# THOMAS DAVID HAYES

# PROFESSIONAL SUMMARY AND QUALIFICATIONS:

Dr. Tom Hayes received his B.A. in biology from Rice University, Masters of Forest Science from Yale University, and Ph.D. in biogeochemistry and disturbance ecology from the University of California, Berkeley. He has authored over 100 publications and technical papers, plus numerous conference and workshop presentations.

Tom has worked over 30 years as a natural resource manager, research ecologist, university educator, and conservation biologist. His experience encompasses ecological and environmental monitoring, habitat restoration, rare species conservation, silviculture, ecological baseline and impact analysis, reserve design and management, regulatory biology, biogeochemistry, and expert testimony. His conservation projects include a variety of plant and animal species, and a diversity of terrestrial, wetland, and aquatic habitats. Tom started his current position with GEAA in October 2008.

His employment history includes: associate scientist, U. of Wisconsin, Stevens Point (2005-2008); research ecologist, U. of Wisconsin, Madison (2003-05); research faculty, Oregon State U., Corvallis (1996-2003); Ph.D. candidate (part-time), U. of California, Berkeley (1993-2002); state stewardship ecologist, The Nature Conservancy of Texas (1989-92); senior biologist, Texas Parks & Wildlife Dept, Austin (1985-89); and project manager/biologist, Espey, Huston & Associates, Austin, TX, (1978-84).

# EDUCATION:

- Ph.D. Forest Ecosystems and Conservation Ecology, Dept. of Integrative Biology, University of California, Berkeley, CA, 2002.
- M.For.Sci. Ecosystem Biology, School of Forestry and Environmental Studies, Yale University, New Haven, CN, 1977.
- **B.A.** Biology, Cum Laude, Rice University, Houston, TX, 1975.
- **Diploma** McClellan High School, Mabelvale, AR, 1971.
- **Diploma** Marine Biology and Higher Mathematics, National Science Foundation Fellow, Humboldt State University, Arcata, CA, 1970.

### WORK EXPERIENCE:

Science Director, Greater Edwards Aquifer Alliance, Austin, TX, 2008-present.

Research Ecologist (3-mo grant), Marine Sciences Institute, U. of California, Santa Barbara, 2008.

- Vallier Resident Ecologist & Associate Scientist, Treehaven Environmental Learning Center, Tomahawk, WI, & College of Natural Resources, U. of Wisconsin Stevens Point, 2005-08.
- **Project Manager**, Flambeau Experiment, Forest Landscape Ecology Laboratory, Dept. of Forest Ecology & Management, U. of Wisconsin, Madison, 2003-05.

Research Faculty (courtesy), Dept. of Forest Science, Oregon State U., Corvallis, 1996-2003.

Ph.D. Candidate (part time), Dept. of Integrative Biology, U. of California, Berkeley, 1993-2002.

State Stewardship Ecologist, The Nature Conservancy of Texas, San Antonio, 1989-92.

Biologist III, Habitat Assessment, Resource Protection Div., Texas Parks & Wildlife Dept, Austin, 1986-89.

Biologist II, Resource Management, Parks Div., Texas Parks & Wildlife Department, Austin, 1985-86.

Project Manager/Conservation Biologist, Espey, Huston & Associates, Austin, TX, 1978-84.

Research Assistant, Hubbard Brook Exp. Forest, USDA Forest Service, in cooperation with School of Forestry & Environmental Studies, Yale U., New Haven, CN, 1976-77.

**Research Assistant**, Biology & Environmental Engineering Depts., Rice U., Houston, TX, 1972-75. **Biological Technician**, Southwest Research Institute, Houston, TX, 1973-74.

# **OTHER QUALIFICATIONS**:

### Technical Skills:

Environmental and ecological monitoring, natural resource inventory, invasive species control, field GIS/GPS technology, outdoor recreation planning, timber cruising and marking, habitat typing and restoration, mensuration, plant identification, photo interpretation, reserve design and management, regulatory compliance, wetland delineation.

# Selected Honors/Committee Chairs:

STAR Graduate Fellowship, Environ. Sci. Res. Div., US Environ. Protection Agency, 1997-2000.

National Network for Environ. Manag. Studies, Fellow, US Environ. Protection Agency, 1994-96.

Texas Org. for Endangered Species, Communities Committee Chair/Steering Committee, 1991-92.

Texas Academy of Science, Conservation Section Chair, 1989-1990.

**Texas Organization for Endangered Species**, Plant Committee Chair/Steering Committee, 1982-1984. **Phi Beta Kappa**, Rice University, Houston, TX, 1975.

President's Honor List, Rice University, Houston, TX, 1971-1975.

National Science Foundation Fellowship, Humboldt State University, Arcata, CA, Summer 1970.

#### Resume of T.D. Hayes, p. 2 of 4.

#### Professional Training/Certifications:

Wisconsin Commercial Pesticide Applicator Certificate, National Wildfire Coordinating Group S-390 Fire Behavior, Unified Federal Wetland Delineation Method, U.S. Fish & Wildlife Service Habitat Evaluation Procedures.

### FIELDS OF EXPERIENCE:

I have worked 30 years as a conservation biologist and educator. My experience includes university and public education, land management planning, regulatory assessment, ecological baseline and impact analysis, reserve design and management, ecological forestry, project supervision, biogeochemistry, ecological and environmental monitoring, habitat restoration, and rare species conservation.

While attending Rice University from 1971 to 1975, I received a multi-disciplinary education, with an emphasis in ecosystem and population biology. During 1972-1975 I was a technician in various wetland and plant ecology studies within the Biology Department. I also worked for the Department of Environmental Engineering in 1973, analyzing the dynamics of stream runoff within disturbed wetland forests at The Woodlands, a new-town development north of Houston. During 1973-1974, I was employed part-time by Southwest Research Institute, Houston, performing laboratory and field research on the biological impact of thermal pollution in Galveston Bay.

While at Yale University, my work and course experience included ecological impact analysis, forest ecology, biogeochemistry, systems modeling, wetland biology, and silviculture. During the summers, I was employed as a field research assistant at the U.S. Forest Service's Hubbard Brook Experimental Forest, New Hampshire, where I examined timber harvest effects, soil microbiology, nutrient cycling, nitrogen fixation, historical land use, and acid deposition. I also participated in a 6-week environmental assessment of Puerto Rico. During the school term, I instructed undergraduate biology and ecology students in laboratory and field methods.

I joined Espey, Huston & Associates, Inc. (EH&A), an environmental engineering firm, in January 1978 at the Galveston Laboratory. In June 1978, I became Manager of this estuarine bioassay/bioaccumulation laboratory, which employed four people. From August 1978 through April 1984, I worked as Project Manager and Plant and Wetland Ecologist at EH&A's main office in Austin, Texas, with proposal, implementation, management, data analysis, writing, and budget responsibilities for habitat restoration, wetland determinations and permitting, quantitative field sampling, vegetation and land use mapping, plant taxonomy, endangered species surveys, photo interpretation, mitigation, expert testimony, and other ecological baseline and impact analyses. My projects spanned the US, but mostly were in the southeastern and midwestern US.

I gained employment as Biologist II with the Resource Management Section, Parks Division, Texas Parks & Wildlife Department, Austin, in February 1985. I primarily trained and organized resource management teams throughout the 123-unit State Park System, to lessen human impacts and proactively maintain or re-establish native plant, wetland, and aquatic communities. I also coordinated special projects, including large volunteer restoration efforts, regulatory assessments, non-formal education, water rights, and mitigation negotiations for development. In June 1986, I was promoted to the Habitat Assessment Branch of the Department's Resource Protection Division, as Biologist III (Wetlands Program). My overall focus was habitat and rare species conservation through a variety of wetland and other regulatory programs, requiring ecological baseline and impact analyses and mitigation, in close coordination with other state and federal agencies, and private landowners. I coordinated and wrote all official Department responses to the Corps of Engineers' Section 10 and 404 permits for wetland and aquatic habitat impacts and reservoir construction throughout Texas. I also acted as the primary Department liaison to the U.S. Forest Service, coordinating and writing the formal State responses to 10-year plans and other documents and activities concerning all National Forests and Grasslands in Texas. Other tasks included ecological impact assessment, wetlands research coordination, ecological forestry, special project management, endangered species management plans, water rights permitting, and expert testimony.

In October 1989, I accepted the position of State Stewardship Ecologist for The Nature Conservancy of Texas. I was the scientist and resource manager with primary responsibility for the design, management, and monitoring of 32 Conservancy-owned preserves and numerous other private and public conservation projects. My duties included conservation of priority species and plant communities, site management plans, staff supervision, environmental forestry, coordinating special project teams, soliciting and administrating research grants, quality control, multi-partner management, budget management, and regulatory negotiations. I also managed several large wetland and coastal restoration projects, including the Runnels Family Marsh Preserve near Palacios and the Diamond Y Springs Preserve near Fort Stockton.

In November 1992, upon joining my wife in California while she attended law school, I was employed as an independent consultant in wetland and forest ecology. Starting in August 1993, I was also a part-time Ph.D. student in the Department of Integrative Biology at the University of California at Berkeley. From August 1993 to May 1996, I taught laboratory and field protocols, led discussion groups, mentored, and performed evaluations for undergraduate classes in basic biology (botany, ecology, and evolution) and conservation biology. In June 1996, I obtained a concurrent faculty appointment (courtesy) in the Department of Forest Science, Oregon State University, Corvallis, where I conducted most of my subsequent research. The overall project, of which my dissertation research was a part, addressed the long-term impact of forest-clearcut edges on microclimate, forest structure, and biogeochemical processes, which affect the long-

#### Resume of T.D. Hayes, p. 3 of 4.

term sustainability of remnant old-growth forests in the Pacific Northwest. I initiated and implemented all aspects of the innovative silvicultural research, including outside funding, training, quality assurance, and managing 30+ students, volunteers, international interns, and visiting professors each of 6 years. Results quantify the depth and magnitude of edge effects on a suite of abiotic and biotic processes impacting nutrient cycling and forest sustainability, revealing significant impacts 120 m or deeper into old-growth forest reserves from induced edges.

In May 2003, I became Project Director for the Forest Landscape Ecology Laboratory, Department of Forest Ecology and Management, University of Wisconsin-Madison. In this position, I was responsible for all aspects of implementing the multifaceted Flambeau Experiment, an innovative 50+-year landscape-scale study on the Flambeau River State Forest. The research goal was to integrate key structural characters of old-growth forests, which promote sustainability and biodiversity, with common forest management practices. Across 35 replicated sites, two treatment factors (coarse woody debris loads and canopy openings) were factorially manipulated, in order to develop a mechanistic understanding of how alternative management regimes maintain productivity and biodiversity through changes to forest carbon and nitrogen cycling. Field tasks encompassed diverse ecological field sampling and monitoring, including plant communities, forest structure, coarse woody debris, carbon and nitrogen dynamics (litter fall, decomposition, soil sampling), forest surveying/mapping, and meteorological monitoring. I supervised a staff of 15, including permanent academic staff, grad and undergrad students, seasonal interns, and long-term volunteers. My other responsibilities included field and laboratory training, quality control, technical and non-technical writing, proactive project planning, obtaining funding, collaborative agreements, financial oversight, and planning and negotiating with government and private partners and other natural resource interests.

I began a 3-year grant-funded position in July 2005, as the Vallier Resident Ecologist at UW-Stevens Point's (UWSP) Treehaven Environmental Learning Center near Tomahawk, Wisconsin. I was also a member of the forestry faculty at UWSP's College of Natural Resources, the country's largest undergraduate program in natural resources. This new, privately endowed position was responsible for teaching, land management, research, and outreach at Treehaven. I taught field botany, ecological monitoring, and applied silviculture during Treehaven's 12-week summer camp and at other times during the year. In addition to managing the Treehaven internship program, I coordinated two different two-year planning efforts, including a comprehensive revision of the multi-partner Treehaven land management plan, and a National Science Foundation grant which I obtained, in order to develop a strategic plan to create new opportunities in experiential science education and participatory research for students and citizens throughout northern Wisconsin. With three collaborators, in 2007 I also implemented 40 new professional workshops in field GIS/GPS, timber cruising, and other natural resources technology and skills development.

In July 2008, I accepted a 3-month grant to work as a Research Ecologist at the Marine Sciences Institute, UC-Santa Barbara. The position was based at the US Geological Survey office in Henderson, NV, where I helped design a wetlands restoration project spanning southern Nevada and portions of three adjacent states. As part of a Regional Habitat Conservation Plan, research focused on assessing past and future habitat restoration strategies for Mojave Desert spring and riparian systems, including vegetation inventory, avian and insect communities, GIS, invasive species control, prescribed fire, simulated biocontrol, and native plantings.

As of October 2008, I am working in Austin, Texas, as the first Science Director for the Greater Edwards Aquifer Alliance (GEAA). This full-time position coordinates a multi-partner science and technology initiative. Responsibilities encompass planning, implementing, and administrating protection, restoration, management, and monitoring activities, in order to maintain and enhance threatened species, biotic communities, and associated land-water ecosystems in the Edwards Aquifer/Texas Hill Country region. Specific duties currently include (1) implementing range-wide inventory and protection for the endangered Golden-cheeked Warbler (GCW) that includes GIS-based habitat trend analyses and protecting high-quality "at risk" habitat; (2) establishing a range-wide citizen-science GCW monitoring network; (3) coordinating input on regional habitat conservation plans; (4) drafting listing petitions for recently discovered salamander populations; and (5) developing a database and conservation strategy for endangered karst invertebrates.

#### **PUBLICATIONS AND TECHNICAL REPORTS:**

During my career, I have authored over 100 publications and technical papers, as well as numerous conference and workshop presentations. The following abbreviated publication list is representative:

- Hayes, T., and R. Reid, 1979, "Fish, Wildlife, and Recreation Resources of the Matagorda Bay System," prepared for U.S. Fish and Wildlife Service, Albuquerque, NM, Espey, Huston, and Associates (EH&A) Doc. No. 79240.
- Sexton, C., and T. Hayes, 1980, "Biological Assessment of the Impact of Florida Gas Transmission Company's Proposed Trans-Gulf Pipeline Construction and Conversion Project on Threatened and Endangered Species," prepared for Federal Energy Regulatory Commission, Environmental Evaluation Branch, Washington, D.C., EH&A Doc. No. 80131.
- Reid, R., T. Hayes, and C. Perino, 1980, "Vegetation and Wildlife Resources of the Black Mesa and Kayenta Mine Sites," prepared for Peabody Coal Company, Flagstaff, AZ, EH&A Doc. No. 8071.
- Hayes, T., P. Jensen, and C. Green, 1981, "Critical Area Mapping and Spill Probability Evaluation of the Houston Ship Channel," prepared for The Clean Channel Association, Houston, TX, EH&A Doc. No. 81149.

#### Resume of T.D. Hayes, p. 4 of 4.

- Hayes, T., and EH&A staff, 1981, "Acid Deposition in Texas: Technical Summary and Perspective," prepared for Texas Energy and Natural Resources Advisory Council, Austin, TX, Energy Dev. Act Project 80-L-11-6, EH&A Doc. No. 81305.
- Hayes, T., P. Price, and B. Stewart, 1982. "Ecological Baseline Studies of the Shell Vanderrick Mine Facilities Area, Vanderburgh County, Indiana," prepared for Shell Oil Company-Mining, Houston, TX, EH&A Doc. No. 82367.
- Hayes, T., 1984, "Remote Sensing Analysis: Potential Impacts to Forest Vegetation Due to Cooling Tower Plume Drift, Farley Nuclear Power Plant," prepared for Alabama Power Company, Birmingham, Alabama, EH&A Doc. No. 83775.
- Hayes, T., D. Riskind, and W. Pace, 1987, "Patch-Within-Patch Restoration of Man-Modified Landscapes Within Texas State Parks," Chapter 10, pp. 173-198, in M. Turner (editor), <u>Landscape Heterogeneity and Disturbance</u>, Springer-Verlag Publisher, New York, NY.
- Hayes, T., 1987, "Downstream Impacts of the Proposed Little Cypress Reservoir upon Bottomland Hardwood Forests and Swamps," Spec. Rpt., Resource Protection Div., Texas Parks and Wildlife Dept., Austin, TX.
- Riskind, D., R. George, G. Waggerman, and T. Hayes, 1987, "Restoration in the Subtropical United States," <u>Restoration</u> <u>and Management Notes</u> 5(2): 80-82.
- Pace, W., III, D. Riskind, and T. Hayes, 1988, "Restoration and Management of Native Plant Communities on Texas Parklands: The Mixed-prairie Experience," in <u>Proceedings of the Tenth North American Prairie Conference</u>, Native Prairies Association of Texas, Dallas, TX.
- Hayes, T., 1990, "Reclamation Plan and Surface Use Agreement for Oil and Gas Operations at Diamond Y Spring Preserve, Pecos County, Texas," The Nature Conservancy of Texas, San Antonio, TX.
- Hayes, T., 1992, <u>Endangered, Threatened, and Watch List of Natural Communities of Texas</u>, Publication # 8, Texas Organization for Endangered Species, Austin, TX.
- Hayes, T., 1993, "Invited Written and Oral Testimony Before Congress in Support of H.R. 1164, Forest Biodiversity Act of 1993," U.S. House of Representatives, Committee on Agriculture, Washington, DC, October 28, 1993.
- Hayes, T., 1994, "Standard Operating Procedure 5.1: Litter Decomposition," Environmental Research Laboratory, US Environmental Protection Agency, Corvallis, OR.
- Hayes, T., R. Griffiths, and C. D'Antonio, 1997, "Biogeochemical Attributes of Old-growth Forest-Clearcut Edges," <u>Bulletin of the Ecological Society of America</u> 78 (4):105.
- Hayes, T., R. Griffiths, and C. D'Antonio, 1999, "Nitrogen and Carbon Cycling in Fragmented Old-growth Forest," oral paper, Ecological Society of America annual meeting, Spokane, WA.
- Hayes, T., A. Swanson, C. D'Antonio, and R. Griffiths, 2002, "Biogeochemical Edge Effects on Nitrogen and Carbon Retention in Fragmented Old-growth Forest," invited oral paper, Forest Edges Symposium, Ecological Society of America annual meeting, Tucson, AZ.
- Hayes, T, 2002, <u>Ecosystem Consequences of Forest Fragmentation in the Pacific Northwest: Biogeochemical Edge</u> <u>Effects within Old-growth Forest Remnants</u>, Ph.D. dissertation, Department of Integrative Biology, University of California, Berkeley, CA.
- Hayes, T., C. D'Antonio, A. Swanson, and R. Griffiths, draft manuscript, "Structural Edge Effects within Old-Growth Forest Remnants in the Pacific Northwest," for submission to <u>Canadian Journal of Forest Research</u>.
- Hayes, T., C. D'Antonio, R. Griffiths, and A. Swanson, draft manuscript, "Ecosystem Consequences of Forest Fragmentation in the Pacific Northwest: Biogeochemical Edge Effects within Old-growth Forest Remnants," for submission to <u>Ecology</u>.