

# LINDA KATHERINE VANCE

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## EDUCATION:

- 2004: **Doctor of Philosophy (Ph.D.)**, University of California, Davis, Graduate Group in Ecology. Exam Areas: Ecological Principles, Conservation Biology, Experimental Design and Analysis, Ecology of Fishes, Watershed Ecology. Dissertation: Stream temperature dynamics and impacts on the distribution of salmonid fishes.
- 1986-1997: **Undergraduate coursework, Natural Science.** Norwich University, Vermont, and Los Rios Community College, California. 50+ semester units in botany, zoology, ecology, chemistry, physical science and mathematics.
- 1980: **Master of Laws (LL.M.)**, York University, Osgoode Hall Law School, Downsview, Ontario, Canada, 1980.
- 1977: **Bachelor of Civil Law (B.C.L.[J.D. Equivalent] )**, McGill University Law School, Montreal, Quebec, Canada, 1977.
- 1974: **Diplôme d'études collégiales (D.E.C.)**, Dawson College, Department of Social Sciences, Montreal, Quebec, Canada, 1974. Major: History and Philosophy.

## EMPLOYMENT:

- October 2007- **Senior Ecologist/ Spatial Analysis Lab Director, Montana Natural Heritage Program of the University of Montana.** In addition to duties listed below, assume responsibility for strategic planning and implementation of the ecology component of the Montana Natural Heritage Program. Direct Montana Wetland and Riparian Mapping Center in Helena. Direct operations, planning, and projects at the Spatial Analysis Lab on the University campus, and represent the Heritage Program to University faculty. Supervise a staff of 12 ecologists and 2 technicians, plus field crews and graduate students. Conduct field studies to locate and describe upland and wetland ecological systems throughout Montana, and develop print and web-based interpretive materials to guide resource management. Produce print and web-based materials to support broad adoption of the National Vegetation Classification Standard by agency and academic researchers. Lead the Land Cover I-team planning and implementing land cover maps as part of the Montana Spatial Data Infrastructure. Oversee sagebrush mapping and assessment projects in Montana and Wyoming. Collaborate with Natural Heritage ecologists in Colorado and Wyoming to develop vegetation-based indicators of wetland health and integrity across the Rocky Mountains. Present research findings at GIS, wetland and ecology meetings and conferences. Manage budgets and work plans for EPA, BLM, MTDEQ and USGS contracts. Design research projects and pursue funding from multiple sources.
- May 2005-  
September 2007 **Ecologist/Projects Manager, Montana Natural Heritage Program, Helena, MT.** Design and carry out wetland and watershed assessments using field-based measurements, vegetation surveys, and remotely-sensed data. Analyze geospatial relationships between land use and land cover variables and watershed health using ArcGIS desktop software, database software, and statistical packages. Evaluate changes in wetland condition and distribution in major Montana watersheds. Act as project manager on state and federal contracts, writing grant proposals, overseeing budgets and deliverables, and preparing final reports for distribution and publication on the organization's website. Conduct field assessments of plant communities and perform rare plant surveys. Consult with state, federal, local and non-governmental partners on wetland and landscape assessments. Develop and refine indicators of wetland integrity as part of a NatureServe/EPA collaboration. Produce and update ecological systems descriptions for

Montana wetland and riparian ecosystems. Initiate and manage statewide, multi-agency team to rank Montana ecosystems. Serve as lead for the monitoring and assessment component of Montana's wetland conservation strategy. Represent Montana and Region 8 on the National Wetland Assessment and Monitoring Workgroup of the EPA.

- May, 2003-  
June 2004 **Ecologist/herpetologist, Forest Service Pacific Southwest Research Station, Albany, CA.** (13 month term appointment) Conduct field research on mountain yellow-legged frogs, garter snakes and fish in Dusy Basin (Kings Canyon/Sequoia NP), Yosemite, and Plumas National Forest. Use pit tagging and radio telemetry techniques to examine distribution, site fidelity, dispersal and competitive interactions. Analyze geospatial relationships between species and their environment with global positioning devices, desktop geographic information systems (ArcGIS), database software, and statistical packages (S-Plus, SigmaPlot). Prepare research findings and management options for Forest-based biologists. Prepare Record of Establishment for Research Natural Area on Klamath National Forest. Supervise field crews and maintain field camp in remote, high-elevation settings.
- September, 2000-  
February, 2003 **Director, Biological Sciences Programs, University Extension, University of California at Davis, Davis, California.** Design professional and continuing education programs in life sciences, agriculture, agricultural business development, informatics, forensics, fire protection, natural resources, watershed management, and field biology. Create and manage professional master's degree and certificate programs. Recruit, train and evaluate instructors. Hire, train and supervise program representatives and program assistants. Prepare and manage annual budget in excess of \$800,000. Participate in overall management structure through Management Issues Council, Program committees, task forces, Dean's Council, etc. Establish collaborations with university faculty, Cooperative Extension, and State and Federal agencies. Negotiate and execute training grants and contracts. Sample of courses designed: Water Quality Monitoring in Streams and Rivers I (Nutrients), II (Pathogens) and III (Pesticides); Instream Habitat Improvements for Regulated Rivers; Riparian Ecology; Ecology and Management of Vernal Pool Grasslands; Fundamentals of Salmonid Biology; California Inland Fish Identification; Biomarker Measurements in Water Quality Monitoring; GIS Applications in Watershed Management; GIS Applications in Vegetation Management; Ecology and Management of Waterfowl Habitat
- January, 2000-  
September 2000 **Interim County Director and Farm Advisor (50% time), University of California Cooperative Extension Inyo/Mono Counties, Bishop, California.** Survey agency personnel, stakeholders and other appropriate parties to determine the public issues education and applied research needs in UCCE's program areas (agriculture, natural resources, family and consumer science, youth development) in two eastern Sierra counties. Supervise office manager and program representative. Promote outreach mission of UCCE in two-county region through attendance and participation at scoping meetings, public hearings, user group meetings, and watershed advisory committees. Participate in Coordinated Resource Management Plan teams and Holistic Resource Management Teams to establish grazing and recreational use plans that balance needs of users with those of endangered fish and wildlife species and sensitive habitat areas. Carry out administrative duties of UCCE County Director and Inyo County Department Head, including affirmative action reporting. Collaborate with federal, state and local agencies (NV and CA Water Quality, CA Fish and Game, US Forest Service, BLM, and LADWP) on land use planning to promote water quality and quantity protection. Present workshops on watershed processes, grazing management, and pesticide use. Respond to public information requests as needed. Prepare and defend budget and position requests at County and University level.
- October 1997-  
September 2000 **Researcher, various titles (Graduate, Postgraduate, Staff) University of California (Davis), Department of Agronomy & Range, Davis, California.** Act as Project Manager for Water Resource Center and NASA-funded grants. Design, plan and conduct applied agricultural, watershed and fisheries research in coastal, mountain, and intermountain regions. Plan and evaluate research designs to assess land use impacts on water quality and water temperature using traditional ground-based instruments, GPS, GIS (ArcView) and remote sensing technologies. Create, modify and/or implement research protocols for sampling and analyzing

water quality, vegetation, macroinvertebrate, and fish data using accepted techniques. Create and maintain databases. Train farm advisors and research personnel on water quality and water temperature monitoring and data collection. Use common statistical methods (regression, multivariate analysis) and programs (Systat, SAS) to analyze and present data. Hire, train and supervise field assistants, contract labor, and students. Prepare extension publications, journal articles, and professional presentations. Perform literature searches in support of study design, grant preparation, report writing, and presentations. Design educational materials and programs for UCCE clientele. Advise on irrigation and water management practices compatible with ecosystem needs. Prepare budgets, write grants and submit reports for funding agencies.

1998-2001: **Consultant in watershed monitoring and analysis**, self-employed, Davis, California. Design and conduct watershed analyses, fish habitat surveys (endangered and/or native species), vegetation monitoring and analysis, canopy coverage surveys, water quality and stream temperature monitoring programs for private and non-profit entities, including Resource Conservation Districts, the U.S. Forest Service, and irrigation districts in California and Nevada. Coordinate with university research groups, cooperative extension, rancher's groups, and citizen monitors on data collection and dissemination. Prepare technical reports and analyses. Recommend further research actions and/or implementation of management protocols.

## **OTHER PROFESSIONAL EXPERIENCE:**

2010- Faculty Affiliate, Science, Union Institute and University  
2009- Faculty Affiliate, Organismal Biology and Evolution, University of Montana  
1996-2000 Professor of Liberal Studies, California Institute of Integral Studies, San Francisco, CA  
1981-1996 Attorney, Montpelier, VT.  
1985-1996 Assistant Professor (1985-1991) and Associate Professor of History and Philosophy, Norwich University, Northfield, Vermont.

## **SELECTED PUBLICATIONS**

- Vance, L.K. 2009. Assessing Wetland Condition with GIS: A Landscape Integrity Model for Montana. A Report to the Montana Department of Environmental Quality and the Environmental Protection Agency. Montana Natural Heritage Program, Helena, MT. 23 pp. plus appendices.
- Vance, L.K., K. Newlon, J. Clarke and D.M. Stagliano. 2009. Assessment of the Red Rock River Subbasin and Wetlands of the Centennial Valley. Report to the Bureau of Land Management, Montana / Dakotas State Office. Montana Natural Heritage Program, Helena, Montana 43 pp. plus appendices.
- Vance, L.K. 2009. Geographically isolated wetlands and intermittent/ephemeral streams in Montana: Extent, distribution and function. Report to the Montana Department of Environmental Quality and the U.S. Environmental Protection Agency. Montana Natural Heritage Program, Helena, MT.
- Faber-Langedoen, D., G. Kudray, C. Nordman, L. Sneddon, L. Vance, E. Byers, S. Gawler, C. Josse, G. Kittel, S. Menard, P. Comer, E. Muldavin, J. Rocchio, M. Schafale, J. Christy and T. Foti. 2008. Ecological Performance Standards for Ecological Mitigation Using Ecological Integrity Assessments. Natureserve, Arlington, VA.
- Vance, L.K. and D. Stagliano. 2008. Watershed assessment of portions of the Clark's Fork Yellowstone, Shoshone and Bighorn Lake subbasins in Montana and Wyoming. Report to the Bureau of Land Management, Billings, MT. Montana Natural Heritage Program, Helena, MT.

- Vance, L.K. and D. Stagliano. 2007. Watershed assessment of portions of the Lower Musselshell and Fort Peck Reservoir Subbasins. Report to the Bureau of Land Management, Billings, MT. Montana Natural Heritage Program, Helena, MT.
- Vance, L.K., G. Kudray and S.V. Cooper. 2006. Crosswalking National Wetland Inventory attributes to hydrogeomorphic functions and vegetation communities: a pilot study in the Gallatin Valley, Montana. Report to the Montana Department of Environmental Quality and the U.S. Environmental Protection Agency. Montana Natural Heritage Program, Helena, MT.
- Vance, L.K., G. Kudray, and D. Stagliano. 2006. Watershed assessment of the Middle Powder Watershed. Report to the Bureau of Land Management, Miles City, Montana. Montana Natural Heritage Program, Helena, MT.
- Vance, L.K. 2005. Watershed assessment of the Cottonwood and Whitewater watersheds. Report to the Bureau of Land Management, Malta, Montana. Montana Natural Heritage Program, Helena, MT.
- Vance, L.K. 2004. Record of Establishment for the Haypress Meadows Resource Natural Area, Klamath National Forest, California. Pacific Southwest Research Station. 33 pp.

## **SELECTED PRESENTATIONS:**

- Vance, L.K., K. Newlon and J. Lemly. **Selecting Reference Sites Across Ecoregions: The Rocky Mountain ReMAP National Water Quality Monitoring Conference.** Denver, Colorado, April 28, 2010.
- Vance, L.K. Prioritizing local conservation targets with GIS. Intermountain GIS Conference, Bozeman, MT, April 21, 2010.
- Vance, L.K. Wetland Landscape Profiling. American Water Resources Association, Montana Chapter. Missoula, MT. October 1, 2009.
- Vance, L.K. Rocky Mountain wetlands: strategies for identification and assessment of reference standards. National Wetland Monitoring and Assessment Workgroup. Crystal City, VA/ December 3-5, 2008.
- Vance, L.K. Using wetland and riparian maps in conservation planning. Montana Association of Planners. Bigfork, MT. September 23, 2008.
- Vance, L.K. Ecological functions of geographically isolated wetlands. Western Wetland Monitoring and Assessment Conference. Rapid City, S.D. April 28-30, 2008.
- Vance, L.K. GIS in wetland monitoring and assessment. Montana Association of Geographic Information Professionals. Missoula, MT. April 11, 2008.
- Vance, L.K. Identification and analysis of geographically isolated wetlands. Montana Wetland Council, Helena, MT. January 28, 2008
- Vance, L.K. Mapping and assessment of geographically isolated wetlands after Rapanos/Carabell. American Water Resources Association, Montana Chapter. Polson, MT. October 13, 2006.
- Vance, L.K. and G. Kudray. From prairie potholes to gallery forests: Watershed assessment in Big Sky country. Wetland Monitoring and Assessment in the Northern Great Plains and Rocky Mountains Golden, CO, October 27, 2005.

## **SELECTED RESEARCH AND TRAINING GRANTS:**

- Vance, L.K. 2009. Profile and assessment of riparian areas, shrublands and grasslands along Montana's large rivers. United States EPA Region 8. \$115,000.
- Vance, L.K. and T. Luna. 2009. Development of a restoration handbook for wetlands and riparian areas in north-central Montana. United States EPA Region 8. \$62,500.
- Vance, L.K. 2009. Identifying potential Research Natural Areas on BLM-managed lands. United States Bureau of Land Management, Montana-Dakotas State Office. \$31,000.
- Vance, L.K. 2008. Ecological modeling for decision support. U.S. Forest Service Region 1. \$90,000.
- Vance, L.K. 2008. Identification and mapping of trumpeter swan and northern leopard frog reintroduction sites. PPL Montana, Montana FWP and the Wyoming Trumpeter Swan Society. \$15,000.
- Vance, L.K. 2008. Sagebrush mapping and sage grouse habitat modeling. BLM Buffalo Field Office, Wyoming. \$275,000.
- Vance, L.K. 2008. Developing a rotating-basin assessment and monitoring strategy for Montana wetlands. United States EPA Region 8. \$127,000
- Vance, L.K.. 2008. Terrestrial ecological systems mapping and aquatic ecosystem classification for Critical Areas Assessment. Montana Fish, Wildlife and Parks. \$72,000.
- Vance, L.K., and J. Rocchio. 2008. Survey design and indicator development for wetland assessment in the Rocky Mountain west. United States EPA Office of Research and development. \$384,000.
- Vance, L.K. 2008. Outreach and Training on the National Vegetation Classification Standard. United States Geological Survey. \$25,000
- Vance, L.K. 2007. A conservation planning geodatabase for southwest Montana. United States EPA. \$67,000.
- Vance, L.K. 2007. Watershed health assessment in Montana. Montana/Dakotas Office of the Bureau of Land Management. \$40,000 per year for 5 years.
- Vance, L.K. 2007. Establishing a reference network to support wetland assessment and monitoring in Montana. United States EPA Region 8. \$117,000
- Vance, L.K. 2007. GIS-guided supplement feeding to minimize livestock effects on wetlands. Natural Resource Conservation Service. \$50,000.
- Vance, L.K. and G. Kudray. 2006. Mapping wetlands and riparian areas in the Upper Clark Fork River Basin. Montana Department of Justice, Natural Resource Damage Program. \$71,000.
- Vance, L.K. 2006. Mapping and analysis of geographically isolated wetlands. United States Environmental Protection Agency. \$107,950.
- Vance, L.K. 2006. Developing a Level 1 wetland assessment tool. U.S. Environmental Protection Agency. \$50,400.

## **PROFESSIONAL MEMBERSHIPS**

Society of Wetland Scientists  
American Water Resources Association

Montana Association of Geographic Information Professionals (President, 2010-2011)  
Reviewer, *Wetlands*, 2008-2009