BRUCE SAVAGE, Ph.D., P.E.

https://www.isu.edu/cee/research-facilities/water-resources-laboratory/

Executive Summary

With over 22 years of leadership in academia and civil/environmental engineering, I am seeking the role of Dean of the College of Science and Engineering at Idaho State University. My goal is to foster a positive workplace where research and teaching are respected and valued, expand and strengthen industry partnerships, and align the College's initiatives with the strategic vision of the University. My experience demonstrates an ability to work effectively with a wide range of faculty across multiple departments.

My qualifications include serving as the Chair of Civil and Environmental Engineering (CEE) at Idaho State University for 10 years. During that time, I have worked with the CEE faculty through upper administrative leadership changes and enrollment cycles. I led the CEE department forward during significant growth, doubling student enrollment from 145 to 275 with a large increase in international students and their sequential reduction in numbers, and spearheading the department's successful ABET accreditation for two full cycles. I provided strategic leadership in faculty recruitment, curriculum development, and budgeting, managing both the departmental and engineering office budgets. I am willing to listen to others and strive for good communication to help understand and resolve issues. This is evidenced by the variety of projects that I have worked on or worked towards at ISU. A review of key accomplishments showing the ability to work with others.

- Research: PI/Co-PI on multiple projects with nearly $4M funded plus the recent statewide $24M NSF ESPCoR grant, I-CREWS. Funding was through collaboration with entities such as the Idaho National Laboratory, the Center for Advanced Energy Studies, the Department of Energy, and regional partners like the Idaho Transportation Department. Key projects include:
  - Idaho Community-engaged Resilience for Energy-Water Systems (I-CREWS), $24 million. For this project, I worked as a Co-PI [ISU PI: Donna Lybecker – Political Science] developing the ISU portion of the proposal. Since the award, I have been functioning as an ISU team lead [with PI-Kitty Griswold, Biology], serving on the project leadership team, the modeling team, and the cross functional team. These three teams are state-wide committees. I interface with faculty and personnel from Boise State University, University of Idaho, Sho-Ban Tribes, Coeur d'Alene tribe, and the State ESPCoR office.
  - Disaster Response Complex (DRC) for Emergency Responders. A $1.08M grant from the Idaho Global Entrepreneurial Mission [PI-Mustafa Mashal-Civil Engineering]. Co-PI on the proposal and Co-Director of the DRC. I led the negotiations with ISU Facilities for space for both the outdoor and the indoor facilities.
  - Renovation of Space #1; led the discussion and collaborated with GeoScience faculty [Ben Crosby] to design and oversee construction of the 3000 ft^2 Water Resources Laboratory with a recirculation system and 4-ft water flume for research.

- Renovation of Space #2; led the discussion and effort to acquire space for a new faculty in CEE (Mustafa Mashal) that used student workers to renovate and build the Structural Laboratory (SLAB), a research and teaching laboratory. This one-of-a-kind project that gave students experience in constructing a 1520 ft^2 research facility, unparallel in Idaho.
- Component Flood Evaluation Laboratory (CFEL). As Co-PI [PI: Chad Pope – NE], I provided research support to eight graduate students and several undergraduates on multiple grants focused on nuclear power plant flooding, in collaboration with the Idaho National Laboratory.
- U.S. Patent [#11441532] - Submerged oscillating water column energy harvester.

- Built strong partnerships between the department and external stakeholders
  - Re-established the CEE advisory board.
  - Collaborated with CoSE development to cultivate relationships and secure donations.
  - Proposed the idea and led the student/faculty team that completed the design and construction of the ISU "I" on Redhill.
  - Served as PI for a funded summer camp for 7^{th} and 8^{th} grade students [Co-PI: Arya Ebrahimpour-CEE] through collaboration with the Idaho Transportation Department (ITD) and Federal Highways Administration (FHWA).

- Strategic Planning and Vision: Led the development of departmental strategy and was instrumental in creating two new general education courses, CE 1140 Environmental Sustainability and Climate and CE 1150 Engineering Marvels and Civilizations, that align with ISU's mission.

- Teaching/Advising**:** As an experienced professor, my teaching philosophy focuses on fostering an engaging and learner-centered environment that emphasizes both student success and academic rigor. I strive to integrate real-world applications into my teaching, challenging students to think critically and apply their learning to practical, real-world problems. Effective advising is also key to student success, helping students navigate their academic paths and achieve their career goals.
  - I developed a flipped course, CE 2200 - Civil Tools, designed to teach software applications to students with varying levels of proficiency. This course leverages instructional technologies to enhance the delivery of content and achieve defined learning outcomes.
  - To improve student retention and success, I assign sophomore civil engineering students a civil engineering faculty advisor. This initiative ensures students receive personalized guidance to help them navigate the curriculum and receive advice on career development.

- Publications: Published peer-reviewed papers, co-authored with multiple colleagues, and delivered conference presentations and posters while serving as department chair.

In addition to my time at ISU, I have held faculty positions at McNeese State University and Bucknell University. These experiences, along with my professional background as a civil/environmental engineer including work as a commissioned officer with the U.S. Public Health Service, have given me a broad and diverse perspective that I bring to academia.

EDUCATION

Ph.D. Civil and Environmental Engineering, Utah State University, Logan 2002
Focus: Fluid Mechanics and Hydraulics; minor area: Water Resources

M.S. Civil and Environmental Engineering, Utah State University, Logan 1997
Focus: Fluid Mechanics and Hydraulics

Attended University of Oklahoma, 1993/1994
Graduate courses in Civil Engineering (part-time)

B.S. Civil Engineering, Utah State University, Logan 1992
Minor: Japanese

ACADEMIC EXPERIENCE

Idaho State University, Pocatello, Idaho

Chair, Department of Civil and Environmental Engineering (2014 to present)

- Provide leadership for CEE department in the areas of teaching, research, and service
- Directed department's academic/curriculum programs
- Coordinated hires for full-time and adjunct faculty
- Managed an increase in international students; CEE enrollment increased from approximately 145 in 2012 to a peak of 275 in 2016
- Recruiting and outreach efforts to improve the quality and quantity of new students
- Advocate on behalf of the department at the college and university levels
- Implement university, college, and departmental policy
- Perform faculty evaluations
- Coordinate and facilitate advising for undergraduate and graduate students
- Led and directed ABET accreditation activities including writing the report for undergraduate program; **full accreditation cycle was achieved for two full cycles** of six years each
- Managed departmental budget
- Developed general education course
- Served as GFR for multiple students
- Served on graduate committees for multiple students including qualifying exams
- T&P Committees
- Managed the Engineering Office staff including hiring/firing; providing support for CEE, EE, ME, NE, CS, and Health Physics departments
- Manage Engineering Office budget
- Lead faculty on the restoration of the "I" on Red Hill project
- Advise/Evaluate undergraduate/graduate transfer students and respective transfer courses
- Interface with graduate students and lead the GTA approval process

WORKLOAD: As a Chair of Civil and Environmental Engineering at Idaho State University, the typical workload consisted of significant administrative functions, teaching, research, and limited service. In conjunction with chair duties, the typical teaching load is two or three courses in the Fall semester (one or two – three-credit courses and one – one-credit course) and two courses in the Spring (two – three-credit courses). The courses are both graduate and undergraduate courses.

Professor (2019 to present)

- Teach graduate and undergraduate courses in the engineering program
- Develop courses
- Advise undergraduate and graduate students
- Serve on department and college committees
- Perform research
- Supervise senior design projects
- Developed a flipped course (CE 2200 – Civil Tools)

Associate Professor (2013 to 2019)

- Teach graduate and undergraduate courses in the engineering program
- Advise undergraduate and graduate students
- Serve on department and college committees
- Perform research
- Supervise senior design projects

Assistant Professor (2006 - 2012)

- Taught graduate and undergraduate courses in the engineering program
- Developed new course in the curriculum
- Supervised students involved in senior design projects
- Mentored students in academic and professional development
- Served as graduate student committee chair and committee member
- Prepared technical presentations and papers for peer reviewed journals
- Undergraduate Advisor
- Advisor for Student Chapter of ASCE
- Committee Member (University, College and Departmental)

McNeese State University, Lake Charles, Louisiana

Assistant Professor (2003 to 2006)

- Taught graduate and undergraduate courses in the engineering program
- Upgraded laboratory facilities and laboratory exercises
- Mentored students in academic and professional development
- Served as graduate student committee chair and committee member
- Prepared technical presentations and papers for peer reviewed journals
- Committee Member (College and Departmental)

Bucknell University, Lewisburg, Pennsylvania

Visiting Assistant Professor (2001 to 2003)

- Taught graduate and undergraduate courses in the engineering program
- Mentored students in academic and professional development
- Supervised students involved senior design projects
- Served as faculty advisor for student club

Utah State University, Logan, Utah

Graduate Research Assistant (1995 to 2001)

- Physical modeling of hydraulic structures (flood control, spillway rehabilitation, pumping pits, labyrinth weirs, ogee crests, and storm grates)
- Developed and programmed data acquisition and analysis instrumentation for velocity probes, pressure transducers and solenoid valves
- Calibrated flow measuring devices using standard methods
- Supervised purchasing of materials and construction of physical models
- Prepared reports of laboratory testing for clientele

PROFESSIONAL ENGINEERING EXPERIENCE

INDEPENDENT CONSULTANT

Principal (1999 to 2016)

- Performed hydrologic analysis, hydraulic analysis, modeling and design
- Provided expert opinion in litigation
- Computational Fluid Dynamics modeling of hydraulic structures
- Planning and design/preliminary reviews of proposed development sites/subdivisions

Environmental Engineer, Guthrie, Oklahoma

Commissioned Officer (LTJG) (1992 - 1995), U.S. Public Health Service

- Engineer for multiple wastewater facilities: preliminary inspection, design, bidding, construction inspection and close-out
- Engineer for multiple small water systems and facilities: hydraulic analysis, water plant treatment options, water supply sources
- Other engineering duties included surveying, design review, drafting, solid waste coordinator and construction inspection

PEER-REVIEWED PUBLICATIONS

Hogarth, K., Cantrell, J., **Savage, B**., Khadka, R., and Mashal, M. (2024). *A Disaster Response Complex for Training of First Responders in the Northwest United States*. Countering WMD Journal, United States Army Nuclear and Countering WMD Agency.

Khanal,S., Medasetti, U., Mashal, M., **Savage, B**., and Khadka, R. (2022). *Virtual and Augmented Reality in the Disaster Management Technology: A Literature Review of the Past 11 years*. Frontiers in Virtual Reality-Technologies for VR. Volume 3. https://doi.org/10.3389/frvir.2022.843195 3:843195.

Torabi, M., Tuladhar, R., **Savage, B**., and Brown, W.K. (2021). *Revisiting Historical Weir Data; Comparing Numerical Analysis and Experimental Data of Different Weirs*. US Society of Dams (USSD); Dams and Levees.

Torabi, M. and **Savage, B**., (2019). *Modeling of a Novel Submerged Oscillating Water Column (SOWC) Energy Harvester*, 7th International Junior Researcher and Engineer Workshop on Hydraulic Structures, IJREWHS'19, B. HEINER and B. TULLIS (Eds), Utah State University, Logan, UT, USA.

Peer-Reviewed Publication Continued

Sangsefidi, Y., MacVicar, B., Mehraein, M., Torabi, M., and **Savage. B**. (2019). *Evaluation of Flow Characteristics in Labyrinth Weirs Using Response Surface Methodology*. Flow Measurement and Instrumentation. Volume 69, October 2019, Article 101617.

McMartin, T., Vasquez, V., Tullis, B., and **Savage, B**. (2019). *Importance of Site-Specific Design for Labyrinth Spillways – Lessons Learned from Upper Brushy Creek Dam 7*. Association of State Dam Safety Officials (ASDSO). 2019 Dam Safety Annual and Conference. September 2019. Orlando, Florida. Peer-reviewed.

A. Wells, A., Ryan, E., **Savage, B.**, Tahhan, A., Suresh, S., Muchmore, C., Smith, C.L., and Pope, C.L. (2019). *Non-watertight Door Performance Experiments and Analysis Under Flooding Scenarios*. Results in Engineering, Vol 3.

Ryan, E.D., **Savage, B.**, Smith, C.L., and Pope, C.L. (2019). *Comparison of Free Surface Flow Measurements and Smoothed Particle Hydrodynamic Simulation for Potential Nuclear Power Plant Flooding Simulation*. Annals of Nuclear Energy, Vol 126.

Crookston, B., Paxson, G., **Savage, B**., (2017). *Closure to Discussion on Physical and Numerical Modeling of Large Headwater Ratios for a 15° Labyrinth Spillway*. J. of Hydraulic Engineering. Vol 143 (9).

Stanard, T., Vasquez, V., Haberman, R. Tullis, B., **Savage, B.** (2016). *Hydraulic Modeling of a Unique Labyrinth Weir – Upper Brushy Creek Dam 7 Modernization*. United States Society on Dams, 2016 Annual Meeting and Conference. April 2016. Denver, Colorado. Peer-reviewed.

Savage, B., Crookston, B., Paxson, G. (2016). *Physical and Numerical Modeling of Large Headwater Ratios for a 15° Labyrinth Spillway*. J. of Hydraulic Engineering. Vol 142 (11).

Savage, B., Heiner, B. Barfuss. S., (2014). *Parshall Flume Discharge Correction Coefficients via Modeling*. Journal of Water Management. Proceedings of the Institute of Civil Engineering (ICE). Vol 167(5).

Shrivastava, A., Williams, B., Siahpush, A., **Savage, B**., Crepeau, J. (2014) *Numerical and Experimental Investigation of Melting with Internal Heat Generation.* Applied Thermal Engineering. Volume 67, (1-2).
Peer-Reviewed Publication Continued

Savage, B. and Brenchley, S. (2013). *Fish Passage using Broad-Crested Labyrinth weirs for low-head dams*. International Journal of River Basin Management. Volume 11, Issue 3.

Crookston, B.M., Paxson, G.S., **Savage, B**.M., Tullis, B.P. (2013). *Increasing Hydraulic Design Flexibility of Labyrinth Spillways*. International Conference on Large Dams (ICOLD). 2013 International Symposium.

B.M. Crookston, G. S. Paxson, and **Savage, B**.M. (2012). *Hydraulic Performance of Labyrinth Weirs for High Headwater Ratios*. 4th IAHR International Symposium on Hydraulic Structures, 9-11 February 2012, Porto, Portugal, ISBN: 978-989-8509-01-7.

B.M. Crookston, G. S. Paxson, and **B. M. Savage**. (2012). *It Can Be Done! Labyrinth Weir Design Guidance for High Headwater and Low Cycle Width Ratios*. Dam Safety 2012 Conference. Denver, Colorado, USA. August 2012.

Peer-Reviewed Publication Continued

W.K. Brown, G.S. Paxson, and **B. Savage** (2012). *Revisiting Spillway Discharge Coefficients for Several Weir Shapes*. Innovative Dam and Levee Design and Construction for Sustainable Water Management. United States Society on Dams (USSD). 32nd Annual USSD Conference. New Orleans, Louisiana, April 23-27, 2012.

Rahmeyer, W., Barfuss, S. and **Savage, B**. (2011). *Composite Modeling of Hydraulic Structures*. Proceedings of the 2011 Annual Conference, Association of State Dam Safety Officials (ASDSO).Washington, D.C. 2011.

Savage, B.M., Rahmeyer, W., Barfuss, S., and Graff, S. (2010). *Composite Modeling of the Success Dam Spillway; Lessons Learned*. Proceedings of the 2010 Annual Conference, Association of State Dam Safety Officials (ASDSO). Seattle, Washington, 2010.

Savage, B., Johnson, M. and Towler, B. (2009). *Hydrodynamic Forces on a Spillway; Can We Calculate Them?*" Proceedings of the 2009 Annual Conference, Association of State Dam Safety Officials (ASDSO). Ft Lauderdale, Florida, 2009.

Paxson, G., Crookston, B., **Savage, B**., Tullis, B., Lux, F. (2008) *The Hydraulic Design Toolbox: Theory and Modeling for the Lake Townsend Spillway Replacement Project*." Proceedings of the 2008 Annual Conference, Association of State Dam Safety Officials (ASDSO). Indian Wells, CA. Orlando, Florida, 2008.

Johnson, M. and **Savage, B**., (2006). *Physical and Numerical Comparison of Flow over Ogee Spillway in the Presence of Tailwater*. Journal of Hydraulic Engineering (ASCE). Volume 132, Issue 12, pp. 1353-1357. **(Google Scholar Citations as of September 2024: 150)**

Paxson, G. and **Savage, B**. (2006) "*Labyrinth Spillways: Spillway Comparison of Two Popular U.S.A. Design Methods and Consideration of Non-Standard Approach Conditions and Geometries*", Proceedings of the International Junior Researcher and Engineer Workshop on Hydraulic Structures (IJREWHS'06), Montemor-o-Novo, Editors Jorge Matos and Hubert Chanson Eds., Report CH61/06, Div. of Civil Engineering, The University of Queensland, Brisbane, Australia, Dec., pp 37-46 (ISBN 1864998687).

Savage, B. and Paxson, G. (2005). *Negotiating the Maze, Labyrinth Spillway Theory and Practice*", Proceedings of the 2005 Annual Conference, Association of State Dam Safety Officials (ASDSO). Orlando, FL.

Savage, B., Frizell, K., and Crowder, J. (2004). *Brains versus Brawn: The Changing World of Hydraulic Model Studies*. Proceedings of the 2004 Annual Conference, Association of State Dam Safety Officials (ASDSO). Phoenix, AZ. 2004.

Savage, B. and Johnson, M. (2001). *Flow Over an Ogee-Spillway: A Physical and Numerical Model Case Study*. Journal of Hydraulic Engineering, 127:8, 640-649. 2001. ASCE. **(Google Scholar Citations as of September 2024: 387)**

Savage, B. Johnson, M. and Geldmacher, R. (2001). *Comparison of Physical Versus Numerical Modeling of Flow Over Embankment and Ogee Spillways*. Proceeding of the 2001 Annual Conference, Association of State Dam Safety Officials (ASDSO). Snowbird, Utah.2001.

PATENTS

B. Savage and A. Torabi. "Submerged Oscillating Water Column (SOWC) Energy Harvester", United States Patent #11441532. (2022).

OTHER PUBLICATIONS/ PRESENTATIONS

Soil-Cement Earth Structures/Subgrades. (2024). Murri, B., Lebrecht, W. Mahar, J., Savage, B. Joint Idaho Academy of Science and Engineering (IASE) and Intermountain Conference on the Environment (ICE) Symposium

Options for Joint Collaboration in PreCast. (2022). NPCA Annual Convention. National Precast Concrete Association. Amelia Island, FL. November 3-5, 2022

Design Studio Update. PreCast Show. National Precast Concrete Association (NPCA) and PreCast Concrete Institute (PCI). Kansas City, Mo. March 3-5, 2022.

Advanced Manufacturing for Bulk Storage of Hydrogen. (2022). Peck, J., Jenks, S., Mashal, M., Mondal, K., and Savage, B. Idaho Conference on Undergraduate Research, Boise, Idaho, United States

Bringing Precast Concrete to Classrooms, Issue 3/2021, M. Mashal and B. Savage. Concrete Plant International (CPi). North America and Worldwide Editions.

Bulk Storage of Hydrogen. (2020) Whitepaper, M. Mashal, K. Mondal, B. Savage, R. Rodriguez, K. Sharma, M. McMurtrey. Center for Advanced Energy Studies (CAES).

A Holistic Approach to Examining Hydroelectric Dam Viability: Economics, Public Health, and the Environment. (2020) Whitepaper. I. van Woerden, M. Mashal, B. Savage, J. Mahar, and K. Araujo. Center for Advanced Energy Studies (CAES).

Removal of E. coli and Turbidity Concentration from Drinking Water of the Urban Slum Areas of Dhaka City Using a Clay-based Filtration System. Ahmed, S., Savage, B., Rahman, M.A., Nahar, N. (2018). Open published.

Nuclear Power Plant Component Flooding Fragility Research, C. L. Pope, **B. Savage**, S. Jash, B. Johnson, C. Muchmore, L. Nichols, E. Ryan, S. Suresh, A. Tahhan, R. Tuladhar, A. Wells, C. L. Smith, INL/EXT-18-45247, Idaho National Laboratory, Research Report (2018).

Nuclear Power Plant Mechanical Component Flooding Fragility Experiments FY-2017 Report, C. L. Pope, **B. Savage**, B. Johnson, C. Muchmore, L. Nichols, G. Roberts, E. Ryan, S. Suresh, A. Tahhan, R. Tuladhar, A. Wells, C. Smith, INL/EXT-17-43439, Idaho National Laboratory, Research Report (2017).

Nuclear Power Plant Mechanical Component Flooding Fragility Experiments Status, C. L. Pope, **B. Savage**, B. Johnson, C. Muchmore, L. Nichols, G. Roberts, E. Ryan, S. Suresh, A. Tahhan, R. Tuladhar, A. Wells, C. Smith, INL/EXT-17-42728, Idaho National Laboratory, Research Report (2017).

Status of the Flooding Fragility Testing Development, C. L. Pope, **B. Savage**, A. Sorensen, B. Bhandari, D. A. Kamerman, A. Tahhan, C. Muchmore, G. Roberts, E. Ryan, S. Suresh, A. Wells, C. Smith, INL/EXT-16-39115, Idaho National Laboratory, Research Report (2016).

Other publications/presentations continued

Savage, B. Roberts, G. and Pope, C. (2017) "*Making a Wave in Idaho*." Flow-3D Americas Users Conference. Santa Fe, NM.

Savage, B. and Kidd (2013). "*Comparing Labyrinth Verses Slotted-Weir Baffles in Culverts Using CFD*" Flow-3D World Users Conference.

Chanda, K., Savage, B. and Mahar, J. (2013). "Using Bio-Infiltration Swales to Control Stormwater Run-off Quantity and Quality." Submitted to the Joint Conference of Idaho Academy of Science (IAS) and the Intermountain Conference on the Environment (ICE); 2013 IAS/ICE symposium. [Abstract is peer reviewed]

Kidd, J. and Savage, B. (2013). "Comparing Labyrinth Verses Slotted-Weir Baffles in Culverts Using CFD" Submitted to the Joint Conference of Idaho Academy of Science (IAS) and the Intermountain Conference on the Environment (ICE); 2013 IAS/ICE symposium. [Abstract is peer reviewed]

J. Gentle, K. Myers, I. West, K. Hart, B. Savage and others. (2012). "*Concurrent Wind Cooling in Power Transmission Lines*." Western Energy Policy Research Conference. August 2012. Published in Conference Proceedings.

Brown, W.K., Paxson, G.S., Savage, B. (2012). "*Revisiting Spillway Discharge Coefficients for Several Weir Shapes*." Innovative Dam and Levee Design and Construction for Sustainable Water Management. United States Society on Dams (USSD). 32nd Annual USSD Conference. New Orleans, Louisiana, April 23-27, 2012.

B. Savage, B. Crookston and G. Paxson. (2012). "Evaluating High Head Ratios for Labyrinth Weirs." 2012 Flow-3D World Users Conference. San Francisco.

Savage, B., "*New Turbulence Parameter for Fish Passage/Habitat Turbulence*". National Conference on Engineering and Eco-hydrology for Fish Passage. University of Massachusetts Amherst. June 27-29, 2011.

Numerical Modeling of the Success Dam Spillway Project, CESPK-ED-DH. Contract: W91238-08-D-0015. Rahmeyer, W. and Savage, B. Utah Water Research Laboratory Report: USU 685. Completed for HDR, Klienfelder West, Inc. – Geomatrix Consultants, Inc. and U.S. Army Corps of Engineers – Sacramento District. December 2010.

Savage, B., "Success Dam; A Modeling Comparison". Flow Science/ Flow-3D Annual Conference. Dallas, TX. September 2009.

Savage, B., "An Analysis of the Flow Patterns within a Denil Fishway". Flow Science/ Flow-3D Annual Conference. Dallas, TX. September 2007.

Savage, B. "Numerically Modeling Flow Rates and Pressures over a Variety of Dam Shapes", Dam safety in the Northeast: Proceedings of the ASDSO Northeast Regional Conference, held June 4-6, 2003, Lake Harmony, Pennsylvania. 2003.

Savage, B. and Odeh, M. *"Numerical simulation of turbulent flow through a complex hydraulic structure (Denil Fishway) used for upstream passage of migrating fish*", American Fisheries Society Annual Meeting, Baltimore, Maryland, August 2002.

Other publications/presentations continued

Savage, B. "*Reverse Flow Tubes and Their Application in Upstream Fish Passage"* Ph.D. Dissertation. Utah State University, Logan, Utah. 2001.

Savage, B., Odeh, M., Brenchley S., *"Use of Labyrinth Weirs in Upstream Fish Passage Structures; A Model Study",*Third International Symposium on Ecohydraulics, Salt Lake City, Utah. 1999.

Savage, B. "*Flow Characteristics of Trapezoidal Rock Weirs"* M.S. Thesis, Utah State University, Logan, Utah, 1997.

POSTER PRESENTATIONS

Sustainable and Low Carbon Concrete for Structural Applications (2023). PreCast Show. Kabiraj Phuyal, Kunal Mondal, Ph.D., James Mahar, Ph.D., Bruce Savage, Ph.D., P.E., Jared Cantrell, Chikashi, Sato, Ph.D., Mustafa Mashal, Ph.D., P.E.

Disaster Management Robotics in collaboration with Idaho National Laboratory (INL). S. Medasetti, A. Sebastian, M. Mashal, and B. Savage. 2020 Graduate Research Symposium, Idaho State University. The Poster was the winner for the category for Engineering, Physical, and Mathematical Sciences.

Precast Concrete Engineering Studio (2019). M. Mashal and B. Savage PCI Convention, Fort Worth, TX.

A Disaster Response Complex (DRC) for Research, Curriculum, and Training of First Responders. (2019) D. Garz, J. Cantrell, M. Mashal and B. Savage. CAES Winter Collaboration Meeting, Idaho Falls, ID.

Increasing the Output of a Hydraulic Turbine via a Venturi Valve. Daniel Garz, Dr. Bruce Savage. Idaho Conference on Undergraduate Research. July 2019.

Engineering Design Studio at Idaho State University. Precast/Prestressed Concrete Committee Days and Technical Conference. Chicago, IL. September 2019.

Concrete Design Studio Plan at Idaho State University. Precast/Prestressed Concrete Convention at the PreCast Show. March 2019.

Precast Concrete Engineering Studio (2019-2022), (2019) M. Mashal and B. Savage. Precast/Prestressed Concrete Institute (PCI) Committee Days and National Bridge Conference, Rosemont, IL, United States.

A Disaster Response Complex for Training of First Responders in Idaho. (2019). D. Garz, J. Cantrell, K. Hogarth, M. Mashal, and B. Savage (2019). 9th Annual Energy Policy Research Conference, Boise, ID, United States.

Precast Concrete Engineering Studio (2019-2022), (2019). M. Mashal and B. Savage. Precast/Prestressed Concrete Institute (PCI) Convention, Louisville, KY, United States.

Engineering Precast Studio at Idaho State University. National Precast Concrete Association. Annual Foundation Board Meeting. October 2019. Seattle, WA.

Water Related Research in the College of Engineering, ISU. INRA Steering Committee Meeting. Salt Lake City. November 2008.

FUNDED PROPOSALS

Comparative Analysis of Precast Concrete Gravity Grease Interceptors (GGIs) and Hydromechanical Grease Interceptors (HGIs): A Review of Independent Studies. Submitted to the National PreCast Concrete Association. 2024. PI: Sato, Co-PI: Savage. $41,348. In contract negotiations.

*Idaho Community-engaged Resilience for Energy-Water Systems (I-CREWS)***, $24 million. Co-PI: Savage** [PI: Donna Lybecker – Political Science] NSF ESPCoR RII Track-1. 2023 – 2028. In progress.

Use of Non-proprietary Ultra-high-performance Concrete in Pervious Applications. SBOE Undergraduate Research Funds Application. $8,000, PI: Ebrahimpour, CoPI: Savage. (Completed)

Water Storage Infrastructure Viability using Repurposed Tires for Pumped Hydro. (2021). ISU-CAES Internal Seed Grant. $25,465. Bruce Savage (PI). Co-PIs: James Mahar, Chikashi Sato, Mustafa Mashal, Karen Hume, Dakota Roberson. (Completed)

National Summer Transportation Institute Program. (2021). Federal Highways Administration/Idaho Transportation Department, $62,769. PI: Bruce Savage. (Completed)

National Summer Transportation Institute Program. (2020). Federal Highways Administration/Idaho Transportation Department, $48,520. PI: Bruce Savage. (Completed)

Use of Advance Manufactured Hollow-Core Slabs in the Construction of Arch Culvert Bridges to Improve Aquatic Organism Passage. (2019). $19,857. Bruce Savage (PI). Co-PIs: James Mahar, Mustafa Mashal. Completed.

A Disaster Response Complex for Emergency Responders in Idaho. (2019). Idaho Global Entrepreneurial Mission – Higher Education Research Council. $1,083,600. Mustafa Mashal (PI) and Bruce Savage (Co-PI). (2019 - 2021)

Precast Concrete Engineering Design Studio. $109,529. Funded by Precast/Prestressed Concrete Institute (PCI) Foundation and National Precast Concrete Association (NPCA) Foundation. PI: Mustafa Mashal. Co-PI: Bruce Savage. (2019 - present)

National Summer Transportation Institute Program. (2019) Federal Highways Administration/Idaho Transportation Department, $75,000. PI: Bruce Savage, Co-PI: Arya Ebrahimpour. (Completed)

Emergency Training Complex Team Collaboration - Phase II. (2018). $13,000. Battelle Energy Alliance LLC - BEA – INL. PI: Mustafa Mashal. Co-PI: Bruce Savage. (Completed)

Idaho Department of Transportation Student Internships. (2018). Idaho Transportation Department. Administered grant to fund four student internships. Expended Funds: $21,879. Bruce Savage (PI). (Completed)

Application for the Venturi Concept for a Pinch Valve. Undergraduate Research (2018). $2,570. Idaho State Board of Education. Student: Dan Garz. Faculty: Bruce Savage. (Completed)

Funded proposals continued

Wave Impact Simulation Device Design. Battelle Energy Alliance LLC/Idaho National Laboratory, $164,000. Chad Pope (PI) and Bruce Savage (Co-PI), November 2017 – September 2018.

Component Flooding Evaluation Research. Battelle Energy Alliance LLC/Idaho National Laboratory, $138,000. Chad Pope (PI) and Bruce Savage (Co-PI), November 2017 – September 2018.

Wave Impact Simulation Device Development. Battelle Energy Alliance LLC/Idaho National Laboratory, $46,391. Chad Pope (PI) and Bruce Savage (Co-PI), May 2017 – September 2017.

Portal Evaluation Tank (PET) CY2017 Experiments. Battelle Energy Alliance LLC/Idaho National Laboratory, $164,048. Chad Pope (PI) and Bruce Savage (Co-PI), March 2017 – September 2017.

National Summer Transportation Institute Program. PI: Bruce Savage, Co-PI: Arya Ebrahimpour. Submitted to: Federal Highways Administration/Idaho Transportation Department, $75,362. June 2017.

Engineering Internship Opportunities. Idaho Transportation Department. Bruce Savage (PI). $3,000. (2017)

Component Flooding Evaluation Laboratory Design. Battelle Energy Alliance LLC/Idaho National Laboratory, $76,063. Chad Pope (PI) and Bruce Savage (Co-PI), January 2016 – September 2017.

Engineering Internship Opportunities. Idaho Transportation Department. Bruce Savage (PI). $4,500. (2016)

National Summer Transportation Institute Program. PI: Bruce Savage, Co-PI: Arya Ebrahimpour. Submitted to: Federal Highways Administration/Idaho Transportation Department, $72,611. June 2016.

Component Flooding Research. Battelle Energy Alliance LLC/Idaho National Laboratory, $423,372. Chad Pope (PI) and Bruce Savage (Co-PI), November 2015 – September 2017.

Flooding Risk Analysis Improvement. Battelle Energy Alliance LLC/Idaho National Laboratory, $200,000. Chad Pope (PI) and Bruce Savage (Co-PI), January 2015 – December 2015.

Engineering Internship Opportunities. Idaho Transportation Department. Bruce Savage (PI). $5,000. (2015)

National Summer Transportation Institute Program. PI: Bruce Savage, Co-PI: Arya Ebrahimpour. Submitted to: Federal Highways Administration/Idaho Transportation Department, $52,500. June 2015.

National Summer Transportation Institute Program. PI: Bruce Savage, Co-PI: Arya Ebrahimpour. Submitted to: Federal Highways Administration/Idaho Transportation Department, $72,140. June 2014.

Development of a Constant Peak Flow Hydraulic Valve. $2,000. Internal ISU grant. 2014.

National Summer Transportation Institute Program. PI: Bruce Savage, Co-PI: Arya Ebrahimpour. Submitted to: Federal Highways Administration/Idaho Transportation Department, December 2012. $63,531. Funded. Project time period June 2013.

Funded proposals continued

Highway Transportation Training of Women and Minority Civil Engineering Students in Idaho - Year 2. Federal Highway Administration; On-the-Job Training/Supportive Service Program. PI: Bruce Savage, Co-PI: Arya Ebrahimpour. $171,380. (2011).

Highway Transportation Training of Women and Minority Civil Engineering Students in Idaho. Federal Highway Administration; On-the-Job Training/Supportive Service Program. PI: Bruce Savage, Co-PI: Arya Ebrahimpour. $190,577. (2010).

Water Resource Laboratory/Flume. Idaho State University, College of Engineering Internal Funding. PI; Bruce Savage. $70,000. (2009)

Idaho NSF EPSCoR Instrumentation Acquisition and Start-up Augmentation Funds; New Investigator Funding. National Science Foundation. Funds to be used in the construction of flume facility. PI: Bruce Savage. $55,000. (2009).

Flume Room Renovation. Idaho Department of Public Works. PI: Dr. Ben Crosby. $112,000. Dr. Crosby originally received the funding. After funding was received, a collaborative proposal was written by Drs. Cosby and Savage to modify original funding request. Request approved to relocate laboratory to the Engineering Research Center. 2009.

Evaluation of Embankment Weir Discharge Coefficients. Funded through a donation from Schnabel Engineering. PI: Bruce Savage. $5,000 (2009).

Numerical Modeling of the Success Dam Spillway Project. Army Corp of Engineers project, awarded thru Utah State University. PI: Bruce Savage. $125,054. (2008).

Increasing Data Accuracy, Reliability, Accessibility, and Understandability to Improve Basin-Wide Water Resources Decision Making, PI: Bruce Savage. $40,000. Part of the INRA ICEWATER Network Project. PI: Daniel Ames, Bruce Savage, Ben Crosby. Total Project $171,000. (2008).

Inland Northwest Research Alliance (INRA) Steering Committee. Co-PI; Dan Ames, Bruce Savage and Ben Crosby. $25,000. (2008).

Underwater Treadmill and Swim System (UTSS) to Study Treatment Strategies, Therapeutic Rehabilitation and Condition in Dogs. Idaho State University – University Research Grant (URC). PI – Ken Rodnick. Co-PI: Curt Anderson, Bruce Savage, and Mary Hoffle. $11,000. (2008).

Submerged Oscillating Water Columns. Idaho State University – Faculty Research Committee (FRC). PI: Bruce Savage. $5,000. (2008).

Numerical Modeling of Lake Townsend Spillway. Funded by Schnabel Engineering. PI: Bruce Savage. $13,200. (2007).

Expanding the capabilities of the College of Engineering through the addition of 3D solids modeling component. PI: Mary Hofle, Co-PI: Bruce Savage. Funded by Idaho Technology Incentive Grants, Idaho State Board of Education. $75,300. (2007)

NASA FIRST Program at ISU. PI: Bruce Savage, Co-PI: Mike Ellis. Funded by NASA Idaho Space Grant Consortium. $27,000. (2007).

Funded proposals continued

CFD studies on Labyrinth Weirs and Hydraulic Structures. Donation to ISU provided by Schnabel Engineering (West Chester, PA) to maintain a computer software site license and purchase a permanent license to Flow-3D. $8,000. (2006).

Expanding the capabilities of the Engineering Department through the addition of 3D solids modeling. Louisiana Education Quality Support Fund. PI: Bruce Savage. $43,950. (2006).

Improvement to the Fluid Mechanics Laboratory. Purchase of an open channel hydraulics flume and attachments for use in research and fluid mechanics and water resources courses. Funded by Technological Advancements for Students Committee (TASC). PI: Bruce Savage. $43,000. (2004).

Continuing CFD studies on Labyrinth Weirs and Hydraulic Structures. Funding ($2000/year) provided by Schnabel Engineering (West Chester, PA) to maintain a CFD site license. (2004, 2005).

Upgrades to the Fluids Laboratory. Internal funding to improve the laboratory equipment that was used for the fluid mechanics course. Bucknell University. PI: Bruce Savage. $10,000. (2002)

Numerically Modeling Flow Through a Denil Fishway. Funded by USGS Conte Anadromous Research Center (CAFRC). PI: Bruce Savage. Total funding $30,000. (2000 - 2002)

Reverse Flow Tubes and Their Application in Upstream Fish Passage. Dissertation Research. Initiated the research concept of using counter-current flows placed in series (termed reverse flow tubes) to dissipate energy, especially for upstream fish passage. PI: Bruce Savage. Successfully wrote proposals to acquire project funding, $20,000 from the USGS Conte Anadromous Research Center (CAFRC) and $44,000 from the Utah Water Research Laboratory (UWRL). Designed and constructed a 24 ft long x 4 ft wide x 3 ft high flume, capable of tilting to a 1:4 slope with a flow capacity of 22 cfs. (1997 - 2001).

UNPUBLISHED REPORTS

ISU Precast Studio Summary Report. 2023. Submitted to the Pre-Cast Concrete Institute (PCI) and National PreCast Concrete Association (NPCA). Not peer-reviewed.

Annual/Final Report. August 2020. National Summer Transportation Institute Program. Federal Highway Administration. Savage, B.

Annual/Final Report. August 2018. National Summer Transportation Institute Program. Federal Highway Administration. Savage, B. and Ebrahimpour, A.

Annual/Final Report. August 2017. National Summer Transportation Institute Program. Federal Highway Administration. Savage, B. and Ebrahimpour, A.

Annual/Final Report. September 2016. National Summer Transportation Institute Program. Federal Highway Administration. Savage, B. and Ebrahimpour, A.

Annual/Final Report. September 2015. National Summer Transportation Institute Program. Federal Highway Administration. Savage, B. and Ebrahimpour, A.

Unpublished Reports

Annual/Final Report. September 2014. National Summer Transportation Institute Program. Federal Highway Administration. Savage, B. and Ebrahimpour, A.

Quarterly Reports (1 – 6) January 2012 – June 2013. On-the-Job Training/Supportive Services (OJT/SS). Highway Transportation Training of Women and Minority, Civil Engineering Students in Idaho, Years 1 and 2. Federal Highway Administration. Savage, B. and Ebrahimpour, A.

Final Report. July 2013. On-the-Job Training/Supportive Services (OJT/SS), Highway Transportation Training of Women and Minority, Civil Engineering Students in Idaho, Year 2. Federal Highway Administration. Savage, B. and Ebrahimpour, A.

Annual/Final Report. October 2013. National Summer Transportation Institute Program. Federal Highway Administration. Savage, B. and Ebrahimpour, A.

Highway Transportation Training of Women and Minority Civil Engineering Students in Idaho. Final Report. Savage, B. and Ebrahimpour, A. Submitted to: Federal Highways Administration/Idaho Transportation Department. July 2012.

Hydraulic Model Study of Dual-Flow and Thru-Flow Fish Screens, Hydraulics Report No. 448, Barfuss, S., Savage, B. Utah State University Research Foundation.

Numerical Modeling of the Success Dam Spillway Project, CESPK-ED-DH. Contract: W91238-08-D-0015. Rahmeyer, W. and Savage, B. Utah Water Research Laboratory Report: USU 685. Completed for HDR, Klienfelder West, Inc. – Geomatrix Consultants, Inc. and U.S. Army Corps of Engineers – Sacramento District. December 2010.

*Evaluation of the Kansas Kickapoo Water System; Options to Reduce Trihalomethanes (THMs).*Kickapoo Tribe of Kansas Water System, Kickapoo, Kansas.U.S.Department of HHS, PHS, IHS, Oklahoma City Area, Western District Office.

Concho Wastewater Treatment Operation and Maintenance Manual. Cheyenne and Arapaho Tribes of Oklahoma, Concho, EPA Project #03-6002-01. U.S. Department of HHS, PHS, IHS, Oklahoma City Area, Western District Office. Oklahoma. Indian Health Service.

INVITED TALKS

Hydraulic Modeling; Not just another pretty face on the catwalk. Invited presentation, GeoScience Colloquium. (Spring 2009)

Upstream Fish Passage and Dams. Presented to GEOL 599: Geomorphology/Stream Ecology (Spring 2009)

Research Opportunities in Water Resources. Presented to the CE 491: Senior Seminar. (2006, 2007)

The Changing World of Hydraulic Modeling. Idaho Water Resources Research Institute
Water Resources, Hydrology Seminar. (2006).

Opportunities in Civil Engineering. Presented to ENGR 120: Introduction to Engineering (2006, 2007, 2008, 2009, 2010, 2011).

Invited Talks continued

Advances in Computational Fluid Dynamics and Hydraulics. Presented to ENGR 651: Graduate Seminar. (2006)

PAPER REVIEWER

- Journal of Hydraulic Engineering
- Journal of Experiments in Fluids
- Journal of Water Management (ICE)
- Journal of Drainage and Irrigation
- Journal of American Water Works Association
- Journal of Computational Mechanics
- Journal of Petroleum Engineering
- IAHR Hydraulic Structures Proceedings
- Water Science and Technology

HONORS and AWARDS

- Outstanding Advisor for ASCE (2010).
- Excellence in Teaching Award. Industrial Advisory Board of the College of Engineering and Technology (2004 -2005)
- Professor of the Year. Mu Omega Sigma Engineering Honor Society (2004 -2005)
- Department of Engineering Endowed Scholar Award (2004)
- ASCE ExCEEd 2002 Fellow (2002)
- ASCE J. Waldo Smith Hydraulic Fellowship (2000)
- Public Health Service Citation (1995)
- Project Engineer of the Year - Indian Health Service, Oklahoma City Area (1994)
- Public Health Service Unit Citation (1994)

PROFESSIONAL SERVICE

- ASCE Student Pacific Northwest Region Planning Committee (2013 – 2015)
- Engineering Week. Coordinate the spaghetti bridge competition with ASCE (2006-Present)
- Fundamental of Engineering Exam: Review session for fluid mechanics (2008 – Present)
- External Reviewer for promotion (2014)
- Committee Member: 4th International Junior Researcher and Engineer Workshop on Hydraulic Structures. (2012).
- Mentor - 4th International Junior Researcher and Engineer Workshop on Hydraulic Structures. Utah State University. (2012).committee
- Third Year Review and Promotion Committee (2013).
- National Council of Examiners for Engineering and Surveying (NCEES). Participated in the cut score exam exercise (Civil Professional Engineering Exam). (2008)
- Forays in the Field: Summer program for young girls in science. Presented a module on bridge building (2007, 2008)
- Opportunities in Civil Engineering Presentation/Modules (Pocatello HS, Century HS) (2008)
- Member Greater Portneuf Water Resources Planning (GPWRP) Board (2007-2008)

COMMITTEE SERVICE (ISU)

- Hiring committee for I-CREWS faculty
- GFR (average of 2 students/year) (2006 – present)
- Graduate committee member and qualifying exam committee member (2006 – present)
- 4+1 Program Development Committee (2017 – 2019)
- Promotion and Tenure Policy Review Committee Chair (Ad Hoc) (2017)
- CEE Department Program Prioritization Task Force (2014)
- LinkedIn Implementation (2012 - 2014)
- ME faculty promotion committee (2014)
- CE Department 3rd Year Review committee (2014)
- Curriculum Review Committee. Ad hoc. Department committee. (2013).
- Civil Engineering Curriculum Committee (2012 – Present)
- School of Engr. Assessment, Evaluation, and Improvement (AEI) Committee (2011 – 2012)
- College of Science and Engineering Computer Committee (2009 – 2012)
- College of Engineering Computer Committee (2008 - 2009)
- College of Science and Engineering Scholarship Committee (2009 - 2012)
- College of Engineering Scholarship Committee (2008 - 2009)
- Faculty Policy and Procedure Committee (2008 - 2010)
- CE Undergraduate Curriculum Redesign Subcommittee (2008)
- ASCE Student Chapter Advisor (2007 - 2013)
- Intermountain Conference on the Environment (ICE) Program Committee. (2009)
- CE Newsletter Development (2008)
- Recruiting Brochure Development Committee (2007)
- Faculty Search Committee - Department Chair (2006-2007)
- Intermountain Conference on the Environment (ICE) Program Committee. (2007)
- Academic Dishonesty Board (2006-2007)
- Promotion and Tenure Committee (2006-2007)

COMMITTEE SERVICE (McNeese/Bucknell)

- Engineering Dean Search Committee (2006); McNeese
- Laboratory and Grants Coordinator (2005 - 2006); McNeese
- University Graduation Committee (2005 - 2006); McNeese
- University Recruitment Advisory Committee (2006); McNeese
- Engineering Week Activities (Chairman, 2005, 2006); McNeese
- ABET Alumni Assessment Committee (member, 2004 - 2006); McNeese
- Engineering (ENGR) Course Coordinator (2004 - 2006); McNeese
- Mission Statement and PEO Development (Chairman, 2004 - 2005); McNeese
- Engineering Week Activities (Co-Chairman, 2004); McNeese
- ABET Steering Committee (member, 2003 - 2004); McNeese
- Student Evaluation Instrument (SEI) subcommittee (member, 2003 - 2004); McNeese
- FE Review Session Instructor (2003 - 2006); McNeese
- Member Engineering College Computing Committee (2002 - 2003); Bucknell
- Faculty advisor for Lambda Chi Alpha fraternity (2002 - 2003); Bucknell

PROFESSIONAL MEMBERSHIPS

- American Society of Civil Engineers (ASCE)/Environmental
- Precast/Prestressed Concrete Institute
- National Precast Concrete Association

TEACHING EXPERIENCE

General Engineering Courses

- Engineering Statics
- Mechanics of Materials
- Civil Engineering Tools
- Engineering Graphics
- Fluid Mechanics
- Fluid Mechanics Laboratory
- Project Design I (Senior Design A)
- Project Design II (Senior Design B)

Specialty Courses

- Hydraulic Design
- Engineering Hydrology
- Water Resources Engineering (undergraduate/graduate)
- Open Channel Flow (undergraduate/graduate)
- Pipeline Hydraulics (graduate)
- Intermediate Fluids with Computational Fluid Dynamics (graduate)
- Contaminant/Fate Transport and Modeling (undergraduate/graduate)
- Groundwater and Seepage (graduate)
- PreCast Design Studio (undergraduate/graduate)

GRADUATE STUDENTS

Doctoral Committee

Evelin Noris Paucar Ph.D. ENSM (2022)
Ali Shockgzar, Ph.D. CE (2022)
Alison Wells Ph.D. NE (2019)
Emerald Ryan, Ph.D NE (2018)
Hiral J. Kadakia, Ph.D. ME (2011)
Bhushan Gokhale, Ph.D. Envir Engr (2010)
Nabanita Modak, Ph.D. Envir Engr (2008)
Danny Anderson, Ph.D. in GeoScience (2006 - 2008)

Masters Committee

Greesh Vaidya MS CE (continuing)
Durga Parajuli MS CE (2023)
Mahesh Acharya MS CE (2023)
Dan Garz, MS CE (2021)
Usha Pant, MS CE (2021)
Cody Muchmore, MS NE (2017)
Antonio Tahan, MS NE (2017)
Sneha Suresha, MS NE (2016)
Emerald Ryan, MS NE (2016)
David Kammerman MS NE (2016)
Bisho Bandari, MS NE (2016)
Marcie Evans, MS ENSM (2016)
Praveen Katamaneni, MS Envr Engr (2014)

Masters Committee Continued

Nawamee Shrestha, MS Envr Engr (2015)
Harvey Burch, MS CE (2013)
Logan Tew, MS ME (2013)
Amber Shrivastava, MS ME (2012)
Tifani White, MS CE (2012)
Shilpa Siddhanti, MS Envr. Engr (2011)
Sandeep Vangari, MS ENSM (2010)

Major Professor
Prateek Karna MS CE (continuing)
Icewal Ghmire MS CE (continuing)
Eric Lyman MS CE (2024)
Laura-Louise Alicke, MS CE (continuing)
Mohammadamin Torabi, Phd CE (2021)
Larinda Nichols, MS NE (2018)
Soumadipta Jash, MS NE (2018)
Rojin Tulahar, MS CE (2018)
Shafayet Ahmed, MS Envir. E (2017)
Greg Roberts, MS CE (2017)
Troy Barry, MS ENSM (2015)
Ahmed Alhaddad, MS CE (2014)
Jeff Kidd, MS CE (2013)
Gilbert Diaz, MS CE (continuing)
Tyler Saxton, MS CE (2012)
Krystal Firebaugh, MS CE (2012)
Kris Murray, MS CE (2010)
Martin Sorenson, MS CE (2010)

Graduate Faculty Representative – approximately 2 students/year

LARGE UNFUNDED PROPOSALS

Alkali-Silica Reaction Mitigation Strategies with Specific Admixtures Research Project. Submitted to Idaho Transportation Department. $150,000 . April 2023 – March 2024. PI: Mashal, Co-PI: Savage. Not funded.

Innovative Pumped Storage Using Repurposed Tires. Submitted to: Department of Energy. $2,984,725. July 2023 – June 2025. PI: Savage. Not funded.

2023 CAES Summer Visiting Faculty Application Project Proposal. Center for Advanced Energy Studies. Not funded.

Global Center for ZERO-Emissive BUILT Environment Technologies (BUILT-ZERO). Submitted to NSF. Multi-institutional lead by Rowan University. Not funded.

EAGER: CET -Submerged Oscillating Water Columns for Desalination. Submitted to NSF. $362,100. PI: Savage. Not funded.

A Disaster Response Complex for Emergency Responders. (2022). Continuation of the Disaster Response Center (DRC). Submitted to IGEM HERC. PI: Mashal. $1,016,400. Not funded.

Unfunded Proposals Continued

Enhancing Education Opportunities and Workforce Development in Precast. (2022). Submitted to the National Precast Concrete Association (NPCA). In collaboration with the College of Technology (Darren Leavitt & John Limmakka). PI: Savage. $100,000.

National Center for Equitable, Transformative, Safe, and Zero-emissive Transportation Systems through Education and Research Opportunities (NETZERO). (2022). United States Department of Transportation. $300,000. ISU PI: Mashal.

NSF Engines: Type 1: HAzard MiTigation, ClimaTe Adaptation, And CommunIty ResilieNce (ATTAIN) in the Everchanging Northern Mountain States. (2022). National Science Foundation. $1,000,000. ISU Lead PI: Mashal.

Innovative Pumped Storage Using Repurposed Tires. (2022). Concept Paper. Submitted to: Department of Energy, Innovative Pumped Storage Hydropower Technologies. $3,000,000. Concept paper recommended for Full Proposal. PI: Savage

Submerged Oscillating Water Columns for Desalination. Concept Paper. (2021). Submitted to Department of Energy, Office of Energy Efficiency and Renewable Energy. $300,000. PI: Savage.

Innovative Pumped Storage Using Repurposed Tires. Submitted to Energy Storage Innovations Prize (HeroX), Department of Energy. PI: Savage. $50,000 competition prize. PI: Savage. Not Funded.

Internal and External Flood Hazard Regulatory Guidance: Data Shortcoming Identification and Improvement Centered on Uncertainty Quantification Coupled with Experiment Recommendations, Performance, and Modeling. $800,000. Preapplication submitted to Department of Energy, NEUP Program. Chad Pope (PI) and Bruce Savage (Co-PI).

Increasing Pumped Storage Infrastructure Viability using Recycled Tires. Department of Energy. $1,558,258. (PI: Savage, B., Team: Mahar, J., Mashal, M., Baldwin, T., Crookston, B. – Utah State University)

Investigation of Gapping, Sliding, and Uplift Considering Soil-Structure and Fluid-Structure Interactions in Seismically Base Isolated Small Modular Reactors (SMRs) During an Earthquake. Department of Energy. $749,972. (PI: Mashal, Co-PIs Ebrahimpour, Savage, and Baldwin).

Cost-Effective, Resilient, and Durable Vessels for Delivery to Fueling Stations and Underground Storage of Hydrogen. Department of Energy, Concept Paper. $2,500,000. (PI: Mashal, Team: Savage, Ebrahimpour, Rodriguez, and Baldwin). Discouraged.

Submerged Oscillating Water Columns. Department of Energy, Concept Paper. (PI: Savage, B., Team: Schoen, M., Baldwin, T. Torabi, A.). $707,000.

Innovative Design Concepts for Standard Modular Hydropower. Department of Energy, Concept Paper. (PI: Savage, B., Team: Mahar, J., Mashal, M., Baldwin, T.) $1,250,000. Discouraged.

Component Flooding Evaluation Laboratory Modifications, $900,000, Idaho National Laboratory, Submitted September 2017. Chad Pope (PI) and Bruce Savage (Co-PI).

Water for Agriculture, Storage, Power and Prosperity (WASP2). Pre-proposal submitted to NSF EPSPCor, August 2016. PI: Savage, B. Co-PIs: Mahar, J., Hernandez, J., and Sato, C.

Continuation of Highway Transportation Training of Women and Minority Civil Engineering Students in Idaho. Submitted to: Federal Highways Administration/Idaho Transportation Department. $ 237,622. Submitted to Federal Highways Administration (FHWA). April 2012. PI: Arya Ebrahimpour. Co-PI: Bruce Savage.

Water Disinfection by Hydrodynamic Cavitation in conjunction with UV Irradiation. Environmental Protection Agency (EPA); Research and Demonstration of Innovative Drinking Water Treatment Technologies in Small Systems. PI: Chikashi Sato. Co-PI: Bruce Savage and Peter Sheridan. $410,139. (2011).

Water Disinfection by Hydrodynamic Cavitation with UV Irradiation. Submitted to NSF. PI: Chikashi Sato, Co-PI: Bruce Savage and Malcom Shields. $308,319. (2010).

Water Disinfection by Hydrodynamic Cavitation in Conjunction with UV Irradiation. PI: Sato, C. Co-PI: Savage, B., Rosentreter, J., Sheridan, P. Submitted to: P3 Awards: A National Student Design Competition for Sustainability Focusing on People, Prosperity and the Planet; Research Area: Water; Funding Opportunity Number: EPA-G2013-P3-Q4-Water. USEPA. $15,000. In Review. Expected project time period 08/15/2013- 08/14/2014.

NSF – MRI: *Acquisition of Terrestrial Laser Scanner for Environmental Monitoring*. PI: Nancy Glenn and Joe Wheaton. Collaborators: Ames, Baxter, Crosby, Germino, Leung, Thackray, Rogers, Savage, Hruska, Vierling, Yager. ($217,000). Equipment Proposal (2009)

NSF – MRI: *A Particle Image Velocimetry (PIV) / Planar Laser-Induced Fluorescence (PILF) System*. PIs: Brian Williams and Bruce Savage. ($271,000). Equipment Proposal (2009)

Feasibility Study of Wind Energy to Reduce Operating Costs for Food Processing Facilities. PI: Kurt Meyers, INL. Co-PI: Mike Ellis, Brian Williams and Bruce Savage. $450,000 (150,000/year for 3 years). (2008).

Evaluation of Subterranean Mountain Reservoirs to Increase Water Storage Capacity. PI: Bruce Savage, Co-PI: Jim Mahar, Chikashi Sato. Proposed as a line-item project with Larry Grossman, ISU lobbyist. 4 year grant. $1.2 million. (2009).

Enhancing production efficiency of rainbow trout with cold temperature incubation during early development. PI: Kenneth J. Rodnick, Co-PIs: Sophie St-Hilaire, Scott E. LaPatra, Bruce Savage, Idaho SBOE. $75,000. (2008).

Virtual Office Hours for Distance Education. PI: Bruce Savage, Co-PI: Rich Wabrek Technology Incentive Grant Pre-proposal. $58,000. (2008).

Large Plotting/Printing Capabilities for Senior Capstone. Bruce Savage (PI). Technology Incentive Grant Pre-proposal. $14,000. (2008).

Distance Learning Office Hours. PI: Rich Wabrek Co-PI: Bruce Savage (Co-PI). Submitted to Idaho Technology Incentive Grants, Idaho State Board of Education. (2007)