TEXAS STATE VITA

I. Academic/Professional Background

A. Name: Thomas Hardy Title: Chief Science Officer, Meadows Center for Water and the Environment

B. Educational Background

Degree	Year	University	Major	Thesis/Dissertation
Ph.D.	**1988**	**Utah State University**	**Civil and Environmental Engineering**	State-parameter estimation of real time river water quality
Masters	**1982**	**University of Nevada**	**Aquatic Ecology**	Ecological interactions of the introduced and native fishes in the outflow of Ash Springs, Lincoln County, Nevada
Bachelors	**1978**	**University of Nevada**	**Biology**	NA
Bachelors	**1977**	**University of Nevada**	**Education**	NA

C. University Experience

Position	University	Dates
Research Professor/Senior Lecturer, Department of Biology	**Texas State University**	**2009-present**
Chief Science Officer, Meadows Center for Water and the Environment	**Texas State University**	**2009-present**
Professor; Department of Civil and Environmental Engineering	**Utah State University**	**2002-2009**
Associate Director, Utah Water Research Laboratory	**Utah State University**	**2002-2009**
Associate Professor, Department of Civil and Environmental Engineering	**Utah State University**	**1995-2002 (Tenured in 1995)**
Assistant Professor, Department of Civil and Environmental Engineering	**Utah State University**	**1990-1995**
Research Assistant Professor, Department of Civil and Environmental Engineering	**Utah State University**	**1988-1990**
Director, Institute for Natural Systems Engineering	**Utah State University**	**1987-2009**
Acting Research Assistant Professor, Department of Civil and Environmental Engineering	**Utah State University**	**1987-1988**
Research Scientist, Aquatic Biology	**University of Nevada at Las Vegas**	**1980-1982**

D. Relevant Professional Experience

Position	Entity	Dates
Principal	**Watershed Systems Group, INC**	**1978-2013**
Principal	**Environmental Mapping and Remote Sensing, Inc.**	**1994-1999**
Instructor, Computer Techniques	**Utah Division of Wildlife Resources**	**1988**

Research Engineer	**BIO/WEST, Inc.**	**1984-1987**
Research Diver	**University of Nevada at Las Vegas** **Utah Water Research Laboratory**	**1979-1984** **1984-1985**
Civil Engineer	**Twelve-Nine, Inc.**	**1984**
Project Manager/Aquatic Ecologist	**Environmental Consultants, Inc.**	**1979-1985**
Surveyor	**Clark County Engineering Department**	**1976**

II. TEACHING

A. Teaching Honors and Awards: NA

B. Courses Taught:

Course	Entity	Dates
BIOL 7360 – Approaches to Aquatic Resource Modeling	**Texas State University**	**2012,2013**
CEE 5690/6690 - Natural Systems Engineering	**Utah State University**	**2002,2003,2004,2005,2006, 2008**
CEE 6930 - Special Problems	**Utah State University**	**1999,2003,2004,2005,2006**
CEE 5700/6700 - Field sampling techniques	**Utah State University**	**1999,2000,2001**
CEE 493/693 - Special problems in natural systems engineering	**Utah State University**	**1998**
CEE 596/696 - Management of Regulated Rivers	**Utah State University**	**1994,1995**
CEE 588 - Senior Design Seminar	**Utah State University**	**1993,1994,1995,1996,1997, 1998,1999,2002,2003,2004, 2005,2006**
CEE 369 - Environmental Systems Engineering	**Utah State University**	**1993,1994,1995,1996,1997, 1998**
CEE 796 (5720/6720) - Natural Systems Modeling	**Utah State University**	**1992,1997,1998,1999,2000, 2001,2003,2004,2005,2006**
CEE 363 - Introduction to Environmental Engineering	**Utah State University**	**1992,1993,1994,1995,1996**
CEE 103 – Digital computer applications in engineering	**Utah State University**	**1990,1991,1992**
CEE 693 – Ecology and management of regulated rivers	**Utah State University**	**1990**

C. Graduate Theses/Dissertations or Exit Committees:

1. Ph.D. students (Committee Chair)

Michele Crawford Recreation induced impacts on Texas wild rice growth and fitness, Texas State University, anticipated completion Fall 2014

Nikki Davis Predicting future range expansion of Whooping Crane (*Grus americana*) winter habitat using long-term censure and remotely sensed data, Texas State University, anticipated completion Fall 2014

Alphonce Guzha Integrating surface and sub-surface flow models of different spatial and temporal scales using potential coupling interfaces, Utah State University, 2008. Post Doctoral Research Associate, University of Florida, 2008-2011; Visiting Research Scientist, George-August Goettingen University, Germany, 2011-present.

Leon Basdekas Virgin River operations optimization model, Utah State University, 2007. Senior Engineer, Watercourse Engineering, Inc., 2005-2008; Principal Engineer (Water Resources), Colorado Springs Utilities, 2008-present.

Craig Addley Habitat modeling of river ecosystems: multidimensional spatially explicit and dynamic habitat templates at scales relevant to fish, Utah State University, 2006. Senior Consultant, Cardno Entrix, Inc., 2006-present.

Anji Dodd Two-dimensional mobile bed hydrodynamic model for the transport of mixed sediments, Utah State University, 2006. CALFED Science Fellow, Humboldt State University, Arcata, CA, 2005-2008; Senior Environmental Scientist/Engineer, Huffman and Carpenter, LLC, 2007-2008; Senior Project Manager, Manhard Consulting, 2008-2013; Visiting Faculty, Humboldt State University, 2013-present; Senior Project Manager, Kimley-Horn and Associates, Inc., 2013-present.

Ekaterina Saraeva Development of an instream flow-based extrapolation procedure for the Nooksack Watershed, Utah State University, 2006. Post Doctoral Research Associate, Utah Water Research Laboratory, Utah State University, 2006-2011. Research Engineer, Watershed Systems Group, Inc. 2013-present.

Ph.D. Committee member/exit committee

Francesco Zignol (Geography – Texas State University – San Marcos)
Adrian Vogl (Texas State University – San Marcos)
Ahmed Mohamed (Utah State University)
Anga Rebane (Utah State University)
Bethany Neilson (Utah State University)
David Kikkert (Utah State University)
Hussein Batt (Utah State University)
Issaak Vasquez (Utah State University)
Jacing Chou (Utah State University)
Joon Hee Lee (Utah State University)
Karen Williams (Utah State University)
Kiran Chinnayakanahalli (Utah State University)
Madeline Merck (Utah State University)
Mark Schmelter (Utah State University)
Miaohsi Wang (Utah State University)
Rajiv Prasad (Utah State University)
Robert Black (Utah State University)
Sanyogita Andriyas (Utah State University)
Shyamal Bikash Chowdhury (Utah State University)
Somkiat Prajamwong (Utah State University)
Tong Yin (Utah State University)

2. Master's students (Committee Chair)

Laura Clark Applications of unmanned autonomous vehicle systems: Mapping salt cedar and change detection of petroleum exploration, anticipated completion Fall 2013

Ovie Shola Seasonal variation in aquatic macroinvertebrates of the San Marcos, River, Texas, Spring 2015

Jacob Bilbo Seasonal impact of recreation based suspension of turbidity on the macroinvertebrate assemblage of the San Marcos River, anticipated completion Fall 2014

Greg Cummings Habitat association of Rainbow Trout in the Canyon Reservoir tailrace, anticipated completion Spring 2014

Eric McKlesky A behavioral-based, mechanistic population model for sympatric stream salmonids using the SWARM simulation system, Utah State University, 2005

Britanie Ames A simplified method for estimating sediment transport flow regimes based on a stream classification system, Utah State University, 2005

Mikhail Bhosle Estimating uncertainty in fish habitat modeling using two-dimensional hydraulics, Utah State University, 2004

Jason Thompson A methodology for assessing aquatic habitat and riparian habitat quality at the watershed scale, Utah State University, 2003

Hans Milliken A comparative evaluation of instream flow protection criteria for aquatic resources on Forest Service managed stream systems, Utah State University, 2003

Nathan Kennard Development and testing of a rapid assessment methodology for instream habitat, Utah State University, 2000

Loni Johnson The application of multi-spectral airborne imagery for the detection of temporal changes in stream channel characteristics, Utah State University, 1999

Greg Guensch Validation of an individual-based, mechanistic habitat selection model for drift-feeding salmonids, Utah State University, 1999

Jennifer Ludlow Comparison of physical habitat simulation models with energetic modeling for habitat use, Utah State University, 1997

Nathan Bartsch Development and utilization of a physical habitat model for *Etheostoma fonticola* in the Landa Lake and Comal River systems, Utah State University, 1996

Karl Tarbet Evaluation of two-dimensional hydraulic modeling in a natural river and implications in instream flow assessment methods, Utah State University, 1996

Michael Chulick Statistical modeling methodology for the determination of habitat suitability and habitat preferences of the endangered fountain darter, Utah State University, 1995

James Shoemaker Use of multispectral aerial videography for jurisdictional delineation of wetland areas, Utah State University, 1994

Thomas Redd Use of airborne multispectral videography for the classification and delineation of riparian vegetation, Utah State University, 1994

Kiran Panja Classification of mesoscale hydraulic features based on spectral analysis of multispectral aerial videography, Utah State University, 1994

Brent Crowther Delineation of mesoscale hydraulic features, subaqueous sediments, spawning sites, and riverine bathymetry in the south fork of the Salmon River utilizing multispectral, airborne videography, Utah State University, 1994

Craig Addley A mechanistic approach to modeling habitat needs of drift feeding salmonids, Utah State University, 1991

Brent Bartz Sources of uncertainty and effects on interpretation of results in the development of instream flows for fisheries habitat, Utah State University, 1990

M.S. Committee member/exit committee

Casey Williams (Texas State University – San Marcos)
Kristina Tower (Texas State University – San Marcos)
Clara Fobb (Texas State University – San Marcos)
Lauren Loney (Texas State University – San Marcos)
Kenneth Behen (Texas State University – San Marcos)
Kerstin Hoesel (Texas State University – San Marcos)
Rachel Byrne (University of Houston – Clear Lake)
Abdelmonaim Angallouch (Utah State University)
Ben Case (Utah State University)
Brian Hines (Utah State University)
Bruce Savage (Utah State University)
Cynthia Tyler (Utah State University)
El-Hassan K. El-Hassan (Utah State University)
Lizzette Oman (Utah State University)
Mark Woodbury (Utah State University)
Paul Badame (Utah State University)
Rajan Phadnis (Utah State University)
Shanda Fallau (Utah State University)
Walter Wilson (Utah State University)

D. Courses Prepared and Curriculum Development:

BIOL 7360 – Approaches to Aquatic Resource Modeling
IF310 – Using the computer based PHABSIM system
CEE 103 – Digital computer applications in engineering
CEE 363 – Introduction to Environmental Engineering
CEE 369 – Environmental Systems Engineering
CEE 493/693 Special problems in natural systems engineering
CEE 5690/6690 – Natural Systems Engineering
CEE 5700/6700 – Field sampling techniques
CEE 5720/6720 – Natural Systems Modeling
CEE 596/696 – Management of Regulated Rivers
CEE 693 – Ecology and management of regulated rivers

Member of Curriculum Committee for transition of USU's Civil and Environmental Engineering program through conversion from quarters to semesters and subsequent ABET Accreditation.

E. Funded External Teaching Grants and Contracts: NA

F. Submitted, but not Funded, External Teaching Grants and Contracts: NA

G. Funded Internal Teaching Grants and Contracts: NA

H. Submitted, but not Funded, Internal Teaching Grants and Contracts: NA

I. Other: NA

III. SCHOLARLY/CREATIVE

A. Works in Print

1. Books (if not refereed, please indicate)

The Science of Instream Flows: A Review of the Texas Instream Flow Program (2005). Committee on Review of Methods for Establishing Instream Flows for Texas Rivers, National Research Council. Washington, D.C., National Academies Press, c2005. ISBN: 0-309-54808-X, 162 pages.

a. Scholarly Monographs: NA

b. Textbooks:

The Theory and Application of the Physical Habitat Simulation System (PHABSIM). Copyright - Thomas B. Hardy 2006. All rights reserved. 148pp.
Translated into Japanese (2009).
Translated into Korean (2006).

c. Edited Books:

Hardy and Davis (editors) (in press) Texas Riparian Areas. Texas A&M Press, College Station, Texas.

d. Chapters in Books:

Hardy, T.B., and T.A. Shaw. 2013. Application of real-time management for environmental flow regimes. In: Ecohydraulics: An Integrated Approach (I. Maddock, A. Harby, P. Kemp, and P. Wood, Eds), John Wiley & Sons, Chichester, UK. (doi: 10.1002/9781118526576.ch16)

Hardy, T.B., D.S. Bowles, and K. Bosworth. 1987. Recursive river water quality estimation using abstract evolution equations in functional Sobolev spaces. In: Systems analysis in water quality management (M.B. Beck, Ed). Pergamon Press, London. 321-331 pp.

Deacon, J.E., and T.B. Hardy. 1984. Streamflow requirements of woundfin (*Plagopterus argentissimus*): Cyprinidae in the Virgin River, Utah, Arizona, Nevada. In: Festschrift for Walter W. Dalquest in Honor of His Sixty-sixth Birthday (N.V. Horner, Ed). Department of Biology, Midwestern State University, 1984. 141-163 pp.

Hardy, T.B., C.G. Prewitt, and K.A. Voos. 1982. Application of a physical habitat usability model to the fish community in a spring-fed desert stream. In: Analysis of Ecological Systems: State-of-the-Art in Ecological Modeling (Lauenroth, Skogerboe, and Flug, Eds). Developments in Environmental Modeling 5. Elsevier Scientific Publishing Company. 391-397 pp.

e. Creative Books:

Arielle's Answer (Copyright 2003 - Thomas B. Hardy. Self Published)

2. Articles

a. Refereed Journal Articles (Students underlined):

Basdekas, L, L.A. Bastidas, T.B. Hardy, A.J. Caplan, and M. McKee. (In Press) 2014. Virgin River multi-objective optimization: Maximizing endangered fish habitat and minimizing costs. International Journal of River Basin Management.

Perkin, J.S., Z.R. Shattuck, P.T. Bean, T.H. Bonner, E. Saraeva, and T.B. Hardy. 2010. Movement and microhabitat associations of Guadalupe Bass in two Texas rivers. North American Journal of Fisheries Management 30:33–46.

Guzha, A.C., and T.B. Hardy, 2009. Application of the distributed hydrological model, TOPNET, to the Big Darby Creek watershed, Ohio, USA. Water Resources Management Journal 24:979-1003. (DOI 10.1007/s11269-009-9482-6).

Saraeva, E., and T.B. Hardy. 2009. Prediction of fisheries physical habitat values based on hydraulic geometry and frequency distributions of depth and velocity. International Journal of River Basin Management 7:31-41.

Saraeva, E., and T.B. Hardy. 2009. Extrapolation of site-specific weighted usable area curves and instream flow requirements to unmeasured streams within the Nooksack watershed in support of strategic watershed planning. International Journal of River Basin Management 7:91-103.

Hardy, T.B., T. Shaw, R.C. Addley, G.E. Smith, M. Rode, and M. Belchik. 2006. Validation of chinook fry behavior based escape cover modeling in the lower Klamath River. International Journal of River Basin Management 4:169–178.

Hardy, T.B., and C. Addley. 2003. Instream flow assessment modeling: combining physical and behavioral-based approaches. Canadian Water Resources Journal 28:1-10.

Gregory, P.J., J.S.I. Ingram, R. Anderson, R.A. Betts, V. Brovkin, T.N. Chase, P.R. Grace, A.J. Gray, N. Hamilton, T.B. Hardy, S.M. Howden, A. Jenkins, M. Meybeck, M. Olsson, I. Ortiz-Monasterio, C.A. Palm, T.W. Payn, M. Rummukainen, R.E. Shulze, M. Thiem, C. Valentin, and M.J. Wilinson. 2002. Environmental consequences of alternative practices for intensifying crop production. Agriculture, Ecosystem and Environment 88:279-290.

Guensch, G.R., T.B. Hardy, and R.C. Addley. 2001. Validation of an individual-based, mechanistic habitat selection model for drift-feeding salmonids. Canadian Journal of Fisheries and Aquatic Science 58:446-457.

Goodwin, P., and T.B. Hardy. 1999. Integrated simulation of physical, chemical and ecological processes for river management. Journal of Hydroinformatics 1:33-58.

Gilver, D.J., R. Bryant, and T.B. Hardy. 1999. Remote sensing of channel morphology and in-stream fluvial processes. Progress in Environmental Science 1:257-284.

Hardy, T.B. 1998. The future of habitat modeling and instream flow assessment techniques. Regulated Rivers: Research and Management 14:405-420.

Hardy, T.B. 1995. Assessing environmental effects of severe sustained drought. Water Resources Bulletin, American Water Resources Association 31:867-875.

Kershner, J.L., and T.B. Hardy. 1992. The rules of the game for evaluation of FERC relicense proposals. Rivers 2:342-345.

Modde, T., and T.B. Hardy. 1992. Influence of different microhabitat criteria on salmonid habitat simulation. Rivers 3:37-44.

Bishop, A.B., T.B. Hardy, and B.D. Glabou. 1990. Analyzing instream flow tradeoffs for small hydropower development. Rivers 1:173-182.

Valdez, R., P. Holden, and T.B. Hardy. 1990. Habitat suitability index curves for humpback chub in the upper Colorado River Basin. Rivers 1:31-42.

b. Non-refereed Articles:

Hardy, T.B. 2005. Klamath basin water resources issues: perspectives from the center of the event horizon. The Water Report 11:9-12, 16-17.

3. Conference Proceedings
3.a Referred Conference Proceedings

Duel, H., and T.B. Hardy. 2012. River ecosystem observatory network initiative. 9th International Symposium on Ecohydraulics 2012. H. Mader, and J. Kraml (Eds). ISBN: 978-3-200-02862-3. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Hardy, T.B., R. Perry, S. Williamson, and T. Shaw. 2012. Application of a salmonids life cycle model for evaluation of alternative flow regimes. 9th International Symposium on Ecohydraulics 2012. H. Mader, and J. Kraml (Eds). ISBN: 978-3-200-02862-3.

Hardy, T.B., K.A. Kollaus, T. Heard, J.M. Tennant, and K. Tower. 2012. Incorporating physical habitat and water temperature modeling at high spatial and temporal scales to evaluate required minimum flow regimes during sustained drought. 9th International Symposium on Ecohydraulics 2012. H. Mader, and J. Kraml (Eds). ISBN: 978-3-200-02862-3. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Hardy, T.B., W. Nowlin, B. Schwartz, and T. Bonner. 2010. Implementation of the San Marcos river observing system: a spatially explicit delineation of a spring system based on physical, hydrologic, chemical, and biological monitoring. 8th International Symposium on Ecohydraulics, Seoul, Korea, September 12-16, 2010. 1714-1721 pp. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Hardy, T.B., A.M. Jensen, S. Clemens, and M. McKee. 2010. Development and application of a low cost unmanned autonomous vehicle for multispectral imaging of riparian and stream habitats. 8th International Symposium on Ecohydraulics, Seoul, Korea, September 12-16, 2010. 1200-1204 pp. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Hardy, T.B. 2008. River restoration: Integration of sediment and riparian modeling for assessment of long-term post restoration conditions for aquatic resources. International Symposium on the Stream Corridor Restoration, River Environmental Technology Institute, Seoul, Korea. November 11, 2008. English and Korean papers printed in Symposium Proceedings.

Hardy, T.B., and R.C. Addley. 2001. Vertical integration of spatial and hydraulic data for improved habitat modeling using geographic information systems. In: Hydro-ecology: Riverine Ecological Response to Changes in Hydrological Regime, Sediment Transport, and Nutrient Loading (M.C. Acreman, Ed.). IAHS Publication 266.

Addley, R.C., and T.B. Hardy. 1999. Three dimensional physical and bioenergetics habitat in large river systems using state-of-the-art hydroacoustics, GPS, GIS, photogrammetry, and computational fluid dynamics. In: Proceedings of the 3rd International Symposium on Ecohydraulics – Strategies for Sampling, Characterization and Modeling of Aquatic Ecosystems in Applied Multi-disciplinary Assessment Frameworks. 7 pp. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Shoemaker, J., J. Ludlow, and T.B. Hardy. 1999. A system for collection of high precision bathymetry. In: Proceedings of the 3rd International Symposium on Ecohydraulics – Strategies for Sampling, Characterization and Modeling of Aquatic Ecosystems in Applied Multi-disciplinary Assessment Frameworks. 7 pp. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Guencsh, G. and T.B. Hardy. 1999. Validation of a mechanistic habitat selection model for drift

feeding salmonids. In: Proceedings of the 3rd International Symposium on Ecohydraulics – Strategies for Sampling, Characterization and Modeling of Aquatic Ecosystems in Applied Multi-disciplinary Assessment Frameworks. 8 pp. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Hardy, T.B. 1996. Formation of the international aquatic modeling group. In: The 2nd International Symposium on Habitat Hydraulics, Quebec, Canada. pp A845-850. ISBN 2-89146-380-3: Volume A http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Bartsch, N., C.P. Gubala, and T.B. Hardy. 1996. Determining habitat criteria for the endangered fountain darter through aquatic mapping and hydrologic modeling. In: The 2nd International Symposium on Habitat Hydraulics, Quebec, Canada. pp B251-B262. ISBN 2-89146-381-1: Volume B http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Tarbet, K., and T.B. Hardy. 1996. Evaluation of one-dimensional and two-dimensional hydraulic modeling in a natural river and implications in instream flow assessment methods. In: The 2nd International Symposium on Habitat Hydraulics, Quebec, Canada. pp B395-B406. ISBN 2-89146-381-1: Volume B http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Hardy, T.B. 1996. The future of habitat modeling. In: The 2nd International Symposium on Habitat Hydraulics, Quebec, Canada. pp B448-B463. ISBN 2-89146-381-1: Volume B http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Ludlow, J.A., and T.B. Hardy. 1996. Comparative evaluation of suitability curve based habitat modeling and a mechanistic based bioenergetic model using 2-dimensional hydraulic simulations in a natural river system. In: The 2nd International Symposium on Habitat Hydraulics, Quebec, Canada. pp B519-B530. ISBN 2-89146-381-1: Volume B http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Hardy et al. 1985. A survey of graduate education in environmental engineering. In: Proceedings of the third annual conference on education in engineering. ASCE Fall Meeting, Columbus, Ohio. 6 pp.

3.b Non-refereed:

Hardy, T.B., and J.A. Shoemaker. 1995. Use of multispectral videography for spatial extrapolation of fisheries habitat use in the Comal river. Proceedings of the 15th Workshop on Color Photography and Videography for Resource Assessment. Indiana State University, Indiana. pp.134-142.

Crowther, B.E., T.B. Hardy, and C.M.U. Neale. 1995. Application of multispectral video for the classification of fisheries habitat components in Salmon river, Idaho. Proceedings of the 15th Workshop on Color Photography and Videography for Resource Assessment. Indiana State University, Indiana. pp. 143-157.

Panja, K.V., T.B. Hardy, and C.M.U. Neale, 1995. Comparison of multispectral videography based classification of mesoscale habitats and ground based mapping under turbid riverine conditions, Proceedings of the 15th Workshop on Color Photography and Videography for Resource Assessment, 02–03 May, Indiana State University, Indiana, pp. 158–166.

Redd, T.H., C.M.U. Neale, and T.B. Hardy. 1993. Classification and delineation of riparian vegetation on two western river systems using airborne multispectral video imagery. In: Proceedings of the 14th Biennial Workshop on Color Photography and Videography for Resource Monitoring. Utah State University, Logan, Utah, May 25-28, 1993, Editor C.M.U. Neale.

Panja, K.V., T.B. Hardy, and C.M.U. Neale. 1993. Comparison of meso-scale hydraulic features at different discharges in a turbid river system using multispectral videography. In:

Proceedings of the 14th Biennial Workshop on Color Photography and Videography for Resource Monitoring. Utah State University, Logan, Utah, May 25-28, 1993, Editor C.M.U. Neale.

4. Abstracts:

Hardy, T.B. 2009. Addressing repeatability, uncertainty, scalability and bias in habitat mapping based approached to instream flow assessments. The 7th International Symposium on Ecohydraulics, Concepcion, Chile. February 12-16, 2009. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Hardy, T.B., and E. Saraeva. 2009. A comparative evaluation of habitat mapping versus hydraulic based habitat modeling to assess river restoration actions. The 7th International Symposium on Ecohydraulics, Concepcion, Chile. February 12-16, 2009. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Hardy, T.B., E. Saraeva, and L. Jensen. 2009. Application of stochastic time series modeling for incorporation of increased variability of flow in the development of instream flow recommendations. The 7th International Symposium on Ecohydraulics, Concepcion, Chile. February 12-16, 2009. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Perkin, J., T. Bonner, and T.B. Hardy. 2009. Moving beyond a flat river – multidimensional attributing of river characteristics for aquatic resource investigations. The 7th International Symposium on Ecohydraulics, Concepcion, Chile. February 12-16, 2009.

Hardy, T.B., and R.C. Addley. 2007. Physical habitat and bioenergetic assessments of anadromous fish flow needs. An integrated application of the natural flow paradigm to recommending instream flows. The 6th International Symposium on Ecohydraulics, Christchurch, New Zealand. February 19-27, 2007. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Basdekas, L., T.B. Hardy, R.C. Addley, W. Bradford, and J. Hammond. 2004. Benefits evaluation of channel reconstruction on lower LaVerkin Creek using two-dimensional hydrodynamics and biological habitat modeling. Presented at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Bhosle, M., and T.B. Hardy. 2004. Estimating uncertainty in fish habitat modeling using two-dimensional hydraulics. Presented at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Combs, M., I. Gowing, and T.B. Hardy. 2004. Comparative evaluation of a rapid assessment methodology for instream flow assessments with intensive physical habitat simulation (PHABSIM) approaches. Presented at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Hardy, T.B., and R.C. Addley. 2004. Incorporation of fish behavior in physical habitat models. Presented as the keynote address at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004.

Saraeva, E., and T.B. Hardy. 2004. Development and application of GIS based instream flow extrapolation procedure for watershed planning in the Nooksack river basin. Presented at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Thompson, J., and T.B. Hardy. 2004. Development and application of a GIS base river basin assessment tool for prioritization of aquatic habitat restoration at the watershed level. Presented at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

Addley, R.C. and T.B. Hardy. 2002. A decade of 2-dimensional instream flow modeling experience: Part 1 - Benefits and pitfalls of data collection and hydrodynamic modeling. Presented at the 4th International Symposium on Ecohydruaulics in Cape Town, South Africa. March 3-8, 2002. http://www.iahr.org/site/cms/contentviewarticle.asp?article=663

5. Reports:
a. Reviewed

Hardy, T.B., K. Kollaus, T.C. Heard, and J.M. Tennant. 2012. Effects of changing height of Cape's dam on critical habitat in the San Marcos River. Report prepared for U.S. Fish and Wildlife Service. Meadows Center for Water and the Environment, Texas State University. 16 pp.

Hardy, T.B., K. Kollaus, T.C. Heard, and J.M. Tennant. 2012. Management strategies for Cumming's Dam to enhance fish habitat in the San Marcos River, Texas. Report prepared for U.S. Fish and Wildlife Service. Meadows Center for Water and the Environment, Texas State University. 17 pp.

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Basdekas, L., T.B. Hardy, R.C. Addley, W. Bradford, and J. Hammond. 2004. Benefits evaluation of channel reconstruction on Lower LaVerkin Creek using two-dimensional hydrodynamics and biological habitat modeling. Presented at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004.

Bhosle, M., and T.B. Hardy. 2004. Estimating uncertainty in fish habitat modeling using two-dimensional hydraulics. Presented at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004.

Combs, M., I. Gowing, and T.B. Hardy. 2004. Comparative evaluation of a rapid assessment methodology for instream flow assessments with intensive physical habitat simulation (PHABSIM) approaches. Presented at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004.

Hardy, T.B., and R.C. Addley. 2004. Incorporation of fish behavior in physical habitat models. Presented as the keynote address at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004.

Saraeva, E., and T.B. Hardy. 2004. Development and application of GIS based instream flow extrapolation procedure for watershed planning in the Nooksack River basin. Presented at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004.

Thompson, J., and T.B. Hardy. 2004. Development and application of a GIS based river basin assessment tool for prioritization of aquatic habitat restoration at the watershed level. Presented at the 5th International Symposium on Ecohydraulics in Madrid, Spain. September 12-17, 2004.

Basdekas, L., L. Bastidas, A. Caplan, T.B. Hardy, M. McKee, and D. Stevens. 2004. Balancing water use, water rights, endangered species, and economics: a multi-objective, system operations optimization approach. Presented at the UCOWR/NIWA Conference in Portland, OR. July 20-22, 2004.

Hardy, T.B. 2004. Field validation of habitat modeling in the lower Klamath River. Presented at the Lower Klamath Basin Science Conference in Redding, CA. June 7-9, 2004. – Invited.

Hardy, T.B. 2004. Field validation of habitat modeling of Chinook spawning and fry life stages in the lower Klamath River. Presented at the American Fisheries Society meeting in Redding, CA. April 22-23, 2004. abstract #H52A-1157.

Hardy, T.B. 2004. An applied decision support system using multidisciplinary assessment methods for instream flows – Nooksack River basin. Presented at the American Fisheries Society Conference in Austin, TX. February 9-11, 2004.

Dodd, A.M., E.M. Cashman, and T.B. Hardy. 2003. One-Dimensional Sediment Transport and Turbulence. Presentation at American Geophysical Union Fall Meeting, December 12, 2003. San Francisco, CA.

Hardy, T.B. 2002. EDN 1: Hydraulic model calibration files and supporting analysis files. Prepared for The WRIA 1 Watershed Management Project. Institute for Natural Systems Engineering, Utah Water Research Laboratory, Utah State University, Logan, Utah.

Addley, R.C., and T.B. Hardy. 2002. A decade of 2-dimensional instream flow modeling experience: Part 1 - Benefits and pitfalls of data collection and hydrodynamic modeling. Presented at the 4th International Symposium on Ecohydruaulics in Cape Town, South Africa. March 3-8, 2002.

Hardy, T.B., and R.C. Addley. 1999. Vertical integration of spatial and hydraulic data for improved habitat modeling in GIS. Annual Meeting of the Bonneville Chapter American Fisheries Society. March 15-18, 1999.

Addley, R.C., and T.B. Hardy. 1997. Bioenergetics: a biological response base approach to instream flow assessments. American Fisheries Society Annual Meeting, Monterey, California.

Hardy, T.B. 1995. Water resource system operations and endangered species in the Virgin River Basin: past, present and future. Proceedings of the Annual Spring Symposium of the American Water Resources Association, Water in the 21st Century: Conservation, Demand, and Supply. April 23-26, 1995, Salt Lake City, Utah.

Addley, R.C., and T.B. Hardy. 1994. Distribution and abundance of Virgin Spinedace (*Lepidomeda mollispinis mollispinis*) in the Virgin River basin. Abstract and Presentation at the American Fisheries Society Bonneville Chapter and Wildlife Society Utah Chapter Joint Winter Technical Session, February 24-26, 1993, St. George, Utah.

Neale, C.M.U., T.B. Hardy, and J.A. Shoemaker. 1994. Evaluation of coastal wetland states using spatial and spectral metrics derived from multispectral videographic imagery. Final Report to Environmental Protection Agency, Corvallis, Oregon. Department of Civil and Environmental Engineering, Utah State University, Logan, Utah.

Hardy, T.B., P. Anderson, C.M.U. Neale, and D.K. Stevens, 1994. Application of multispectral videography for the delineation of riverine depths and mesoscale hydraulic features, Proceedings of the American Water Resources Association, on Effects on Human Induced Changes on Hydrologic Systems, 26–29 June, Jackson Hole, Wyoming, pp. 445–454.

Hardy, T.B. 1994. Issues on endangered species. Abstract and Presentation at the Utah Water Users Group Annual Meetings. April 17, 1994. St. George, Utah.

Hardy, T.B. 1994. Use of GIS in multidisciplinary studies for instream flow assessments of endangered species in the Comal River ecosystem. Paper and Presentation at the American Water Resources Association, Effects on Human-Induced Changes on Hydrologic Systems. June 26-29, 1994. Jackson Hole, WY.

Hardy, T.B. 1993. Application of multi-spectral videography for resource management in the Virgin River Basin. Paper and Presentation at the 1993 American Fisheries Society Winter Technical Meeting, Bonneville Chapter. November 14, 1993. Wendover, Nevada.

2. Invited Talks, Lectures, Presentations:

Hardy, T.B. 2013. Environmental economics. Regional Livability Symposium - Water: Key to Our Future. February 15, 2013 - University of Texas Union.

Hardy, T.B. 2008. The ESP of instream flows. Texas Commission on Environmental Quality. November 13, 2008.

Hardy, T.B. 2008. The role of decision support systems in strategic watershed planning: practice to pitfalls. Texas State University, River Systems Institute. May, 2008.

Hardy, T.B. 2008. Applied river restoration under high flow constraints – A case study of design and implementation of fish habitat, sediment augmentation, and channel maintenance/riparian flow regimes in the Trinity River, California, USA. 4th International Workshop on River Environment - Prospects for the River Restoration Technique Harmonizing with Flood Control and River Environment, June 1-4, 2008 Seoul, Korea. Proceedings papers printed in English and Korean.

Hardy, T.B. 2008. River restoration: Integration of sediment and riparian modeling for assessment of long-term post restoration conditions for aquatic resources. International Symposium on the Stream Corridor Restoration, River Environmental Technology Institute, Seoul, Korea. November 11, 2008.

Chen Y., T.B. Hardy, and M. McKee. 2008. Unmanned autonomous vehicles: Emerging cost effective technologies for fisheries research and management. Texas Chapter American Fisheries Society. January 8, 2008.

Hardy, T.B. 2008. Application of physical habitat modeling for game and non-games fish interactions. Texas Chapter of the American Fisheries Society. January 8, 2008.

Hardy, T.B. 2008. The use of aerial drone technology to collect remote sensing data for GIS applications. Texas Geographic Information Committee. January, 2008.

Hardy, T.B. 2008. Instream flow council science panel. Instream Flow Council 2008 Conference. October, 2008.

Hardy, T.B. 2007. Conceptual validation of flow recommendations for salmon in the Klamath Basin using independent models. American Fisheries Society annual meeting in San Francisco, September, 2007.

Hardy, T.B. 2006. Incorporating behavior and production estimates into instream flow assessments. International Conference on Ecological Modeling. 2006. Ube Yamaguchi, Japan. 28 Aug. - 1 Sep. 2007. (Invited – Keynote Address).

Hardy, T.B. 2006. Incorporating ecological risk in assessing instream flows. Presented at LCRA/SAWS Science Symposium - Austin, TX. March, 2006.

Hardy, T.B. 2005. The science of instream flows – Evidence of an adaptive process and the dichotomy of perceived information needs. Presented at Flows for the Future, 2005 Environmental Flows Conferences sponsored by River Systems Institute, October 31 & November 1, 2005, Texas State University - San Marcos, TX. October 31-November 1, 2005.

Hardy, T.B. 2005. Modeling impact assessments in fluvial systems – A virtual river view. Presented as a keynote address at the Institut National Recherche Scientifique - Eau, Terre et Environnement/ Universite Laval sponsored Geosalar Conference, Geomatics and Fish Habitat Modeling in Rivers and Estuaries held in Quebec City, Quebec November 17-18, 2005.

Hardy, T.B. 2005. Managing water for endangered fishes. Presentation at Water in the West: Use-Abuse-and Scarcity, An NR Week Symposium of the College of Natural Resources and the USU Water Initiative, Utah State University, Logan, Utah, October, 2005.

Hardy, T.B. 2005. Use of GIS to integrate spatial data in instream flow assessments. Guest lecturer in the GIS in Water Resources course taught concurrently at University of Texas at Austin and USU (CEE 6440) November 15, 2005.

Hardy, TB. 2004. Field validation of habitat modeling in the lower Klamath River. Presented at the Lower Klamath Basin Science Conference in Redding, CA. June 7-9, 2004.

Hardy, T.B. 2003. Presentation/panelist at Inland Northwest Research Alliance 2003 Subsurface Science Symposium. Role of Stakeholders in Determining Environmental Policy". October 6, 2003. Salt Lake City, Utah.

Bishop, B., T.B. Hardy, and M. McKee. 2003. Presentation at Northern Utah Conference on Evidence. October 10, 2003. Eccles Conference Center, USU, Logan, Utah.

Hardy, T.B., and C. Addley. 2003. Instream flow assessment modeling: combining physical and behavioral-based approaches. American Fisheries Society 133rd Annual Meeting, Quebec City, Quebec. August 12, 2003.

Hardy, T.B. 2003. Technical assessment of instream flows in the lower Klamath River. (Invited) Western Division of the American Fisheries Society Annual Meeting, San Diego, California. April 15, 2003.

Hardy, T.B. 2002. The state-of-the-art in habitat modeling. 14th Annual International HydroVision Conference. Seattle, Washington. August 1, 2002.

Hardy, T.B. 2002. A decade of 2-dimensional instream flow modeling experience benefits and pitfalls of 2-dimensional habitat modeling. Fourth International Ecohydraulics Conference, Cape Town, South Africa. March, 2002.

Hardy, T.B., and R.C. Addley. 1999. Vertical integration of spatial and hydraulic data for improved habitat modeling in GIS. Hydro-ecology Session at IAHS Annual Meeting, Birmingham, England, July, 1999.

Hardy, T.B., and G. Guensch. 1999. Field validation of a mechanistic based bioenergetic model for drift feeding salmonids. Hydro-ecology Session at IAHS Annual Meeting, Birmingham, UK, July, 1999.

Hardy, T.B., N. Bartsch, and P. Connor. 1998. Habitat and flow requirements – instream flow methodology, monitoring, and the best guess. Watershed Management to Protect Declining Species and Symposium on Water Resources and World Wide Web. American Water Resources Association Annual Water Resources Conference. December 6-9 1996, Seattle Washington.

Hardy, T.B., P. Waite, and G. Geuntsch. 1998. Evaluation of a mechanistically based salmonid model for stream position choice. Paper and Abstract at INTECOL 1998. International Symposium for Ecology, Florence, Italy.

Hardy, T.B., and R.C. Addley. 1998. Physical data necessary to describe trout populations at the stream reach and larger scale. Invited Presentation at Trout Population Dynamics at Stream Reach and Stream Network Scales: Quantifying Physical and Biological Processes. April, 1998, Fort Collins, Colorado.

Hardy, T.B. 1998. Linkages between spatial sampling strategies, habitat heterogeneity and hydraulic modeling with implications to applied instream flow assessments. Invited Paper and Abstract at INTECOL 1998. International Symposium for Ecology, Florence, Italy.

Hardy, T.B. 1997. Understanding the biology of your watershed. Fourth Annual Water Summit, Utah Water Users Association. November, 1997, Salt Lake City.

Hardy, T.B. 1997. Moving toward trophic-level-based, ecologically-based instream flow

regimes. Instream and Environmental Flows Symposium Technology and Policy Issues. 17th International Symposium of the North American Lake Management Society. December 2, 1997, Houston, Texas.

Gubala, C.P., T.B. Hardy, and J. Eilers. 1995. SONAR-GPS mapping of aquatic ecosystems and GPS assisted survey of small rivers, streams and creeks. Trimble Surveying and Mapping Users Conference and Exposition, August 9-11, 1995.

Hardy, T.B. 1993. Environmental engineering and the real world. Environmental Studies Program Professional Seminar Series, University of Nevada at Las Vegas.

Hardy, T.B. 1993. Environmental impacts of severe sustained drought: case studies. Abstract and Presentation at the 29th Annual Conference and Symposium "Effluent Use Management" American Water Resources Association, August 29-September 2, 1993. Tucson, Arizona.

Hardy, T.B., D.S. Bowles, and B.A. Finney. 1986. A case for real time water quality management in the United States. Paper presented at the American Geophysical Union Fall Annual Meeting, San Francisco, California.

Hardy, T.B., and R.C. Addley. 2007. Physical habitat and bioenergetic assessments of anadromous fish flow needs. An integrated application of the natural flow paradigm to recommending instream flows. Presented at the 6th International Symposium on Ecohydraulics, Christchurch, New Zealand.

Hardy, T.B. 2008. Modeling game and non-game species – assessing flow dependent needs. Presented at 2008 Texas Chapter of the American Fisheries Society meeting at Texas Tech University-Junction, January 17-19, 2008.

Hardy, T.B. 2008. The use of aerial drone technology to collect remote sensing data for GIS applications. Presented at the Texas Geographic Information Council Quarterly Meeting, Austin, TX. January 30, 2008.

Acreman, M.C., D.J. Booker, M.J. Dunbar, T. Goodwin, A.R. Young, I.M. Gowing, M. Rivas-Casado, I. Maddock, G. Hill, T.B. Hardy, and S. Allan. 2006. A risk-based approach to rapid assessment of physical habitat sensitivity to abstraction. Presented at TISOR International Conference on “Riverine Hydroecology: advances in research and applications” Sterling University, UK.

Stevens, D.K. and T.B. Hardy, 2005. Linking operational hydrology and water quality modeling in the Weber basin: A decision support system. Presented at GSA Annual Meeting and Exposition in Salt Lake City, Utah. October 16, 2005

Hardy, T.B. 2004. The use of hydrologic modeling in the development of flow recommendations. Presented at the Lower Klamath Basin Science Conference in Redding, CA. June 7-9, 2004.

Hardy, T.B. 2004. An applied decision support system using multidisciplinary assessment methods for instream flows – Nooksack River Basin. Presented at the American Fisheries Society Conference in Austin, TX. February 9-11, 2004.

Shoemaker, J., P. Dey, T.B. Hardy, and K. Panja. 1996. Application of multispectral videography for natural resource classifications. Annual ERDAS Users Group Meeting.

Hardy, T.B. 1996. Integration of Low Cost GPS with GIS for Fisheries Resource Management. Presentation at the Winter Meeting of the Bonneville Chapter of the American Fisheries Society, February 29 1996, Logan Utah.

Hardy, T.B., K.V. Panja, and P.C. Anderson. 1993. Application of multi-spectral videography for resource management in the Virgin River basin. Abstract and Presentation at the American Fisheries Society Bonneville Chapter and Wildlife Society Utah Chapter Joint Winter Technical Session, February 24-26, 1993, St. George, Utah.

Shoemaker, J., C.M.U. Neale, J.P. Dobrowolski, and T.B. Hardy. 1993. Use of multispectral videography for jurisdictional delineation of wetland areas. In: Proceedings of the 14th Biennial Workshop on Color Photography and Videography for Resource Monitoring (C.M.U. Neale, Ed). Utah State University, Logan, Utah, May 25-28, 1993.

Anderson, P.C., T.B. Hardy, and C.M.U. Neale. 1993. Application of multispectral videography for the delineation of riverine depths and mesoscale hydraulic features. In: Proceedings of the 14th Biennial Workshop on Color Photography and Videography for Resource Monitoring (C.M.U. Neale, Ed). Utah State University, Logan, Utah, May 25-28, 1993.

Dupont, R.R., and T.B. Hardy. 1988. Estimating the uncertainty of hazardous air emissions from land treatment systems using the Thibodeaux-Hwang air emission model. 88.116-6 Presented to the 81st Annual Conference of the Air Pollution Control Federation, Dallas, Texas. June 20-24. 1988. 18 pp.

3. Consultancies:

Member of science team for development and application of a Chinook Salmon full life cycle model to evaluate Klamath River Dams removals for the Secretarial Determination (Secretary of the Interior). – Department of Interior.

Lead expert witness for federal fish related water claims on Forest Service lands in the Snake River Basin Adjudication. – Department of Justice

Technical review of Forest Service claims for fisheries in the Upper Klamath River Basin, Oregon. – Department of Justice

Mono Basin Hearings before the California Water Development Board – City of Los Angeles.

Expert witness in behalf of her Majesty the Queen of England in the Axford Inquiry. – The Crown of England.

Technical facilitator for Alberta Environment with first nations and oil sands development companies for water withdraw from the Athabasca River. Provincial Government of Alberta, Canada.

4. Workshops:

Unmanned Autonomous Vehicle Workshop, Texas Parks and Wildlife Department. Kerr Wildlife Management Area, Texas. April 2013.

Unmanned Autonomous Vehicle Workshop, Texas Parks and Wildlife Department. Kerr Kerr Wildlife Management Area, Texas. April 2011.

Masters Class – Instream Flow Assessment Techniques - 8th International Symposium on Ecohydraulics, Seoul, Korea, September 11, 2010.

Application of physical habitat modeling for salmonid restoration, Buckly Valley Resource Center, Smithers, Canada, 2009.

Application of physical habitat and behavior based modeling in fish communities. The 7th International Symposium on Ecohydraulics, Concepcion, Chile. February 12-16, 2009.

Two-dimensional hydraulic and habitat modeling, Southwest Florida Water Management District, 2008.

Instream Flows – Integration and Interpretation of study results, Texas State University, 2008.

Instream Flows 101, Texas State University, 2008.

Physical Habitat Simulation, Yamaguchi University, Japan, 2006.
IF310 Using the computer based PHABSIM system, National Ecology Research Center, U.S. Fish and Wildlife Service, 1989-2008.
Application of habitat based assessment of project impacts on fisheries, U.S. Forest Service, 1999-2001.
Application of habitat based assessment of project impacts on fisheries, Alberta Environment, Alberta, Canada, 1998.
Advanced instream flow techniques for quantification of impacts in rivers, Mexico Institute of Freshwater Ecology, Chutepeck, Mexico, 1997.
Advanced instream flow techniques, International Workshop-Institute of Hydrology, Center of Hydrology and Ecology, Wallingford, England, 1997.
Applications of advanced instream flow techniques for protection of aquatic resources, University of Portugal, Eva, 1996.
Advanced instream flow techniques in ephemeral rivers, International workshop – Lisbon Portugal, 1996.
Advanced instream flow techniques, International Workshop, Vienna, Austria, 1995-1996.
Applications of advanced instream flow techniques for protection of aquatic resources, National Rivers Authority, United Kingdom, 1995.
Threatened and Endangered Species Consultation and Management Short Course, Bureau of Land Management, 1994.
Northern Rivers Basin Instream Flow Technical Workshop, Alberta Fish and Wildlife Service, Canada, 1994.
Wildlife habitat and plant management, Utah State University, Department of Fisheries and Wildlife, 1994-1998.
Research Methods, Utah Water Research Laboratory, 1994-1995.
Instream Flow Techniques, Bureau of Land Management, 1994.
Central Asian Republic Interactive Site Workshops on Water Management, USAID, 1994.
Instream negotiation strategies, Utah State University, 1991.
IFIM Field techniques, U.S. Forest Service Technical Training, 1989-1991.
Development of instream flows for fisheries, U.S. Forest Service Technical Training, 1990-1991.
Development of instream flows for fisheries, Utah Division of Water Resources Professional Development Series, 1989.

5. Other Works not in Print:

a. Works "submitted" or "under review"

Basdekas, L., L.A. Bastidas, T.B. Hardy, A.J. Caplan, and M. McKee. (accepted with minor revisions). Virgin River multi-objective optimization: Maximizing endangered fish habitat and minimizing costs. Journal of River Basin Management.
Hardy, T.B., L.K. Jensen, and I. Gowing. (in review). Evaluation of a comparative cross section based rapid assessment tool for instream flow assessments. Journal of River Basin Management.

b. Works "in progress": NA

c. Other works not in print: NA

C. Grants and Contracts

Why does this version of Thom Hardy's CV:
1. OMIT all grants starting after 9/1/13, **totaling $2,649,798.55** which were included in earlier version of CV?
2. **Change who the Principal Investigator was** on the majority of older grants, which in the previous version of Hardy's CV listed only Hardy as Principal Investigator?

1. Funded External Grants and Contracts:

Start Date	End Date	Grant	Begin/End	Pi/Co-Pi listed SAP	Internal Order	Total Budget	
07/15/08	06/14/11	Facilitating Sustain Water-YR4-XIA	07/15/08-06/14/11	Hardy/Sansom	8000000902	50,429	Was just Hardy
08/01/08	12/31/09	EAA Recovery Implementation Plan	08/01/08-12/31/09	Sansom/Hardy	8000001110	254,940	Was just Hardy
06/30/09	08/31/12	Sul Ross YR5-Hardy	09/01/09-08/31/12	Hardy/Sansom	8000001130	41,485	Was just Hardy
10/01/09	08/31/11	ARRA-River System's Monitoring Project_RSI	10/01/09-08/31/11	Hardy/Sansom	1000000016	372,955	
10/01/09	08/31/11	ARRA-River System's Monitoring Project_Hardy	10/01/09-08/31/11	Hardy/Sansom	1000000017	226,000	
10/01/09	08/31/11	ARRA-River System's Monitoring Project_Bonner	10/01/09-08/31/11	Bonner/Sansom	1000000018	109,000	
10/01/09	08/31/11	ARRA-River System's Monitoring Project_Nowlin	10/01/09-08/31/11	Nowlin/Sansom	1000000019	185,745	
10/01/09	08/31/11	ARRA-River System's Monitoring Project_Schwartz	10/01/09-08/31/11	Schwartz/Sansom	1000000020	106,300	
09/01/09	08/31/13	TPWD Texas Instream Flow Program (5 years of funding so far)	09/01/09-08/31/14	Sansom/Hardy	8000001145	189,998	Was just Hardy
11/01/09	10/31/10	TAES (EAA) Rsch Improv Instream Flow	11/01/09-10/31/10	Sansom/Hardy	8000001222	165,940	Was just Hardy
06/01/10	09/30/11	TAES (EAA) Setup Run Model For Mitigation Measures	06/01/10-09/30/11	Sansom/Hardy	8000001383	40,070	Was just Hardy
01/01/11	07/31/12	TWDB Channel Cross Section	01/01/11-05/31/13	Sansom/Hardy	8000001474	36,500	Was just Hardy
01/01/11	07/31/12	TWDB Robotic Aerial Videography	01/01/11-07/31/12	Sansom/Hardy	8000001481	34,966	Was just Hardy
01/01/11	12/31/12	GRTU Guadalupe River Habitat Characterization Study	01/01/11-12/31/13	Hardy/Sansom	8000001497	10,000	Was just Hardy
03/01/11	09/30/12	TWDB Evaluation of Riparian Processes	03/01/11-03/31/13	Hardy	8000001516	38,500	
04/26/11	12/31/11	TPWD Application of UAV Tech (Llano)	04/26/11-12/31/13	Hardy	8000001541	51,999	
04/12/11	09/01/11	CoSM GPR to Map River Sediments in the San Marcos River	04/12/11-09/01/11	Sansom/Hardy	8000001542	25,000	Was just Hardy
05/15/11	12/31/11	CoVictoria Effects on Guadalupe River Aquatic Biota	05/15/11-12/31/11	Hardy/Sansom	8000001550	62,976	Was just Hardy
09/01/11	01/05/12	UT Subcontract Creation of Models	09/01/11-02/28/12	Hardy/Sansom	8000001692	20,641	Was just Hardy
03/01/12	04/30/12	City of New Braunfels_Interlocal Agreement No.2	02/01/12-04/30/12	Hardy	8000001752	5,625	
03/01/12	09/30/12	City of New Braunfels_USU Hydro Climate Rhythms	03/01/12-09/30/12	Hardy	8000001758	25,341	
09/01/12	02/28/13	TxDOT Fountain Darter Mgmt Cape Cod Bridge	09/01/12-02/28/13	Hardy	8000001836	43,203	
07/16/12	09/30/12	CofSM Hydro Simulation Water Modeling	07/16/12-09/30/12	Sansom/Hardy	8000001842	10,000	Was just Hardy
07/23/12	08/31/12	CofNB HCP Work Plan Development and Design	07/23/12-08/31/12	Sansom/Hardy	8000001844	54,302	Was just Hardy
10/16/12	01/15/13	TPWD Texas Wild Rice	10/19/12-02/01/13	Hardy	8000001892	50,000	
03/05/13	12/31/13	UHCL HCP Texas Wild Rice	03/05/13-12/31/13	Hardy	8000001964	498,588	Was $448,588
04/01/13	12/31/13	GLEASON San Marcos WQPP	04/01/13-12/31/13	Hardy	8000001969	25,862	
05/01/13	11/30/13	CofNB Technical Assistance for Habitat Conservation Plan Work De	05/01/13-11/30/13	Hardy	8000001992	11,000	
09/01/13	08/31/14	City of Victoria Conduct Phase II Aquatic Biota Water Study	07/15/13-12/31/13	Hardy	8000002011	73,603	

1985-2008 144 Additional Grants and Contracts $10,877,791

2. Submitted, but not Funded, External Grants and Contracts: NA

3. Funded Internal Grants and Contracts: NA

4. Submitted, but not Funded, Internal Grants and Contracts: NA

D. Fellowships, Awards, Honors:

NATO Advanced Study Institute for the use of Expert Systems in Civil Engineering through a grant awarded by the National Science Foundation in Edinburgh, Scotland. 1989.

IV. SERVICE

A. University:

Chair, Spring Lake Environmental Committee 2012-present.
Prepared the Edwards Aquifer Habitat Conservation Plan 2013 Technical Work Plans for Texas State University and the City of San Marcos collaboratively with Ms. Melani Howard of the City of San Marcos.
Central Promotion and Tenure Review, Utah State University, 2009.
College of Engineering – Promotion and Tenure Review Committee, Utah State University, 2004-2009.
Presidents Task Force on a Campus Wide Water Program, Utah State University, 2001-2005.
President's Diversity Team, Utah State University, 1995.
Natural Resource Policy Program Advisory Committee, Utah State University, 1995.
ASCE Student Chapter Faculty Advisor, Utah State University, 1990-1996.

B. Departmental:

Department of Biology. Aquatic Ecologist Faculty Search Committee. Texas State University. 2013.
College of Engineering – Promotion and Tenure Committee Chair, Utah State University, 2008-2009.
College of Engineering Post-Tenure Review Committee, Utah State University, 2006-2009.
Division of Environmental Engineering Curriculum Committee, Utah State University, 1998-2000.
College of Engineering Computer Committee, Utah State University, 1996-1998.
College of Engineering Outstanding Junior Committee, Utah State University, 1994-1995.
EE/CEE Microcomputer Laboratory Steering Committee, Utah State University, 1989-1992.
CEE Computer Committee, Utah State University, 1990-1999.
ASCE Student Chapter Faculty Advisor, Utah State University, 1989-1995.

C. Community: NA

D. Professional:

Associate Editor of the Korean Journal of Civil and Environmental Engineering. 2011-Present
Technical Reviewer for the Norwegian Science Board of Strategic Research Proposals, International, 1990-Present
Virgin River Fishes Recovery Team, USFWS, 1991-2009.
International Association for Hydro-Environment Engineering and Research- International, 1988-Present.

E. Organizations

International Association for Hydro-Environment Engineering and Research (IAHR) Ecohydraulics Committee. President. International. 2012-Present.
International Association for Hydro-Environment Engineering and Research (IAHR) Ecohydraulics Committee. Secretary. International. 2010-2012.
Utah Water Research Laboratory, Associate Director, Utah State University, 2002-2009.
Institute for Natural Systems Engineering, Director, Utah State University, 1989-2009.

1. Honorary: NA

2. Professional:

International Association for Hydro-Environment Engineering and Research
American Society of Civil Engineers
American Water Resources Association
American Society of Photogrammetry and Remote Sensing
American Fisheries Society - Certified Fisheries Scientist

F. Service Honors and Awards:

1St ever named Fellow of the Utah Water Research Laboratory, 2009.