

Research Roadmap: Spring Lake Education at The Meadows Center for Water and the Environment

- The primary research goal of Spring Lake Education is to support The Meadows Center in achieving its strategic research goals and vision.

Strategic Plan 2017 – 2023

Goal 1 - Strengthen The Meadows Center's research program and the infrastructure platform that supports Texas State's research community.

Over the next six years, the Meadows Center will strive to play an important role in supporting Texas State University's progress in advancing nationally recognized academic research. The Meadows Center will accomplish this by (1) further developing the Meadows Center's core research initiatives, and (2) improving the Meadows Center's ability to provide world-class infrastructure and resources that support the broader research community at Texas State University and beyond.

The Meadows Center has developed robust research competencies and initiatives in core areas including: Environmental Flows, Watershed Research for Planning and Management, Water Conservation, and Interpretive and Experiential STEM Education. There are important steps that the Meadows Center plans to take to strengthen these research initiatives in ways that are recognized by national research standards and that contribute to Texas State University's research goals. Current and future Key activities related to the effort to strengthen the Center's Interpretive and Experiential STEM Education research initiatives are detailed in this research roadmap.

Interpretive and Experiential STEM Education

With more than 33,000 K-12 students participating in interpretive and experiential learning programs at Spring Lake each year and hundreds more people participating in citizen-science "Stream Team" activities across Texas, the Meadows Center provides a living laboratory for researching the efficacy and impact of experiential educational programs and techniques.

- 1.1** Organize the research activities directly supported by the Meadows Center under the research initiatives outlined above to help communicate the Meadows Center's research focus and competencies. Maintain the research section of the Meadows Center website to include current descriptions of research activities and studies under these research initiatives.

Educational research programs have been updated and highlighted on the website. New research projects and collaborations will be included in the information and design updates. The new formatting will include a research initiatives document with embedded links to expanded research detail as our profile continues to be more expansive and compelling.

- 1.2** Work to ensure that the numerous research studies conducted by The Center, including research supported by government and foundation grants and contracts, result in research products that are submitted to peer-reviewed academic journals and other academically recognized publications.

Exciting and relevant research projects are underway within the educational program at The Meadows Center for Water and the Environment. These projects are shaping the understanding of education and nature connection in scholarly communities and amongst practitioners. We are

engaging research at the Meadows Center that captures the unique opportunity and interface of Texas State University students, local and regional school children, cross disciplinary academic expertise, and a marquee environmentally significant and sensitive site along the innovation corridor.

Dussler, R., Williams, J., & Massey, S. R. (2020). Reconnection with freshwater ecosystems at the meadows center for water and the environment. In R. Rozzi et al. (Eds.), *Field environmental philosophy (FEP): Education for biocultural conservation*. Sage. (In review).

This publication is a collaborative effort and partnership with The Meadows Center, TXST Department of Philosophy and Dr. Justin Williams, University of North Texas Department of Philosophy and Dr. Ricardo Rozzi, and Sub Antarctic Conservation Program. The intent is to introduce the reader to socio-ecological significance of Spring Lake, current educational research initiatives, and the mission and work of The Meadows Center for Water and the Environment at Texas State University. Ultimately this publication will create a pathway for The Meadows Center to join the National Science Foundation's Long Term Ecological Research Network (LTER) and designation Long Term Ecological Research Site: <https://lternet.edu/>

Dussler, R., & Deringer, S. A. (2020). Exploring the effects of interpreters' experience of mindfulness interventions on their connection with nature and subsequent environmental interpretation. *Journal of Interpretation Research*, 25(1), 26-45. DOI: 10.1177/1092587220963556.

The purpose of this study was to understand the experience of Texas State University student environmental interpreters participating in mindfulness-based interventions as it related to nature connectedness and their role in environmental interpretation.

Maleki, S., Warren, E.A., Haggelman, R., Navarro, A., & Wait, M. (2020). Children's experience of nature through maps. *Journal of International Research in Geographical and Environmental Education*. (In review).

The purpose of this study is to expose children to a direct experience of nature in a field trip setting to examine what elements of nature and built environment capture their attention. In addition, children's maps are used to examine their mapping and cartographic skills and their compatibility with the Texas Essential Knowledge and Skills (TEKS).

Spencer, R.K. (in progress). How professional development changes environmental mindfulness. Texas State Doctoral Research, Biology Department.

The purpose of this quantitative investigation is to explore to what extent an Interpreter Professional Development Model changes environmental mindfulness and communication efficacy within interpreters and understand the relationship, if any, among changes, retention, and confidence.

Wait, M., K. Daniels, P. Williamson, & S. Forsythe. (in progress). Connecting Interest in and awareness of the environment with an informal experience. Masters Research, Biology Department.

The purpose of this study is to test the effect of participation in an informal learning experience on freshman Texas State University students' interest in science, using the experience of a glass-bottom boat tour as the informal learning environment.

1.3 Create an Office of Educational Research and Programs within the Meadows Center. Change the Director of Educational Programs position at the Meadows Center to be the Director of Educational Research and Programs. Fill the anticipated vacancy for this position with a candidate with a Ph.D. and experiential research expertise who can help direct educational research activities at the Center and who can build connections with the educational research community (including the College of Education, Department of Campus Recreation, and the National Center for Research in Geography Education).

-Hired Chief Education Officer in 2017.

1.6 Actively pursue government and other grants to support and expand research

NSF Improving Undergraduate STEM Education: Pathways into the Earth, Ocean, Polar and Atmospheric & Geospace Sciences - Informal Networks (IUSE:GEOPATHS – IN)

Proposed Project: LoQuest: Transforming local STEM questions into global geoscience journeys

Status: LOI accepted for submission of full proposal

PI : Dr. Michelle Forsythe, PI, Assistant Professor of STEM Education, Department of Curriculum & Instruction, College of Education

Co-PI: Dr. Kristy Daniel, Co-PI. Associate Professor, Department of Biology, College of Science and Engineering

Co-PI: **Dr. Rob Dussler**, Co-PI, Chief Education Officer, The Meadows Center for Water and the Environment

Estimated Funding Request: \$350,000 for 3 years

NSF Improving Undergraduate Stem Education HSI Program, Track 2: Implementation and Evaluation Projects (IEP)

Proposed Project: Náyade: Learning to Tell Nature’s Stories

Status: Submitted LOI

PI: Kristy L. Daniel, Biology, kristydaniel@txstate.edu

Co-PI: Shelly Forsythe, Curriculum & Instruction, mforsythe@txstate.edu

Co-PI: **Rob Dussler**, The Meadows Center for Water and the Environment, robdussler@txstate.edu

Estimated Funding Requested: \$500,000

NSF Advancing Informal STEM Learning (AISL)

Proposed Project: Minding the Texas Hill Country
Status: Submitted LOI

PI: Kristy L. Daniel, Biology, kristydaniel@txstate.edu

Co-PI: Ryan Spencer, Research Coordinator, The Meadows Center, ryanspencer@txstate.edu

Co-PI: Miranda Wait, Deputy Director of Spring Lake Operations, The Meadows Center, miranda.wait@txstate.edu

Estimated Funding Requested: \$2,999,302.00

Wait, M. (2020). Meadows Center Eco Explorers. Inspire! Grants for Small Museums, \$49,164.96. In progress.

Wait, M. (2020). Spring Lake DEEP. Humanities Texas, \$9,500. Pending.

Wait, M. (2020). Access For All. Alice Kleiberg Reynolds Foundation, \$5,000. Funded.

- 1.7** Track and report data on research grants and expenditures associated with the Meadows Center's research initiatives to the Texas State University Administration, including the Associate Vice President for Research and Federal Relations.

Dr. Robert Mace has established a Monthly Metrics report which is provided to Dr. Walt Horton of the Office of Research and Sponsored Programs each month. The report provides key University administration with a monthly update of our progress toward meeting our strategic goals and supporting the broader mission of Texas State University. Domains include:

Research Activities – presentations, publications, and convenings

The Meadows Center is a leader in water and environmental management topics in Texas, the U.S. and internationally. We support responsible water and natural resource policy in Texas and convene stakeholders to address the grand challenges that we will face in the decades to come. The following list provides a snapshot of the presentations, new publications and convenings from the Meadows Center's staff, faculty and students.

Research Proposals

Provides an overview of the proposals in development by the Meadows Center's staff, faculty and students. (Status Legend: idea = potential proposal, evaluating feasibility; in prep = drafting proposal components; submitted = sent to funder; confirmed = funds awarded; denied = proposal rejected; removed = proposal was not sent to funder)

Meadows Research Projects

The Meadows Center's primary goal is to further our core research initiatives (Environmental Flows, Watershed Planning and Management, Interpretive and Experiential STEM Education, Water

Conservation) and support the broader research community at Texas State University. The following list details current research activities from our staff, faculty and students.

On-Site, Non-Meadows Research Projects

Spring Lake is an environmentally, culturally and archaeologically significant resource that serves as a living laboratory for researchers across the state. As the entrusted stewards, the Meadows Center is committed to providing external researchers with access to this world-class platform for research—including access to programs, infrastructure, and resources. The following list details new external research activities happening at Spring Lake that have been approved by the Spring Lake Environmental Review Committee

The Meadows Center will explore research opportunities in partnership the broader Texas State University academic community. Key activities related to the effort to explore new research partnerships are anticipated to include:

- 1.1** Work in partnership with the Departments of Geography and Biology to expand collaborative research opportunities with faculty and students.

Nature and Wellbeing Research Collaborative – comprised of faculty from the Meadows Center, Geography, Biology, Recreation Administration, Social Work, Therapeutic Recreation, Exercise and Sports Science, Philosophy, Curriculum and Instruction, and Education departments.

The collaborative continues to collaborate on research projects and most recently submitted TXST Big Ideas Proposal for The Center for Nature Research (CNR). The CNR will provide education, training, research and community service opportunities for Texas State faculty and students interested in the role that nature plays in promoting health and wellbeing. We believe that Texas State University is uniquely poised to host the CNR due to its primary location on the headwaters of the San Marcos River, as well as its other natural resources and outdoor programming. The Center for Nature Research (CNR) will focus on the role of nature in solving complex social and public health related problems. The CNR will 1) examine the social and behavioral impacts of human-nature connectedness; 2) promote the health and well-being benefits of nature through outdoor programming, research and collaborative partnerships; 3) increase the evidence base on the benefits of human-nature connectedness. To achieve the goals above, CNR will engage Texas State scholars in multidisciplinary, collaborative research in the areas of: Social and environmental justice and ethics; Nature and mindfulness; Nature and pro-environmental behavior; Nature and wellbeing; Nature and pro-social behavior; Nature and youth development—particularly with underserved youth; Ecopsychology; and Outdoor behavioral healthcare. Furthermore, Texas State University has the Meadows Center for Water and the Environment, whose mission is to inspire research and leadership that ensures clean, abundant water for the environment and all humanity.

The Nature and Research Collaborative believe that the CNR would complement the conservation work being done by the Meadows Center, by examining the social elements, such as training and decision making, of environmental conservation, and by bringing together diverse faculty working towards solving the behavioral and social problems related to deepening the human-nature connection. In the future, in partnership with the Meadows Center, we envision that the CNR will create an outdoor learning space that hosts programming and research related to human-nature connection and wellbeing. Likewise, the CNR will host an annual research symposium and provide internal, start-up research funds for faculty doing research in this area.

Relevant Research Proposals in Progress:

Deringer, S. A., Hanley, A., Browning, M., **Dussler, R.**, Griffin, K. (2020 Submitted). *Learning through virtual reality: The impact of a border wall on nature connection and ecological behavior*. Big Ideas Grant Proposal at Texas State University. \$25,000.

Deringer, S. A., Griffin, K., **Dussler, R.**, Hanley, A., Browning, M. (2020 Submitted). *The impact of a border wall on nature connection and ecological behavior*. Research Enhancement Program at Texas State University. \$16,000.

Deringer, S. A., Hanley, A., Browning, M., **Dussler, R.** (2020 Submitted). *The impact of a border wall on human-nature connection and ecological behavior*. National Geographic Foundation, Early Career Grant. \$9,981.

Forsythe, S., Roundtree, A., & **Dussler, R.** (2020 Submitted). *The Spring Lake VR experience: Piloting virtual reality in K-12 classrooms*. Big Ideas Grant Proposal at Texas State University. \$600,000.

Forsythe, S., Daniel, K., **Dussler, R.** (2020). *Ways informal science educators are responding (WISER) to COVID-19*. Grant proposal to Spencer Foundation \$49,417 (Unfunded).

Griffin, K., Deringer, S. A., Thomas, A., Kipp, L., **Dussler, R.**, Norton, C., & Forsythe, S. (2020 Submitted). *Spring Lake outdoor education program*. \$100,000.

Norton, C. L., **Dussler, R.**, Deringer, S. A., Griffin, K., & Forsythe, S. (2019). *Center for Nature Research*. Texas State University Big Ideas Proposal. Proposal provides resources to establish a Center for Nature Research which provide education, training, research and community service opportunities for Texas State University faculty and students interested in studying the role that nature plays in promoting health and wellbeing, \$570,000 (Unfunded).

1.2 Work in partnership with Texas State University's Translational Health Initiative and health researchers to explore collaborative research and educational opportunities.

*No current initiatives underway in this category.

1.3 Explore collaborative research opportunities with faculty and students in the College of Education, leveraging the interpretive and experiential education programs run by the Meadows Center.

Forsythe, S., Roundtree, A., & **Dussler, R.** (2019). *The spring lake vr experience: Enhancing environmental education through an innovative virtual reality application*. A Social Innovation Research Accelerator Proposal, Texas State University \$7,000 (Funded).

Forsythe, S., Roundtree, A., & **Dussler, R.** (2020 Submitted). *The Spring Lake VR experience: Piloting virtual reality in K-12 classrooms*. Big Ideas Grant Proposal at Texas State University. \$600,000.

Forsythe, S., Daniel, K., **Dussler, R.** (2020). *Ways informal science educators are responding*

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In addition to the research conducted directly by endowed chairs and professors, faculty-affiliates, and staff at the Meadows Center, the Meadows Center seeks to expand and strengthen its support to the broader research community at Texas State University and other academic institutions by providing researchers with access to a world-class platform for research—including access to programs, infrastructure, and resources. For example, the Meadows Center’s on-site and Stream Team educational and citizen-science programs provide a living laboratory for researchers to study and test effective techniques relevant to STEM and experiential education. The Meadows Center’s Watershed Planning Assistance Program, which provides technical assistance to communities for watershed planning, generates a rich body of data, information, and best practices on community watershed planning and management that is available to researchers focused on integrated watershed planning and management. The Meadows Center is also committed to making its research databases, facilities, and Spring Lake access accessible to researchers. Finally, the Meadows Center plans to play a more active role in fostering and supporting multi-disciplinary research opportunities among the Texas State University research community. Key activities related to the Meadows Center that support the broader Texas State University research community are anticipated to include:

- 1.1** Create a centralized library of data sets maintained by the Meadows Center that are available to researchers.

The Spring Lake Education Program Data Hub project is creating long-term data sets relative to our education programs. We are collecting demographic data for the different schools that attend our educational programs. We are looking at county, Title I information, and the demographics for the school. Our goal is to have data the Meadows Center and other departments can use in their research and to aid our program in receiving grants. The long-term goal is to have The Meadows Center obtain publication status on our long-term data sets.

- 1.2** Convene periodic meetings for faculty and graduate students interested in water resources and ecosystems to discuss collaborative research opportunities, as well as ideas for how the Meadows Center can support faculty and student research.

This is a strategic area of emphasis that we are excited about developing further. Currently we have the Blue Bag Luncheon Series and several research collaboratives meeting regularly. The initial efforts need to be further developed and expanded into distinct, recurring events hosted at The Meadows Center to highlight the research and educational resources and opportunities that can be supported by The Center.

- 1.4** Establish and host a seminar series on water and the environment to provide opportunities for faculty and students to present their research.

The Meadows Center has established the Blue Bag Luncheon Series as a development and networking opportunity for faculty and staff of The Center to not only present their research but to also engage with faculty from varying academic departments across the University to as they present their research projects in this forum. In addition, water experts outside of the immediate University community are also invited to present both research and project work regarding their area of specialization.

- 1.5** Conduct regular “roadshow” meetings with key Colleges, Departments, and Centers across campus to highlight the research and educational resources and opportunities that can be supported by the Meadows Center. Use these sessions to get feedback on additional steps and activities that the Meadows Center can take to support research and education across campus.

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- 1.6** Use the Meadows Center website to highlight, profile and list research studies and publications relevant to water resources that are produced by faculty and students across campus.

Educational research programs have been updated and highlighted on the website. New research projects and collaborations will be included in the information and design updates. The new formatting will include a research initiatives document with embedded links to expanded research detail as our profile continues to be more expansive and compelling.

- 1.8** Explore opportunities and encourage principal investigators to staff Meadows Center research projects with graduate student researchers as an alternative to hiring paid staff.

As discussed in this document, there are multiple research collaboratives with The Meadows Center and varying academic departments which are actively pursuing NSF research grants and other opportunities which contribute to this goal. In addition, The Nature and Wellbeing Research Group is currently in discussion about functioning as an arm of the Meadows Center that could be revenue generating, as well as grant and publication generating, through research consultation and partnerships with local outdoor programs.

- 1.9** Continue to improve data collection and management activities associated with the San Marcos Observing System (SMOS), which collects monitoring data related to the natural systems in and around Spring Lake. Take steps to ensure that researchers at Texas State University and peer institutions are aware of the availability of SMOS monitoring data for research.

The SMOS, under the direction of Dr. Thom Hardy is an embedded piece of The Meadow Center's work with Edwards Aquifer Habitat Conservation Plan including water quality and biomonitoring activities. Currently, The Meadows does not have a revenue stream to support the SMOS directly.

Additionally, we have an embedded requirement that all research and data and research papers including Spring Lake have to be provided to The Meadows Center as part of the Spring Lake Management Plan. We track these projects and include them in the annual report material.

Future Initiatives to support realization of our strategic plan and research goals:

- Continue to develop and build on the momentum and University recognition of our virtual reality and nature connection research efforts
- Develop the next round of research on mindfulness and nature connection focusing specifically on user experiences with newly developed mindfulness-based nature education programs
- Continue efforts in joining the NSF Long-Term Ecological Research Network and submission of related NSF proposals to support the Meadows Center in being designated and functioning as a Long-Term Ecological Research Site
- Continue work with TXST Philosophy, University of North Texas, and the Sub-Antarctic Biocultural Conservation Program in the development of a student, research exchange program with The Meadows Center: <https://chile.unt.edu/>
- Continue to seek funding, research projects and program development in climate change monitoring and education