

RESUME CURRICULUM VITAE

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EDUCATION

Ph.D. Civil Engineering, Environmental Water Resources Division. Department of Civil Engineering. University of California, Berkeley, 1995. Berkeley, California, 94701. Dissertation Title: "Mechanics and Modeling of River Meander Migration."
Major: Civil Engineering-Water Resources; Minors: Fluvial Geomorphology, Mathematics.

M.S. Civil Engineering, Environmental Water Resources Division. Department of Civil Engineering. University of California, Berkeley, 1986. Berkeley, California, 94701.

B.A. Engineering and Applied Physics, Harvard University, 1969. Cambridge, Massachusetts, 02138.

High school San Rafael High School, San Rafael, California. Graduated 1965.

PROFESSIONAL EXPERIENCE

Research Scientist (November 1994-date)
UC Davis
Department of Human Ecology
Environmental Design Department and Landscape Architecture Program
Geology Department
Civil Engineering Department

I have used my expertise in fluvial geomorphology to develop an interdisciplinary research program, publication record, and applied projects that address vital issues in river management, habitat formation and water quality, with an emphasis on the restoration of habitats for fish, wildlife and riparian vegetation. As a research scientist, private consultant and senior technical advisor, I am also active in using my expertise to help with geomorphic and water resource planning, and with executing various stakeholder meetings, project planning efforts, and other deliberative processes related to

water resource issues for fish, wildlife, and riparian habitat.

I have served as a science advisor for many public agencies and private groups, including the US Bureau of Reclamation, the US Department of Justice, the California State Attorney General's office, the California Tahoe Conservancy, the California Department of Water Resources, the CALFED California Bay-Delta Authority, the National Audubon Society, The Water Heritage Trust (San Francisco), a work group of State and Federal Agencies advising the UC Army Corps of Engineers on their Sacramento River Bank Protection Program, and a multi-agency technical advisory group for Sacramento River Off-stream Storage (North of Delta Off-stream Storage), a \$2 billion State of California project. I have been a science advisor to CALFED on several projects involving the Sacramento River, including major planning issues related to pumping plant placement (M and T pumping plant, and Llano Seco Riparian Sanctuary project). I have collaborated with two non-profit organizations, The Nature Conservancy and River Partners, on separate projects. Another independent research project of mine was a component of the Sacramento River Ecological Flows Study, which is being led by The Nature Conservancy (TNC) with funding from the California Bay-Delta Authority's Ecosystem Restoration Program (CALFED grant ERP-02D0P61).

I have taught workshops on a variety of subjects for groups, including the US Army Corps of Engineers, Yolo County Resource Conservation District, the California State Water Resources Control Board, the California Department of Water Resources, and the California State Parks system. I have given numerous talks and presentations to state and federal agencies. I continue to teach an annual short-course to the U.S. Army Corps of Engineers Hydrologic Engineering Center (HEC) on watershed processes, fluvial geomorphology, and hydrologic/geomorphic modeling.

My primary research focus has been to establish an interdisciplinary research program that addresses pressing issues in river management and restoration. Collaborating with colleagues and students from a wide range of disciplines, I have developed new techniques to analyze river channel bank erosion and river meander migration. The results have major implications for river channel management because they can help predict areas of riparian habitat formation. This research not only adds to the existing body of knowledge regarding the relationship between bank erosion, channel migration, and habitat formation, but also advances the field by introducing new techniques for modeling changing (or regulated) river flows and their effects on habitat formation. I am in the process of expanding this work; my colleagues and I are developing a comprehensive model that integrates river flow rate, channel migration, and riparian vegetation recruitment and establishment.

As a consulting technical advisor in fluvial geomorphology and hydraulic engineering, I apply my expertise in river mechanics in coordination with numerous consulting firms, state and federal agencies, and non-profit groups. I have been involved in many projects that evaluate the impact of changing river processes on water quality, fisheries and other focal species. I have helped develop methodologies to assess such impacts for a range of governmental and non-governmental organizations.

As the advising geomorphologist to the Yolo County Board of Supervisors and the Yolo County Department of Parks and Resources, I am involved with planning and executing stakeholder meetings, project planning efforts, and other meetings held as part of deliberative processes related to the resource issues of Cache Creek and Yolo County. I am responsible for public meeting agendas and summaries, and am also responsible for reviewing and approving interim and final agreements, and

action plans related to the water resources of Cache Creek. I was also appointed (2007-2013) by the City of Winters City Council as a member of the Winters Putah Creek Committee, which serves and advises the City Council.

I have written quantitative geomorphic/hydraulic mathematical models utilizing hydraulic and hydrologic mathematical programs and models, and use ARCGIS for modeling and data presentation.

PUBLICATIONS

1. 2000 Kondolf, G.M., E.W. Larsen, and J.G. Williams. 2000. *Measuring and Modeling the Hydraulic Environment for Assessing Instream Flows*. North American Journal of Fisheries Management 20:1016-1028.
2. 2002 Larsen, E.W. and S.E. Greco. 2002. Modeling Channel Management Impacts on River Migration: A Case Study of Woodson Bridge State Recreation Area, Sacramento River, California, USA. Environmental Management 30(2):209-224.
3. 2003 Golet, G.H., D.L. Brown, E.E. Crone, G.R. Geupel, S.E. Greco, K.D. Holl, D.E. Jukkola, G.M. Kondolf, E.W. Larsen, F.K. Ligon, R.A. Luster, M.P. Marchetti, N. Nur, B.K. Orr, D.R. Peterson, M.E. Power, W.E. Rainey, M.D. Roberts, J.G. Silveira, S.L. Small, J.C. Vick, D.S. Wilson, and D.M. Wood. 2003. *Using Science to Evaluate Restoration Efforts and Ecosystem Health on the Sacramento River Project, California*. In P.M. Faber (editor). 2001 Riparian Habitat and Floodplains Conference Proceedings, Sacramento, CA. Riparian Habitat Joint Venture, 368-385.
4. 2004 Micheli, E.R., J.W. Kirchner, and E.W. Larsen. 2004. Quantifying the Effect of Riparian Forest Verses Agricultural Vegetation on River Meander Migration Rates, Central Sacramento River, California, USA. River Research and Applications, 20:537-548.
5. 2004 Rains, M.C., J.F. Mount, and E.W. Larsen. 2004. Simulated Changes in Shallow Groundwater and Vegetation Distributions under Different Reservoir Operations Scenarios. Ecological Applications, 14(1):192-207.
6. 2004 Rains, M.C., J.F. Mount, and E.W. Larsen. 2004. *Local Shallow Groundwater Drawdown and Baseflow Cessation Due to Regional Groundwater Pumping*. In R. Lowrance (editor). Riparian Ecosystems and Buffers: Multi-Scale Structure, Function, and Management. 2004 AWRA Summer Specialty Conference Proceedings, Olympic Valley, California. American Water Resources Association, Middleburg, Virginia, 1-6
7. 2006 Larsen, E.W., E.H. Girvetz and A.K. Fremier. 2006. Assessing the Effects of Alternative Setback Channel Constraint Scenarios Employing a River Meander Migration Model. Environmental Management, 37(6):880-897.
8. 2006 Golet, G.H., M.D. Roberts, E.W. Larsen, R.A. Luster, R. Unger, G. Werner and G.G. White. 2006. Assessing Societal Impacts when Planning Restoration of Large Alluvial Rivers: A Case Study of the Sacramento River Project, California. Environmental Management, 37(6):862-879.
9. 2006 Stubblefield, A.P., M.I. Escobar and E.W. Larsen. 2006. *Retention of Suspended Sediment and Phosphorus on a Freshwater Delta, South Lake Tahoe, California*. Wetlands Ecology and Management, 14:287-302.
10. 2006 Larsen, E.W., A.K. Fremier and S.E. Greco. 2006. *Cumulative Effective Stream Power and Bank Erosion on the Sacramento River, California, USA*. Journal of American Water Resources Association, 42(4):1077-1097.
11. 2006 Larsen, E.W., A.K. Fremier, and E.H. Girvetz. 2006. *Modeling the Effects of Variable Annual Flow on River Channel Meander Migration Patterns, Sacramento River, CA, USA*. Journal of American Water Resources Association, 42(4):1063-1075.
12. 2006 Yarnell, S., J.F. Mount, E.W. Larsen. 2006. *The Influence of Relative Sediment Supply on Riverine*

Habitat Heterogeneity. *Geomorphology*, 80:310-324.

13. 2007 Larsen, E.W., E.H. Girvetz and A.K. Fremier. 2007. Landscape Level Planning in Alluvial Riparian Floodplain Ecosystems: Using Geomorphic Modeling to Avoid Conflicts between Human Infrastructure and Habitat Conservation. *Landscape & Urban Planning*, 79:338-346.
14. 2007 Greco, S.E., A.K. Fremier, E.W. Larsen, and R.E. Plant. 2007. A Tool for Tracking Floodplain Age Land Surface Patterns on a Large Meandering River with Applications for Ecological Planning and Restoration Design. *Landscape and Urban Planning*, 81:354-373.
15. 2008 Dixon, M.D., J.C. Stromberg, J. Price, H. Galbraith, A.K. Fremier, and E.W. Larsen. In press. *The Potential Effects of Climate Change on the Upper San Pedro Riparian Ecosystem: Boon or Bane? (Chapter 3)*. In: J. Stromberg and B. Tellman (Editors), *Riparian Area Conservation in a Semi-Arid Region: The San Pedro River Example*. University of Arizona Press.
16. 2008 Greco, S.E., Girvetz, E.H., Larsen, E.W., Mann, J.P., Tuil, J.L., Lowney, C., 2008. Relative elevation topographic surface modeling of a large alluvial river floodplain and applications for the study and management of Riparian landscapes. *Landscape Research* 33, 461–486.
17. 2010 Micheli, E.R. and E.W. Larsen River Channel Cutoff Dynamics, Sacramento River, California, USA. *River Research and Applications*. n/a. doi: 10.1002/rra.1360. <http://onlinelibrary.wiley.com/doi/10.1002/rra.1360/abstract>.

LIMITED DISTRIBUTION: REPORTS

1. 1985 Larsen, E.W., Philip Williams and Associates. *Rush Creek Marsh Enhancement Plan*. Report prepared for Marin Co. Open Space. pp. 1-82.
2. 1988 Shen, H.W. and E.W. Larsen. *Migration of the Mississippi River*. Report for the Waterways Experiment Station, U.S. Army Corps of Engineers, Vicksburg, Mississippi. pp. 1-121.
3. 1991 Larsen, E.W. *Parker Creek Plug Bed Mobility Analysis and Data, Mono County, California*. pp. 1-67.
4. 1991 Larsen, E.W. and others. *Parker Creek Plug Restoration Plan*. pp. 1-21 with appendices.
5. 1992 Larsen, E.W., Trihey & Associates. *Description and evaluation of Restoration Alternatives for Lower Lee Vining Creek, Mono County, California*. pp. 1-71.
6. 1992 Larsen, E.W. *Bed Surface and Subsurface Particle Size Characterization, Rush Creek, Mono County, California*. pp. 1-188.
7. 1992 Larsen, E.W. *Bed Surface and Subsurface Particle Size Characterization. Lee Vining Creek, Mono County, California*. pp. 1-260.
8. 1992 Larsen, E.W. and others, Trihey & Associates. *Comparison of Historic and Existing Conditions on Lower Lee Vining Creek, Mono County, California* 1-86.
9. 1992 Larsen, E.W. *1992 Pilot Project Treatment for Lee Vining Creek, Mono County, California*. pp. 1-35.
10. 1992 Larsen, E.W. *Stability of Bar-Pool Pilot Projects, Lee Vining Creek, Mono County, California*. pp. 1-56.
11. 1992 Larsen, E.W., Trihey & Associates. *Overview of Representative 1992 Restoration Treatments, Lee Vining Creek, Mono County, California*. pp. 1-41.
12. 1993 Larsen, E.W., Trihey & Associates. *Summary Comparison of Pre-1941 and Post-1941 Conditions*

Affecting Fish Populations in Lower Rush Creek, Mono County, California. pp. 1-114.

13. 1994 Larsen, E.W. *A Study of Pool Morphology in Pre-1941 Channel Segments of Lower Rush Creek, Mono County, California.* pp. 1-78.
14. 1999 Rutten, L.T., J.F. Mount and E.W. Larsen. *Quantitative assessment of the response to changing sediment supply, North Fork, American River, California.* Technical Completion Report. Part of Water Resources Center Project UCAL-WRC-W-788.
15. 1999 Kondolf, M., T. Griggs, E.W. Larsen, S. McBain, M. Tompkins, J. Williams and J. Vick. *Flow Regime Requirements for Habitat Restoration along the Sacramento River between Colusa and Red Bluff.* CALFED Bay-Delta Program. SAC/136472/JAN00/002.DOC.
16. 1999 Larsen, E.W., J. Fleckenstein and E.G. McPherson. *Investigation into Hydrologic Modeling and the Effect of Urban Forests on Runoff Quantity and Quality.* United States Department of Agriculture. Forest Service. Pacific Southwest Research Station. Center for Urban Forest Research. Internal Report Hydro-1, DRAFT.
17. 1999 Magney D., M. Rains and E.W. Larsen. David Magney Environmental Consulting. 1999. *Harrison Property Bank Stabilization Assessment on San Antonio Creek, Ojai Valley, California.* (PN 99-0081). Prepared for the U.S. Army Corps of Engineers, Ventura, California.
18. 2002 Larsen, E.W., E. Anderson, E. Avery and K. Dole. *The Controls on and evolution of channel morphology of the Sacramento River: A case study of River Miles 201-185.* Report to the Nature Conservancy. November 1, 2002.
19. 2004 Larsen, E.W. and A. Fremier. 2004. *Identification of Riparian and Wetland Vegetation Dependent on Water Supplied by the Amador Canal and An Analysis of Dependence of Jackson Creek Flows on Flow in the Amador Canal.* Report prepared for the Law Offices of J. William Yeates, Attorney-at-Law.
20. 2004 Larsen, E.W. *Meander Bend And Gravel Bar Migration Near River Mile 192.75 Of The Sacramento River.* 2004. Phase I report prepared for CALFED Ecosystem Restoration Program, Agreement #ERP-02-PO8-D, Amendment 2. Steering Committee Technical Memorandum.
21. 2005 Larsen, E.W. *Future Meander Bend Migration and Floodplain Development Patterns near River Miles 241 To 235, Sacramento River.* 2005. Report prepared for River Partners, Technical Memorandum for CALFED Ecosystem Restoration Program, Agreement #ERP-02-P39.
22. 2005 Larsen, E.W. *Meander Bend Migration Near River Mile 178 of the Sacramento River.* 2005. Report prepared for River Partners, Technical Memorandum for CALFED Ecosystem Restoration Program, Agreement #ERP-02-P39.
23. 2005 Larsen, E.W. *Future Meander Bend Migration And Floodplain Development Patterns Near River Miles 200 To 191 Of The Sacramento River.* 2005. Phase II report prepared for CALFED Ecosystem Restoration Program, Agreement #ERP-02-PO8-D, Amendment 2. Steering Committee Technical Memorandum.
24. 2004 Larsen, E.W. *Meander Bend Migration near River Mile 178 of the Sacramento River.* 2004. Report for river Partners, Chico, California.
25. 2005 Larsen, E.W. *Future Meander Bend Migration and Floodplain Development Patterns near River Mile 241 to 235, Sacramento River.* 2005. Report for River Partners, Chico, California.

26. 2005 Larsen, E.W. *Future Meander Bend Migration And Floodplain Development Patterns Near River Miles 200 To 191 Of The Sacramento River*. 2005. Phase III report prepared for CALFED Ecosystem Restoration Program, Agreement #ERP-02-PO8-D, Amendment 2. Steering Committee Technical Memorandum.
27. 2006 Winter, S.M. and E.W. Larsen. *Sediment Retention on a Deltaic Floodplain in Response to Climate and Land-Use Changes*. 2006. Report for the California Tahoe Conservancy.
28. 2006 Young, A, E.W. Larsen, E. Girvetz and A. Fremier. *Evaluating River Restoration Design Using a Meander Migration Model on the Trinity River, California*. 2006. Report for the Department of Water Resources.
29. 2006 Larsen, E.W. and M. Rains. *Meander Migration Model Assessment for The 50- And 100-Year Storms, Whitman Property, San Antonio Creek, Ventura County, California*. Coshow Environmental, INC.
30. 2006 Larsen, E.W. and M. Rains. *Meander Migration Model Assessment for The January 2005 Storm, Whitman Property, San Antonio Creek, Ventura County, California*. 2006. Coshow Environmental, INC.
31. 2007 Larsen, E.W. *Predicting Modes and Magnitude of River Channel Migration and Chute Cutoff Based on Bend Geometry, Sacramento River, California, USA*. Final Report for the U. S. Bureau of Reclamation. Sacramento, CA.
32. 2007 Larsen, E.W. *Sacramento River Ecological Flows Study: Meander Migration Modeling*. Final Report. Prepared for CALFED Ecosystem Restoration Program. Sacramento, CA. 102 pp.
[http://132.241.99.23/SRCAF/library_doc/Meander_Migration_Modeling_Final_Report_\(Larsen_2007\).pdf](http://132.241.99.23/SRCAF/library_doc/Meander_Migration_Modeling_Final_Report_(Larsen_2007).pdf)
33. 2008 Larsen, E.W. *Modeling Revetment Removal and Implications for Meander Migration of Selected Bends River Miles 222 To 179 of the Sacramento River*. Phase III report prepared for CALFED Ecosystem Restoration Program, Agreement #ERP-02-PO8-D, Amendment 2. Steering Committee Technical Memorandum.
34. 2008 Larsen, E.W. *Simulated Channel Migration (2007-2057) near River Miles 197 To 191 of the Sacramento River*. Phase III report prepared for CALFED Ecosystem Restoration Program, Agreement #ERP-02-PO8-D, Amendment 2. Steering Committee Technical Memorandum.
35. 2008 Larsen, E.W. *Chinook Bend Channel Migration Modeling Study*. Prepared for King County Department of Natural Resources and the Wild Fish Conservancy, Seattle, Washington.
36. 2009 Larsen, E.W. *Rumsey Rancheria Flood Inundation Technical Study*. Prepared for James Zanetto, Architect & Planner and Rumsey Indian Rancheria.
37. 2010 Larsen, E.W. *Llano Seco Riparian Sanctuary Channel Study: Meander Bend Migration and Cutoff Modeling*. Final Report. Prepared for River Partners. CALFED Ecosystem Restoration Program. Sacramento, CA.
38. 2010 Larsen, E.W. *Sacramento River Ecological Flows Study: HEC-RAS cross sections and matching stage-discharge curves for use in the SacEFT v.2 model of riparian initiation*. Final Report. Prepared for ESSA Technologies. CALFED Ecosystem Restoration Program. Sacramento, CA.
39. 2010 Larsen, E.W. *Review Summary of Selected Software Packages for Ecosystem Habitat and Attribute Modeling*. Prepared for USACE Engineer Research and Development Center (ERDC). Vicksburg, Mississippi
40. 2010 Larsen, E.W. *Modeling Response to Flow Changes for Cottonwood Initiation and Chinook salmon redd dewatering on the Upper Sacramento River With Environmental Flow and Ecosystem Processes Modeling Software Packages*. Prepared for USACE Hydrologic Engineering Center (HEC). Davis, CA.

41. 2011 Larsen, E.W., T. Horner, E. Ringleberg, *Cache Creek Annual Status Report 2011*. Prepared for Yolo County Board of Supervisors and Natural Resources Division, Woodland CA.
42. 2012 Larsen, E.W., M. Tompkins, E. J. Martin, *Cache Creek Annual Status Report 2012*. Prepared for Yolo County Board of Supervisors, and Natural Resources Division, Woodland CA.
43. 2012 Larsen, E.W. *Modeling Changing River Channel Bed Topography for Linkage with a Fish Behavior Model*. Prepared for US Army Corps of Engineers. U.S. Army Engineer Research and Development Center (ERDC) BAA 11-4790.

SELECTED GRANTS AND PROJECTS

U.S. Fish and Wildlife Service. Numerically Modeling Meander Migration: Upper Sacramento River. \$105,463. October 1, 1997 – June 30, 2000. *Principle Investigator*.

California Department of Parks and Recreation. Geomorphic Assessment of Aquatic Habitat of the Foothill Yellow-legged Frog (*Rana Boylii*). \$6,563. October 30, 1997 – January 15, 1998. *Principle Investigator*.

California Department of Parks and Recreation. Geomorphic Assessment of Aquatic Habitat of the Foothill Yellow-legged Frog (*Rana Boylii*). \$25,000. December 15, 1998 – October 1, 1999. *Principle Investigator*.

California Tahoe Conservancy. Provide Services in Connection with the California Tahoe Conservancy's Wildlife Habitat Enhancement and Stream Environment Zone Restoration. \$76,114. October 1, 1999 – October 31, 2001. *Principle Investigator*.

California Department of Parks and Recreation. Geomorphic Assessment of Aquatic Habitat of the Foothill Yellow-legged Frog (*Rana Boylii*). \$27,000. December 15, 1999 – December 1, 2000. *Principle Investigator*.

California Department of Water Resources. Develop a Numerical River Migration Model and Apply the Model to Specified Altered Conditions on the Sacramento River: Offstream Storage Investigation. \$320,000. March 1, 2000 – June 30, 2002. *Principle Investigator*.

California Department of Parks and Recreation. Preliminary Geomorphic Assessment of land use practices: Riparian prescribed burns. \$25,000. October 18, 2000 – February 1, 2001. *Principle Investigator*.

California Department of Parks and Recreation. Preliminary Geomorphic Assessment of land use practices: Riparian prescribed burns. \$5,000. February 1, 2001 – March 31, 2002. *Principle Investigator*.

California Tahoe Conservancy. Services in Connection with the California Tahoe Conservancy's Wildlife Habitat Enhancement and Stream Environment Zone Restoration. \$30,000. June 30, 2001 – December 31, 2003. *Principle Investigator*.

Department of Water Resources. Amendment – Investigation and Documentation of Meander bend cutoffs on the Sacramento River. \$158,500. February 1, 2002 – January 31, 2003. *Principle Investigator*.

California Department of Parks and Recreation. Crayfish Barrier Flume Study: Phase 1 – Initial Design and Materials Assessment. \$21,790. April 1, 2002 – June 30, 2003. *Principle Investigator*.

- The Nature Conservancy*. Meander Migration Simulation of the Sacramento River, River Miles 185-201. \$42,500. May 3, 2002 – October 31, 2002. *Principle Investigator*.
- U.S. Geological Survey*. Sediment Transport Process in the South and Middle Yuba River Basins. \$168,700. July 1, 2002 – May 30, 2004. *Principle Investigator*.
- CALFED Bay-Delta Program*. Geomorphic Model for Demonstration and Feasibility Assessment of Setback Levees: Bay-Delta River Systems. \$104,458. October 2002 – June 2004.
- California Tahoe Conservancy*. Provide Services in Connection with the California Tahoe Conservancy's Wildlife Habitat Enhancement and Stream Environment Zone Restoration. \$125,000. 2002 – 2003. *Principle Investigator*.
- Department of Water Resources, Division of Planning*. Trinity River Restoration Project. \$218,694. July 2004 – December 2005. *Principle Investigator*.
- California Tahoe Conservancy*. Upper Truckee River Investigation. \$30,000. 2004 – December 2004.
- U.S. Geological Survey*. Sediment Supply South Yuba River Investigation. \$61,185.35. July 2001-December 2004. *Principle Investigator*.
- CALFED/Nature Conservancy/Stillwater Sciences*. Meander Migration Modeling For Flow Regulation Studies- Sacramento River. \$102,000. August 2005 – December 2006. *Principle Investigator*.
- California Tahoe Conservancy*. Upper Truckee River Investigation. \$60,000. July 2006 – June 2007. *Principle Investigator*.
- CALFED/CSU Chico*. Meander Migration Modeling For Flow Regulation Studies- Sacramento River. \$300,000. April 2007 – March 2009. *Principle Investigator*.
- United States Forest Service*. 1996-2000. \$15,000 grant to review numerical hydrologic models of environmental impacts of storm water runoff related to urban forestry practices.
- University of California Water Resources Center*. 1997-1998. Research related to assessing changing sediment supply in the North Fork of the American River.
- Bureau of Reclamation (with Ducks Unlimited)*. 1997-1999. \$40,000 per year grant to study interaction of hydrology, stream dynamics, and vegetative restoration at Upper Stony Creek, California.
- Cal-Trans*. 1998-2000. Studying the effects of land use activities on fluvial geomorphology in selected streams in North Western California. Three years, \$110,000/year.
- State of California, Attorney General's Office; California State Lands Commission*. 1996-Present. Hydraulic engineer and expert witness on mechanics of sediment transport of mining debris and mechanics of river bar formation.
- Philip Williams and Associates*. 1994-present. Research scientist and associated hydraulic engineer developing numerical model of the dynamics of the Santa Clara River, California, and hydraulic modeling for river channel restoration.
- National Audubon Society*. 1994-present. Retained as science advisor on river and marsh channel restoration for

Western Region (California, Nevada, Oregon, Washington).

Muzzi Marsh Project. 1986-2002. Contracted with California Native Plant Society. On-going research mathematical modeling of marsh channels in ecological evolution of marshes. Publication in preparation.

The Water Heritage Trust. 1990-present. Science Advisor. The Water Heritage Trust is a part of the Resource Renewal Institute.

Mill Valley Watershed Project. 1994-1998. Contracted to study the watershed and geomorphology of channels in the Mill Valley watershed. Developing a "Guide to the Creeks of Mill Valley," to be published by California Native Plant Society.

Research

Co-Principle Investigator, 2011-2014. \$516,946.00 grant. Lower Putah Creek Coordinating Committee Terrestrial Biomonitoring Project.

Principle Investigator. 2010-2012. \$158,000 grant. California Department of Water Resources grant. Research on geomorphic dynamics contributing to riparian area conservation and restoration on the Sacramento River. Assessing the effectiveness of conservation strategies in relationship to channel migration, and the fluvial processes that are key for riparian vegetation development.

Principle Investigator. 2009-2011. \$65,000 grant. Solano County Water Agency grant. Research on assessment and monitoring of geomorphic restoration on Putah Creek. Assessing the effectiveness of restoration strategies in relationship to channel migration, and the fluvial processes that are key for riparian vegetation development.

Principle Investigator. 2009-2011. \$72,000 grant. United States Army Corps of Engineers Interagency Purchase Agreement. Research related to developing hydraulic and ecosystem modeling with the Ecosystems Functions Model (EFM) from the Hydrologic Engineering Center (HEC) in Davis, California.

Principle Investigator. 2008-2009. \$35,000 grant. Solano County Water Agency grant. Research on assessment and monitoring of geomorphic restoration on Putah Creek. Assessing the effectiveness of restoration strategies in relationship to channel migration, and the fluvial processes that are key for riparian vegetation development.

Principle Investigator. 2006-2008. \$60,000 grant. Investigation of Channel Dynamics on the Upper Truckee River. Research program with the California Tahoe Conservancy, through the Water Resources Center at UC Davis.

Principle Investigator. 2007-2009. \$300,000 grant. CALFED Ecosystem Restoration Program grant. Research on integrated assessment and monitoring of riparian restoration on the Sacramento River. Assessing the effectiveness of restoration strategies in relationship to channel migration, and the fluvial processes that are key for riparian vegetation development.

Principle Investigator. 2005-2008. \$100,000 contract. CALFED Ecosystem Restoration Program grant. In collaboration with The Nature Conservancy and Stillwater Sciences. Ecosystem flows project. Examining the consequences of flow regulation on the ecosystem dynamics of the Sacramento River.

Principle Investigator. 2001-2004. \$62,000 grant. U.S. Geological Survey. Sediment Supply South Yuba River Investigation

Principle Investigator. 1997-1999. Research on channel dynamics of the Sacramento River. Predicting future channel migration, the effect of setback levees on channel hydraulics. Two-year \$50,000/year funding from the National Fish and Wildlife Service.

Principle Investigator. 1997-1999. Research on channel dynamics of the Sacramento River. Predicting future channel migration, the effect of setback levees on channel hydraulics. Two-year \$50,000/year funding from the National Fish and Wildlife Service.

Principle Investigator. 1996-2006. Research program on rivers in the Lake Tahoe Basin, renewable annual part time salary and student support from the California Tahoe Conservancy, through the Water Resources Center at UC Davis. Developing a quantitative method of assessing stream restoration efforts on selected streams in the Lake Tahoe Basin.

Principle Investigator. 1997-1998. \$15,000 grant with the California Department of Parks and Recreation, studying impacts of changing fluvial geomorphology on Foothill yellow-legged frog.

Principle Investigator. 1996-1998. \$15,000 grant from the US Forest Service. Research on numerical modeling of watershed processes, with particular applications to urban forests.

Co-Principal Investigator (with Professor Jeffrey Mount). 1997-1998. \$30,000 grant with the Water Resources Center. Research related to assessing changing sediment supply in the North Fork of the American River.

Co-Principal Investigator (with Professor Jeffrey Mount). 1997-1999. Studying the interaction of ground water, riparian vegetation, and river morphology of Upper Stony Creek, California. Three-year \$40,000/year research grant with the United States Bureau of Reclamation and Ducks Unlimited.

Co-Principal Investigator (with Professor Jeffrey Mount). 1998-2000. Studying the effects of land use activities on fluvial geomorphology in selected streams in North Western California. Cal-Trans grant: three years, \$110,000/year.

Post Doctoral Researcher, Department of Civil and Environmental Engineering, University of California, Davis. 1995-1997. A research appointment under a \$100,000 grant that I authored and secured from the California Department of Water Resources, numerically modeling the mechanics of long-term meander migration of the Sacramento River. (Working with Professor Geoffrey Schladow and with the Ecology Graduate Group at UC Davis, modeling riparian vegetation succession.)

Expert Witness/Hydraulic Engineer, California State Attorney Generals Office. 1996-1998. With the California State lands Commission, conducted extensive hydraulic and geomorphic research and numerical analysis of data for litigation for a land ownership dispute related to the effect of levees and other hydraulic influences on property boundary lines.

Expert Witness/Hydraulic Engineer, United States Department of Justice. 1988-1990. With the United States Forest Service, conducted extensive hydraulic research and numerical analysis of data for litigation for reserved water rights in the Platte River Division Number One, Colorado District Court.

Research Scientist, Philip Williams and Associates, 1994-1996. Mathematical modeling of hydrologic processes; in preparation: "The Effect of Impervious Areas in Urban Watersheds on Timing and Magnitude of

Runoff'.

Research Assistant in Hydraulic Engineering, Professor H.W. Shen, University of California, Berkeley. 1986-1988. Conducted numerical modeling of mechanics of Mississippi River channel evolution. (Report to Army Corps of Engineers.)

Research Assistant in Fluvial Geomorphology, Professor Luna B. Leopold, University of California, Berkeley. 1986-1988. Quantitative hydrology of urban basins, and the use of hydrologic models in planning issues.

SELECTED PROFESSIONAL AND PUBLIC SERVICE

Technical Advisor, U.S. Army Corps of Engineers Sacramento River Bank Protection Project. Sacramento California.

Technical Advisor and Research Collaboration, U.S. Army Corps of Engineer. Engineer Research and Development Center (**ERDC**), Vicksburg, Mississippi, U.S.A.

Technical Advisor, California Department of Water Resources, FloodSAFE Environmental Stewardship and Statewide Resources Office (FESSRO).

Technical Advisor, California Department of Water Resources, Central Valley Flood Protection Plan.

Science advisor: California Tahoe Conservancy; geomorphic reviewer of projects and proposals for the Lake Tahoe Basin.

Technical advisor (geomorphologist): Winters Putah Creek Committee: (Appointed by City of Winters City Council: Appointment 2007-2010; 2010-present.)

Technical advisor: Solano County Water Agency in coordination with stream keeper, Rich Marovich.

Technical advisor (geomorphologist): Yolo County Board of Supervisors and Yolo County Department of Parks and Resources. (Appointed by Yolo County Board of Supervisors: Appointment 2007-2009).

Science advisor on CALFED Steering Committee to Address Sedimentation Issues at the M&T/Llano Seco Pumping Plant and Fish Screen Facility

Technical Advisory Committee; CALFED/River Partners; Floodplain Restoration Feasibility Study La Barranca Unit Sacramento River National Wildlife Refuge Cooperative Agreement (#11620-00-J331)

Technical Advisory Committee; CALFED/US Fish and Wildlife Service/River Partners: Riparian restoration planning and feasibility study for the Riparian Sanctuary, Llano Seco Unit, Sacramento River National Wildlife Refuge.

Technical Science Advisor: Sacramento River Ecological Flows Study: The Nature Conservancy (TNC)/California Bay-Delta Authority's Ecosystem Restoration Program (CALFED grant ERP-02D0P61)

Technical Advisory Committee; National Park Service Muir Woods.

Technical Advisory Committee; Golden Gate National Recreation Area National Park Service Redwood Creek

Program trainer: U.S. Army Corps of Engineers Annual Watershed Training Program; Hydrologic Engineering Center, Davis, Ca.

Technical Advisory Committee: California Department of Water Resources: Sacramento River North of Delta Off-stream Storage Investigation

Collaboration with Professor Futoshi Nakamura at the University of Hokkaido, Japan.

Technical Science Advisor and Expert Witness: National Audubon Society and San Bernadino Audubon: Southern California Edison Mill Creek FERC relicensing.

Technical advisory committee/expert witness: Natural Heritage Institute, San Francisco, Ca.

Expert Witness and technical advisor: Old Creek Ranch Flood Damage 2005 - Magney Environmental.