO₂ enrichment (FACE) experiments. *Global Change Biology*, 10:2121-2138.
- Smith, SD; **Naumburg**, E; Niinemets, Ü; Germino, MJ. 2004. Environmental Constraints - Leaf to Landscape. In: Smith, WK; Vogelmann, TC; Critchley, C. *Photosynthetic Adaptation*. Springer, pp 262-294.
- Naumburg**, E; Loik, ME, Smith, SD. 2004. Photosynthetic responses of *Larrea tridentata* to temperature extremes under elevated CO₂. *New Phytol* 162:323-330.
- Naumburg**, E; Housman, D; Huxman, TE; Charlet, TN; Loik, ME; Smith, SD. 2003. Photosynthetic responses of Mojave Desert shrubs to Free Air CO₂ Enrichment are greatest during wet years. *Global Change Biology* 9:276-285.
- Naumburg**, E; Ellsworth, DS. 2002. Short-term light and leaf photosynthetic dynamics affect daily photosynthesis estimates. *Tree Physiology*, 22:393-401.
- Naumburg**, E; Ellsworth, DS; Pearcy, RW. 2001. Crown carbon gain and elevated CO₂ response of understory saplings with differing allometry and architecture. *Functional Ecology*, 15:263-273.
- Naumburg**, E; Ellsworth, DS; Katul, G. 2001. Modeling dynamic understory photosynthesis of contrasting species in ambient and elevated carbon dioxide. *Oecologia*, 126:487-499.
- Naumburg**, E; Ellsworth, DS. 2000. Photosynthetic sunfleck utilization potential of understory saplings growing under elevated CO₂ in FACE. *Oecologia* 122:163-174.
- Naumburg**, E; DeWald, LE; Kolb, TE. 2001. Shade responses of five grasses native to southwestern *Pinus ponderosa* forests. *Canadian Journal of Botany*, 79:1001-1009.
- Naumburg**, E; DeWald, LE. 1999. Relationships between *Pinus ponderosa* forest structure, light characteristics, and understory graminoid species presence and abundance. *Forest Ecology & Management* 124:205-215.

SELECTED PRESENTATIONS

- Naumburg**, E, Hubbard, P, Martin, D, McLendon, T. 2005. Successional Trends Following Cultivation in Owens Valley, California. Poster Presentation, Ecological Society of America Meeting, Aug. 2005, Montreal.
- Naumburg**, E, Hubbard, P, Martin, D, McLendon, T. 2004. Effect of precipitation and groundwater depth on grass and shrub vegetation during two years in Owens Valley, CA. Poster Presentation, Ecological Society of America Meeting, Aug. 2004, Portland.

