William Wallace (Wally) Macfarlane
Curriculum Vitae

Utah State University • Department of Watershed Sciences

5210 Old Main Hill • Logan, UT 84322-5210

Phone: (435) 512-1839 • Email: Wally.Macfarlane@usu.edu •
Riverscapes Assessment & Monitoring (RAM) Lab • https://riverscapes.net

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Statement of Research Interests

I am a geospatial scientist who is captivated by rivers, riparian areas and the landscapes they dissect. My research interests include developing innovative GIS, photogrammetry and remote sensing techniques to assess riverscape health, recovery potential and process-based restoration. Topics I have explored include:

- Effectiveness monitoring of low-tech process-based stream restoration
- Modeling and mapping of landforms associated with riverscapes
- Beaver dam capacity modeling
- Large woody debris capacity modeling
- Watershed-scale geomorphic condition
- Riparian condition and recovery potential
- Climate change induced disturbance
- Watershed conservation and restoration planning

I have packaged much of my research into tools and frameworks useful to both practitioners and researchers. These tools include LAS (Landscape Assessment System), VBET (Valley Bottom Extraction Tool), BRAT (Beaver Restoration Assessment Tool) and RCAT (Riparian Condition Assessment Toolbox) and GMWest System -- A GIS-based Risk Assessment System for Gypsy Moth. LAS has been widely used to document the decline of the threatened whitebark pine. VBET, BRAT and RCAT have been widely used across the US, Canada and Europe for beaver, stream and riparian restoration projects.

Education

Bard College, Graduate School of Environmental Sciences,
Annandale-on-Hudson, New York, USA
M.S. Degree in Environmental Science   *Received* June 1999

Utah State University, Department of Geography and Earth Resources,
Logan, Utah, USA
B.S. Degree in Environmental Studies, *Cum Laude*   *Received* June 1996

Work Experience

Professional Academic Experience

Research Assistant Professor, September 2023 to present
Utah State University, Department of Watershed Sciences, Logan, Utah, USA
Supervisor: Edward Hammill, Interim Department Head, Watershed Sciences
Primary responsibilities:
- Manage geospatial research projects
- Complete and oversee analyses on research projects
- Publish findings in peer-reviewed outlets and prepare project reports
- Grant writing to cover my salary and my staff's wages
- Manage grants
- Manage staff
- Manage Riverscapes Assessment & Monitoring (RAM) Lab (Formerly the Ecogeomorphology & Topographic Analysis Lab) (http://etal.joewheaton.org)
- Lead field-based data collection efforts

Related USU Affiliations:
- Co-Director of Riverscapes Assessment & Monitoring (RAM) Lab (Formerly the Ecogeomorphology & Topographic Analysis Lab)
- Co-Director of Fluvial Habitats Center
- Principle Investigator

Senior Research Associate/Co-Lab Director, April 2020 to September 2023
Utah State University, Department of Watershed Sciences, Logan, Utah, USA
Supervisor: Patrick Belmont, Department Head, Watershed Sciences
Primary responsibilities:
- Manage geospatial research projects
- Complete and oversee analyses on research projects
- Publish findings in peer-reviewed outlets and prepare project reports
- Grant writing to cover my salary and my staff's wages
- Manage grants
- Manage staff
- Manage Ecogeomorphology & Topographic Analysis Lab
- Lead field-based data collection efforts

Related USU Affiliations:
- Co-Director of Ecogeomorphology & Topographic Analysis Lab
- Co-Director of Fluvial Habitats Center
- Principle Investigator

Research Scientist/Associate Lab Director, September 2017 to March 2020
Utah State University, Department of Watershed Sciences, Logan, Utah, USA
Supervisor: Joseph Wheaton, Associate Professor

Primary responsibilities:
- Manage geospatial research projects
- Complete and oversee analyses on research projects
- Publish findings in peer-reviewed outlets and prepare project reports
- Grant writing to cover salary
- Co-manage grants
- Manage staff
- Lead field-based data collection

Related USU Affiliations:
- Associate Director of Ecogeomorphology & Topographic Analysis Lab
- Associate Director Fluvial Habitats Center
- Co-Principle Investigator

Research Associate (Researcher III), June 2012 to August 2017
Utah State University, Department of Watershed Sciences, Logan, Utah, USA
Supervisor: Joseph Wheaton, Associate Professor
Primary responsibilities:
- Manage geospatial research projects
- Complete and oversee analyses on research projects
- Publish findings in peer-reviewed outlets and prepare project reports
- Participate in grant writing
- Provide occasional training of students and other researchers and document protocols
- Periodic field work

Research Associate (Researcher II), February 2012 to May 2012
Utah State University, Department of Watershed Sciences, Logan, Utah, USA
Supervisor: Joseph Wheaton, Assistant Professor
Primary responsibilities:
- Provide GIS, photogrammetry, and remote sensing support for the Ecogeomorphology & Topographic Analysis Lab, Fish Ecology Lab and Adler Lab.
- Provide technical trainings and short courses on geospatial techniques and solutions.

MS Student 1997-1999
Graduate School of Environmental Sciences, Bard College, Annandale-on-Hudson, New York, USA
- Supervisor: Kathleen C. Weathers

Fluvial Geomorphology Field Technician, fall term 1995, fall term 1996
Utah State University, Department of Geography and Earth Resources, Logan, Utah, USA
Primary responsibilities:
- Conducted topographic and bathymetric surveys on the Colorado, Green and Snake rivers, Utah and Idaho.

Other Professional Experience

GIS/Photogrammetry Specialist, July 1999 - December 2011

GEO/Graphics, Inc., Logan, Utah, USA
Supervisor: Jerry Hughes, Owner
  Primary responsibilities:

- Implemented and managed over 40 environmental and land-use related GIS, photogrammetry and remote sensing projects for governmental agencies, private businesses and NGOs worldwide.

  Employment highlight**:**

- International Development Enterprise: Rural Prosperity Initiative, January 2006- December 2010. Worked on a project aimed at increasing the income of poor farmers in Nepal, Zambia and Ethiopia, through the delivery of low-cost irrigation technologies and developing supply chains. Developed spatial analyses to determine the best location for technology interventions. Provided environmental monitoring and impact mapping. Monitored and evaluated income growth/distribution through a time series GIS analysis. Provided in-country data collection and training of local staff in GIS, GPS, and data collection. The project was funded by the Bill and Melinda Gates Foundation.

Research Scholarly Contributions Google Scholar Statistics

Google   Scholar   Profile:
https://scholar.google.com/citations?user=9FtvQSoAAAAJ&hl=en

	All	*Since 2019*
Citations	1238	711
h-Index	17	14
i10-index	71	14

ResearchGate Statistics

ResearchGate Profile: https://www.researchgate.net/profile/William-Macfarlane-2

	All
Citations	1174
Research Interest	1435 *(higher than 94% of researchers on Research Gate)*
Total Reads	66,388
Publication Recommendations	73

Other Research Profiles

- Researcher ID Profile: https://orcid.org/0000-0002-1876-5453
- ORCiD Profile: 0000-0002-1876-5453

Peer Reviewed Papers

1. Hafen, K. C., Wheaton, J. M., Roper, B. B., Bailey, P., Macfarlane, W. W., Neilson, B. T., & Tennant, C. J. (2024). Estimating Increased Transient Water Storage with Increases in Beaver Dam Activity. *Water*, *16*(11), 1515. https://doi.org/10.3390/w16111515 cma$_s$

2. Glassic, H. C., McGwire, K. C., Macfarlane, W. W., Rasmussen, C., Nicolaas Bouwes, Wheaton, J. M., & Al-Chokhachy, R. (2024). From pixels to riverscapes: How remote sensing and geospatial tools can prioritize riverscape restoration at multiple scales. *WIREs. Water*. https://doi.org/10.1002/wat2.1716 CMA$_s$w

3. Macfarlane, W. W., Howell, B., Logan, J. A., Smith, A. L., Rasmussen, C. C., & Spangler, R. E. (2023). Climate Change-Driven Cumulative Mountain Pine Beetle-Caused Whitebark Pine Mortality in the Greater Yellowstone Ecosystem. *Forests*, *14*(12), 2361. https://doi.org/10.3390/f14122361 CMAA$_s$WF

4. Remiszewski, T. T., Budy, P., & Macfarlane, W. W. (2023). Expansive, positive changes to fish habitat diversity following the formation of a valley plug in a degraded desert river. *River Research and Applications*, *40*(1), 116–128. https://doi.org/10.1002/rra.4213

5. Fairfax, E., Zhu, E. Y., Clinton, N., Maiman, S., Shaikh, A., Macfarlane, W. W., Wheaton, J. M., Ackerstein, D., & Corwin, E. (2023). EEAGER: A Neural Network Model for Finding Beaver Complexes in Satellite and Aerial Imagery. *Journal of Geophysical Research: Biogeosciences*, *128*(6). https://doi.org/10.1029/2022JG007196 cma$_s$

6. Pennock, C. A., Bruckerhoff, L. A., Gido, K. B., Barkalow, A. L., Breen, M. J., Budy, P., Macfarlane, W. W., & Propst, D. L. (2022). Failure to achieve recommended environmental flows coincides with declining fish populations: Long-term trends in regulated and unregulated rivers. *Freshwater Biology*, *67*(9), 1631–1643. https://doi.org/10.1111/fwb.13966

7. Pennock, C. A., Budy, P., & Macfarlane, W. W. (2022). Effective Conservation of Desert Riverscapes Requires Protection and Rehabilitation of In-Stream Flows With Rehabilitation Approaches Tailored to Water Availability. *Frontiers in Environmental Science*, *10*. https://doi.org/10.3389/fenvs.2022.870488

8. Pennock, C. A., Budy, P., Macfarlane, W. W., Breen, M. J., Jimenez, J., & Schmidt, J. C. (2021). Native Fish Need A Natural Flow Regime. *Fisheries*, *47*(3), 118–123. https://doi.org/10.1002/fsh.10703

9. Graham, H. A., Puttock, A., Macfarlane, W. W., Wheaton, J. M., Gilbert, J. T., Campbell-Palmer, R., Elliott, M., Gaywood, M. J., Anderson, K., & Brazier, R. E. (2020). Modelling Eurasian beaver foraging habitat and dam suitability, for predicting the location and number of dams throughout catchments in Great Britain. *European Journal of Wildlife*

Research, *66*(3). https://doi.org/10.1007/s10344-020-01379-w CMa~s~w

10. O'Brien, G. R., Wheaton, J. M., Fryirs, K., Macfarlane, W. W., Brierley, G., Whitehead, K., Gilbert, J., & Volk, C. (2019). Mapping valley bottom confinement at the network scale. *Earth Surface Processes and Landforms*. https://doi.org/10.1002/esp.4615 [IF=4.050].

11. Laub, B. G., Thiede, G. P., Macfarlane, W. W., & Budy, P. (2018). Evaluating the Conservation Potential of Tributaries for Native Fishes in the Upper Colorado River Basin. *Fisheries*, *43*(4), 194–206. https://doi.org/10.1002/fsh.10054

12. Macfarlane, W. W., Gilbert, J. T., Gilbert, J. D., Saunders, W. C., Hough-Snee, N., Hafen, C., Wheaton, J. M., & Bennett, S. N. (2018). What are the Conditions of Riparian Ecosystems? Identifying Impaired Floodplain Ecosystems across the Western U.S. Using the Riparian Condition Assessment (RCA) Tool. *Environmental Management*, *62*(3), 548–570. https://doi.org/10.1007/s00267-018-1061-2 [IF=2.727]. CMAA$_s$WF

13. Macfarlane, W. W., McGinty, C. M., Laub, B. G., & Gifford, S. J. (2016). High-resolution riparian vegetation mapping to prioritize conservation and restoration in an impaired desert river. *Restoration Ecology*, *25*(3), 333–341. https://doi.org/10.1111/rec.12425

14. Macfarlane, W. W., Gilbert, J. T., Jensen, M. L., Gilbert, J. D., Nate Hough-Snee, McHugh, P. E., Wheaton, J. M., & Bennett, S. (2017). *Riparian vegetation as an indicator of riparian condition: Detecting departures from historic condition across the North American West*. *202*, 447–460. https://doi.org/10.1016/j.jenvman.2016.10.054 [IF = 6.243]. CMAA$_s$WF

15. Gilbert, J. T. †, Macfarlane, W. W., & Wheaton, J. M. (2016). The Valley Bottom Extraction Tool (V-BET): A GIS tool for delineating valley bottoms across entire drainage networks. *Computers & Geosciences*, *97*, 1–14. https://doi.org/10.1016/j.cageo.2016.07.014 [IF=3.433]. CmaA$_s$wF

16. Macfarlane, W. W., Wheaton, J. M., Bouwes, N., Jensen, M. L. †, Gilbert, J. T., Hough-Snee, N., & Shivik, J. A. (2017). Modeling the capacity of riverscapes to support beaver dams. *Geomorphology*, *277*, 72–99. https://doi.org/10.1016/j.geomorph.2015.11.019 [IF=4.127]. CMAA$_s$WF

17. Macfarlane, W. W., Logan, J. A., & Kern, W. R. (2013). An innovative aerial assessment of Greater Yellowstone Ecosystem mountain pine beetle-caused whitebark pine mortality. *Ecological Applications*, *23*(2), 421–437. https://doi.org/10.1890/11-1982.1

18. Logan, J. A., Macfarlane, W. W., & Willcox, L. (2010). Whitebark pine vulnerability to climate-driven mountain pine beetle disturbance in the Greater Yellowstone Ecosystem. *Ecological Applications*, *20*(4), 895–902. https://doi.org/10.1890/09-0655.1

19. Logan, J., Macfarlane, W., & Willcox, L. (2009). Effective monitoring as a basis for adaptive management: a case history of mountain pine beetle in Greater Yellowstone Ecosystem whitebark pine. *IForest - Biogeosciences and Forestry*, *2*(1), 19–22. https://doi.org/10.3832/ifor0477-002

Peer Reviewed Book and Book Chapters

1. 2019. Bennett, S., Wheaton, J., Bouwes, N., Shahverdian, S., **Macfarlane, W.W**. and Portugal, E. Chapter 3 - Planning for Low-Tech Process-Based Restoration. In: Low-Tech Process-Based Restoration of Riverscapes: Design Manual - Version 1.0. Wheaton JM, Bennett S, Shahverdian S, and Maestas JD, (Editors). Utah State University Wheaton Ecogeomorphology & Topographic Analysis Lab. Logan, UT. 57 pp. DOI: [10.13140/RG.2.2.15815.75680](#).

2. 2019. Bennett, S.N., Wheaton, J.M., Bouwes, N., Camp, R., Jordan, C.E., **Macfarlane, W.W**., Maestas, J.D., Shahverdian, S. and Weber, N. Chapter 6 - Low-Tech Restoration Project Implementation. In: J.M. Wheaton, S.N. Bennett, N. Bouwes, J.D. Maestas and S.M. Shahverdian (Editors), Low-Tech Process-Based Restoration of Riverscapes: Design Manual. Utah State University Wheaton Restoration Consortium, Logan, Utah. 38 pp. DOI: [10.13140/RG.2.2.25043.22567](#).

3. 2009. Bentz, B. J. (Editor), J.A. Logan; J. MacMahon; C.D. Allen; M. Ayres, E. Berg; A. Carroll; M. Hansen; J. Hicke; L. Joyce; **W.W. Macfarlane**; S. Munson; J. Negron; T. Paine; J. Powell; K. Raffa; J. Regniere; M. Reid; B. Romme; S.J. Seybold; D. Six; D. Tomback; J. Vandygriff; T. Veblen; M. White; J. Witcosky; D. Wood. Bark beetle outbreaks in Western North America: causes and consequences. Bark Beetle Symposium; Snowbird, Utah; November, 2005. Salt Lake City, Utah: University of Utah Press. 42 p. https://www.fs.usda.gov/treesearch/pubs/43479

Peer Reviewed Research Publications In Press, Revision, Review, Prep

1. In Review. H.C. Glassic, R., J. Wheaton, W.W. Macfarlane, C.E. Jordan, B. Murphy, S. Shahverdian, S. Bennett, N. Bouwes, K. Fryirs, G. Brierley, D. Ciotti, P. Bailey, K. Bartelt, B. Belletti, S. Bizzi, J. Brasington, R. Camp, E. Fairfax, J. Gilbert, J. Jimenez, J. Maestas, T. Mandish, A. McNamara, S. Miller, B. Morizot, M. Perle, H. Reid, L.V. Reynolds, W.C. Saunders, A. Shallcross, P. Skidmore, R. Smith, B. Terrier, G. Wathen, N.Weber. The Principles of Riverscape Health

2. In Review. K. Bartelt, P. Belmont, N. Bouwes, E. Hammill, **W. Macfarlane**, W. Saunders, S. Shahverdian, J.M. Wolf, and J. Wheaton. Mapping valley bottom inundation patterns from beaver dam activity: A potential proxy for hydrologic inefficiency. Submitted to: Earth Surface Processes and Landforms.

Selected Oral Presentations

1. 2024. *Invited Talk*. **Macfarlane, W.W.** BRAT: What it is, what it isn't and what it's becoming. March 14, 2024. Beaver Institute. National Beaver Working Group webinar.

2. 2023. *Invited Talk*. **Macfarlane, W.W.** Lahontan Cutthroat Trout Interagency Meeting, February 28, 2023. Presentation: A Riverscape Network Assessment of Lahontan Cutthroat Trout (LCT) Habitat. Reno, NV.

3. 2022. *Invited Talk*. **Macfarlane, W.W.** An Introduction to Low-Tech Process-based Stream Restoration. Sustainable Southwest Beef Project On-Ranch Demonstration 2022, Canyonlands Research Center, Dugout Ranch UT.

4. 2022. *Talk.* **Macfarlane, W.W.,** K.M Urbanczyk, and S. Burch. Riparian Land Cover Classification to Guide Conservation and Restoration of the Lower White River, Utah. RiversEdge West 20th Anniversary Conference. Grand Junction, CO.

5. 2020. *Invited Webinar*. **Macfarlane, W.W.** and J. Jimenez. Beaver Restoration Webinar Series: Webinar #4: Addressing Common Barriers and Objections to Beaver Restoration Work. The Association of State Wetland Managers and the Bureau of Land Management.

6. 2017. *Invited Talk*. **Macfarlane, W.W.**, J.M. Wheaton, and J. Jimenez. What condition are lotic riparian ecosystems in? Workshop: Interagency riparian and wetland assessment -Best practices, innovative approaches, and opportunities for collaboration, Fort Collins, CO.

7. 2016. *Invited Poster*. **Macfarlane, W.W.**, and J.M. Wheaton. Modeling the capacity of riverscapes to support beaver dams. Binghamton Geomorphology Symposium, Colorado State University, Fort Collins, CO.

8. 2016. *Poster*: **Macfarlane, W.W.,** J.T. Gilbert, J.D. Gilbert, N. Hough-Snee, P.A. McHugh, J. M. Wheaton, S.N. Bennett. Riparian vegetation as an indicator of riparian condition: detecting departures from historic condition across the North American West, Restoring the West Annual Symposium. Logan, UT.

9. 2014. *Invited Plenary Talk.* **Macfarlane, W.W.**, J.M. Wheaton and M.L. Jensen. Modeling the capacity of riverscapes to support dam-building beaver: Utah statewide implementation, Restoring the West Annual Symposium. Logan, UT.

10. 2014. *Poster*: Jensen M.L., **W. W., Macfarlane** and J.M. Wheaton. Filling an important data gap: valley bottom mapping, riparian condition assessment and geomorphic river classification for the Colorado Plateau Ecoregion, Restoring the West Annual Symposium. Logan, UT.

11. 2014. *Presentation***: Macfarlane, W.W.**, P. Budy, G. Thiede and B. Laub. Looking beyond the mainstem: conservation and restoration of endangered and sensitive Colorado River fishes. American Fisheries Society, Western Division Annual Meeting. Mazatlán, Mexico.

12. 2013. *Plenary Speaker:* **Macfarlane, W.W.** and J.M. Wheaton. Modeling the Capacity of Riverscapes to Support Dam-Building Beaver, River Restoration Northwest Symposium. Stevenson, WA.

13. 2013. *Presentation*: **Macfarlane, W.W.**, J.M. Wheaton and S. Bangen. Fish habitat assessment and monitoring: Imagery and topographic techniques Utah Chapter AFS Annual Meeting Wahweap, UT.

14. 2013. *Presentation*: **Macfarlane, W.W.**, M.L. Scott, D.W. Perkins, and J.M. Wheaton, Hypothesis driven, multi-scalar monitoring protocol development: big, canyon-bound rivers, Tamarisk Coalition River Crossings: Linking River Communities Research Conference and Workshop Grand Junction, CO.

15. 2012. *Poster*: **Macfarlane, W.W.**, J.M. Wheaton, M. O'Brien, and J. Christensen, Modeling the capacity of riverscapes to support dam-building beaver, AGU Fall Meeting 2012. American Geophysical Union, San Francisco, CA.

16. 2011. *Invited Talk*: **Macfarlane, W.W.** An assessment of mountain pine beetle caused mortality of whitebark pine forests of mountain areas of the greater Yellowstone Ecosystem. Graduate Degree Program in Forest Ecology. University of Montana. Missoula, MT.

17. 2011. *Invited Talk*: **Macfarlane, W.W.** An assessment of mountain pine beetle caused mortality of whitebark pine forests of mountain areas of the Greater Yellowstone Ecosystem. Whitebark Pine Ecosystem Foundation workshop. Cody, WY.

18. 2010. *Poster*: Logan, J. A., **W.W. Macfarlane**, and L. Willcox. Whitebark pine vulnerability to climate driven mountain pine beetle disturbance in the Greater Yellowstone Ecosystem. 10th Biennial Scientific Conference on the Greater Yellowstone Ecosystem: Questioning Greater Yellowstone's Future: Climate, Land Use, and Invasive Species. West Yellowstone, WY.

19. 2010. *Presentation*: **Macfarlane, W. W.**, J. A. Logan, and W. R. Kern. Using the Landscape Assessment System (LAS) to map mountain pine beetle-caused mortality in whitebark pine, Greater Yellowstone Ecosystem. "High-Five" Symposium, the Future of High-Elevation Five-Needle White Pines in Western North America. Missoula, MT.

20. 2010. *Presentation*: **Macfarlane, W. W.**, J. A. Logan, and W. R. Kern. Using the Landscape Assessment System (LAS): an aerial survey method for mapping the extent and intensity of

Mountain Pine Beetle-caused tree mortality. Western Forest Insect Work Conference, Flagstaff, AZ.

21. 2009. *Presentation*: **Macfarlane, W. W.**, J. A. Logan, and W. R. Kern. An assessment of mountain pine beetle caused mortality of whitebark pine forests of mountain areas of the Greater Yellowstone Ecosystem. Global Change and the World's Mountains, Perth, Scotland.

22. 2009. *Presentation*: **Macfarlane, W. W.**, J. A. Logan, and W. R. Kern. Status of Whitebark Pine Decline in the Greater Yellowstone Using GIS and Remote Sensing Union of International Forest Researchers (IUFRO): Forest Insects and Environmental Change Conference, Jackson, WY.

23. 2008. *Presentation*: **Macfarlane, W. W.**, and J. A. Logan. Remote sensing and GIS landscape assessment of Whitebark Pine mortality. 7th North American Forest Ecology Workshop, Logan, UT.

Thesis

1999 **Macfarlane, W.W.** Using historic research, remote sensing and GIS to investigate vegetation change related to land use in a rangeland ecosystem. *M.S. Thesis.* Bard Graduate Center, Bard College, Environmental Science: Annandale-on-Hudson, New York, 161 pp.

Non-Reviewed Publications

1. 2024. **Macfarlane, W.W.**, J. Gilbert, D. Baker, C. Gunnell, J. Gilbert, N. D'Souza, E.P. Sargeant, and C. Seeborg. Montana Beaver Dam Census & Beaver Restoration Assessment Tool (BRAT) Verification DOI: 10.13140/RG.2.2.14951.05281

2. 2024. Weber N., Wheaton J.M., Shalcross A., Al-Chokhachy R, Bailey P., Bartelt K., Bennett S., Bouwes B., Bouwes N., Gilbert J., Dickard M., Heitke J., Jordan C., Glassic H., **MacFarlane W.W.**, Miller S., Saunders C., Whitehead K. Low-Tech Process-Based Restoration Design and Monitoring Protocol: Standard Methods for Developing Project Designs and Assessing Riverscape Health. Version 2.0. Prepared by Anabranch Solutions and Utah State University Riverscapes Assessment and Monitoring Lab. Prepared for the Bureau of Land Management. Logan, UT. 81 pp. DOI: **10.5281/zenodo.13769899**

3. 2021. Pennock, C.A., **W.W. Macfarlane**, P. Budy, J. Jimenez, and J. Goodell. Conservation, Restoration, and Monitoring Plan for the Lower White River, Utah. TCFWRU 2022(1):1-78. DOI: 10.13140/RG.2.2.30133.96489

4. 2021. **Macfarlane, W.W.**, Nielsen, T. A. and Garlick, C. Surface Water & Riparian Resource Inventory & Assessment: Emery County: Dingell Act Land Conveyances & Exchanges. Prepared for Bureau of Land Management, Price Field Office. Utah State University Ecogeomorphology & Topographic Analysis Lab. Logan, UT. 44 Pages. DOI: 10.13140/RG.2.2.16712.19207

5. 2021. **Macfarlane W.W., Adams, J. and Shahverdian, S.** Riverscape Conservation, Restoration and Monitoring Plan: Dugout Ranch, Utah. Prepared for The Nature Conservancy. Utah State University Ecogeomorphology & Topographic Analysis Lab. Logan, UT. 83 pages. DOI: 10.13140/RG.2.2.33486.95044

6. 2020. Laub, B. G., **W. W. Macfarlane**, T.E. Walsworth, J. Goodell, J. Jimenez, P. Kauss, D. Keller, G. P. Thiede, D. Truman, and P. Budy. 2020. Restoration and monitoring plan for the lower Price River, Utah. UTCFWRU 2020(3):1-44. DOI: 10.13140/RG.2.2.27446.32323

7. 2020. **Macfarlane W.W.**, Bangen S., Hallerud, M.A., Anderson, B., Hafen C., Albonico M.T., Garlick C., Gibby T., Hatch T., Rasmussen C., Portugal, E.W. and Wheaton J.M. California Beaver Restoration Assessment Tool Building Realistic Expectations for Partnering with Beaver in Conservation and Restoration. Prepared for the Nature Conservancy. Utah State University Ecogeomorphology & Topographic Analysis Lab. Logan, UT. 45 pages. DOI: 10.13140/RG.2.2.20316.00644

8. 2020. Urbanczyk K.M., Burch, S. and **Macfarlane W.W.** 2018 Riparian Land Cover Classification of the Lower White River, Utah. Prepared for Bureau of Land Management, Utah State University Ecogeomorphology & Topographic Analysis Lab. Logan, UT. DOI: 10.13140/RG.2.2.16832.25603

9. 2019. **Macfarlane W.W.**, Bangen S., Hallerud, M.A., Anderson B., Hafen C., Albonico M.T., Garlick C., Gibby T., Hatch T., Rasmussen C., Portugal E., and Wheaton J.M. California Beaver Restoration Assessment Tool: Building Realistic Expectations for Partnering with Beaver in Conservation and Restoration. Prepared for The Nature Conservancy. Utah State University Ecogeomorphology & Topographic Analysis Lab. Logan, UT. 45 pages. DOI: 10.13140/RG.2.2.20316.00644

4. 2019. Wheaton J.M., Wheaton A., Maestas J.D., Bennett S.N., Bouwes N., Shahveridan S., Camp R., Jordan C., **Macfarlane W.M.**, Portugal E.W., and Weber N. Low-Tech Process-Based Restoration of Riverscapes: Pocket Field Guide. Utah State University Restoration Consortium. DOI: 10.13140/RG.2.2.28222.13123/1

5. 2019. **Macfarlane W.W.**, Hallerud, M.A., Bangen S., Hafen C., Albonico M.T., Garlick C., Gibby T., Hatch T., Rasmussen C., and Wheaton J.M. 2019. Idaho Beaver Restoration Assessment Tool: Building Realistic Expectations for Partnering with Beaver in Conservation and Restoration. Prepared Idaho Fish and Game. Utah State University Ecogeomorphology & Topographic Analysis Lab. Logan, UT. 55 pages. DOI: 10.13140/RG.2.2.12641.25447

6. 2019. O'Brien G., Stevens G., **Macfarlane W.W.**, and Wheaton J.M. Geomorphic Assessment of the Lower White River: Valley Landform Delineation, Reach Typing, and Geomorphic Condition Assessment. Fluvial Habitats Center, Utah State University, Prepared for Bureau of Land Management, Logan, UT, 99 pp. DOI: 10.13140/RG.2.2.28838.57924/1

7. 2019. **Macfarlane W.W.**, M.A. Hallerud., C. Hafen, M.T. Albonico, and J.M. Wheaton. Panther Creek Beaver Restoration Assessment Tool: Building realistic expectations for partnering with beaver in restoration and conservation. Prepared for the Shoshone-Bannock Tribes Fish & Wildlife Department. Utah State University Ecogeomorphology & Topographic Analysis Lab. Logan, UT. 42 pages. DOI: 10.13140/RG.2.2.28413.41445

8. 2019. **Macfarlane W.W.**, M.D. Meier, C. Hafen, M.T. Albonico, M.A. Hallerud, and J.M. Wheaton. John Day Basin Beaver Restoration Assessment Tool: Building realistic expectations for partnering with beaver in restoration and conservation. Prepared for the North Fork John Day Watershed Council. Utah State University Ecogeomorphology & Topographic Analysis Lab. Logan, UT. 85 pages. DOI: 10.13140/RG.2.2.29252.27520

9. 2019. **Macfarlane W.W.**, M.D. Meier, C. Hafen, M.T. Albonico, and J.M. Wheaton. North Fork Brunt River Beaver Restoration Assessment Tool: Building realistic expectations for partnering with beaver in restoration and conservation. Prepared for the Powder Basin Watershed Council. Utah State University Ecogeomorphology & Topographic Analysis Lab. Logan, UT. 80 pages. DOI: 10.13140/RG.2.2.25057.97128

10. 2019. **Macfarlane W.W.**, Hallerud, M.A., Bangen S., Hafen C., Albonico M.T., Garlick C., Gibby T., Hatch T., Rasmussen C., and Wheaton J.M. Greater Yellowstone Area Beaver Restoration Assessment Tool: Building Realistic Expectations for Partnering with Beaver in Conservation and Restoration. Prepared for Greater Yellowstone Coordinating Committee. Utah State University Ecogeomorphology & Topographic Analysis Lab. Logan, UT. 45 pages. DOI: 10.13140/RG.2.2.23671.44964

11. 2018. Jordan C., N. Bouwes, and **W.W. Macfarlane.** Integrated status and effectiveness monitoring program (BPA Project 2003-017-00) and Columbia habitat monitoring program (BPA Project 2011-006-00) Final Technical Report for Bonneville Power Administration. DOI: 10.13140/RG.2.2.27808.23042

12. 2018. **Macfarlane W.W.**, J.D. Gilbert, M.D. Meier, C. Hafen, S.M. Shahverdian, M.T. Albonico, and J.M. Wheaton. Yakama Nation Beaver Restoration Assessment Tool: Building realistic expectations for partnering with beaver in restoration and conservation. Prepared for the Yakama Nation. Utah State University Ecogeomorphology & Topographic Analysis Lab. Logan, UT. 68 pages. DOI: 10.13140/RG.2.2.25896.83203

13. 2018. Shahverdian S., **W.W. Macfarlane.** G.R. O'Brien, and J.M. Wheaton. Birch creek restoration: Improving instream habitat and riparian areas to benefit Bonneville cutthroat trout and sage grouse. Ecogeomorphology and Topographic Analysis Lab, Utah State University,

Prepared for Utah Division of Wildlife Resources and Bureau of Land Management, Logan, UT, 28 pp. DOI: 10.13140/RG.2.2.27580.28806

14. 2017. Shahverdian S., **W.W. Macfarlane**, G. Stevens, M. Meier, and J.M. Wheaton. Geomorphic response to pilot river restoration on the San Rafael River, Utah: a pilot installation of beaver dam analogues. Prepared for Utah Division of Wildlife Resources and Bureau of Land Management, Utah State University Ecogeomorphology & Topographic Analysis Lab Logan, UT, 35 pp. DOI: 10.13140/RG.2.2.18963.37928

15. 2017. Shahverdian S., E. Portugal, R. Camp, **W.W. Macfarlane**, K. Sorenson, and J.M. Wheaton. Grouse Creek watershed restoration plan: using beaver dam analogues to initiate process-based stream recovery. Ecogeomorphology and Topographic Analysis Lab, Utah State University. Prepared for Utah Division of Wildlife Resources, Logan, UT, 35 pp. DOI: 10.13140/RG.2.2.29281.76641

16. 2016. Shahverdian S., **W.W. Macfarlane** and J.M. Wheaton. Memo: Westerly Creek beaver dam capacity assessment: developing realistic expectations for beaver dam activity. Prepared for Muller Engineering Company. Anabranch Solutions, Logan, UT, 24 pp. DOI: 10.13140/RG.2.2.34120.93446

17. 2016. Hafen K. and **W.W. Macfarlane**. Can beaver dams mitigate water scarcity caused by climate change and population growth? USFS Stream Notes. (2016): November: 1-5.

18. 2014. Wheaton J.M. and **W.W. Macfarlane**. The Utah beaver restoration assessment tool: a decision support & planning tool – Manager Brief, Ecogeomorphology and Topographic Analysis Lab, Utah State University. Prepared for Utah Division of Wildlife Resources, Logan, UT, 16 pp. DOI: 10.13140/RG.2.2.19477.14562

19. 2014. **Macfarlane W.W.**, J.M. Wheaton, and M.L. Jensen. 2014. The beaver restoration assessment tool: a decision support & planning tool for Utah. Ecogeomorphology and Topographic Analysis Lab, Utah State University. Prepared for Utah Division of Wildlife Resources, Logan, Utah, 142 pp. DOI: 10.13140/2.1.3190.0167

20. 2013. **Macfarlane W.W.** and C.M. McGinty. Fine scale riparian vegetation mapping: lower San Rafael River, Utah. Fish Ecology Lab and RS/GIS Laboratory, Utah State University. Prepared for Department of the Interior, Bureau of Land Management, Logan, Utah, 52 pp. DOI: 10.13140/RG.2.1.1464.3603

21. 2013. **Macfarlane W.W.** and J.M. Wheaton. Modeling the Capacity of Riverscapes to Support Dam-Building Beaver - Case Study: Escalante River Watershed. Prepared for Grand Canyon Trust and the Walton Family Foundation, Logan, UT, 79 pp. DOI: 10.13140/RG.2.2.18638.28488

22. 2013. **Macfarlane W.W.**, W.R. Kern, D.J. Mattson and J.A. Logan. Pilot Study: Gauging the impact of whitebark pine mortality on occurrence of Clark's nutcracker, red squirrel, black bear and grizzly bear. Ecogeomorphology and Topographic Analysis Laboratory, Utah State University.

Prepared for Natural Resources Defense Council, Logan, Utah, 23 pp. DOI: [10.13140/RG.2.2.33318.34885](10.13140/RG.2.2.33318.34885)

23. 2010. **Macfarlane, W.W.**, J. A. Logan, and W.R. Kern. Using the Landscape Assessment System (LAS) to Assess Mountain Pine Beetle-Caused Mortality of Whitebark Pine, Greater Yellowstone Ecosystem, 2009: Project Report. DOI: [10.13140/RG.2.2.31640.62725](10.13140/RG.2.2.31640.62725)

24. 2010. Logan, J. A., and **W.W. Macfarlane**. Beetle Devastates Yellowstone Whitebark Pine Forests.ActionBioscience.org.
https://www.researchgate.net/publication/307858492_Beetle_devastates_Yellowstone_whitebark_pine_forests

25. 2003. Pederson, J.L., Petersen, P.A., **Macfarlane, W.W.**, Gonzales, M.F. and Kohl, K., 2003. Mitigation, monitoring and geomorphology related to gully erosion of cultural sites in Grand Canyon. Report to the U.S. Geological Survey, Grand Canyon Monitoring and Research Center, 241 pp.

Research Grants Awarded (since appointment as co-lab director)

1. Bonneville Environmental Foundation, 2024-2028. "Oregon & Washington BRAT Model Calibration and Validation Using Beaver Dam Census and Field Data Collection." $305,228.90 (PI)
2. Rio Grande Return, 2024-2025. "New Mexico BRAT Model." $51,030 (PI)
3. Bonneville Environmental Foundation, 2023-2024. "Oregon BRAT Initialization." $24,000 (PI)
4. Defenders of Wildlife, 2023-2025. "Beaver Dam Census New Mexico." $51,030 (PI)
5. Utah Division of Wildlife Resources, 2024-2025. "Boobe Hole Water Enhancement Project Phase II." $32,726 (PI)
6. Utah Division of Wildlife Resources, 2024-2025. "Gooseberry Phase 4." $87,946.
7. Utah Division of Wildlife Resources, 2024-2025.Lower White River Conservation Restoration Monitoring FY 24 WRI 7108." $52,492 (PI)
8. Utah Division of Wildlife Resources, 2024-2025.Birch Creek – Bonneville Cutthroat Trout and Riparian Improvement – Phase 3." $25,500 (PI)
9. The Nature Conservancy, 2023-2025. "Process-based Riverscape Restoration, Dugout Ranch, Utah, Phase I, NFWF Project matching funds." $128,357 (PI)
10. National Fish and Wildlife Foundation, 2023-2025. Process-based Riverscape Restoration, Dugout Ranch, Utah, Phase I. $107,777.77 (PI)
11. US Bureau of Land Management, 2024-2029. "Restoring Riverscapes to Increase Climate-Resilience and Biodiversity on Utah BLM Lands." 5-year cooperative agreement. Yr 1: $66,486 (PI).
12. Montana Fish, Wildlife and Parks - Region 2, 2023-2024. "Montana Wide Virtual Beaver Dam Census and BRAT Model Validation." $66,044.49 (PI)
13. Utah Division of Wildlife Resources, 2023-2024. "Upper Otter Creek Wet Meadow and Wetland Restoration." $50,000 (PI)
14. Utah Division of Wildlife Resources, 2023-2024. "Lower White River Conservation Restoration Monitoring." $47,963 (PI)
15. National Park Service, 2023-2024. "Restoring Habitat and Fluvial Processes in Great Basin National Park and Mesa Verde National Park with Low-Tech Restoration: Mod 1." $23,823 (PI)

16. Luckiamute Watershed Council. 2023-2024. "Mid-Willamette BRAT Mod 1." $10,638 (PI)
17. Utah Division of Wildlife Resources, 2023-2024. "Bear Hollow Drone Survey." $5,333.46 (PI)
18. Utah Division of Wildlife Resources, 2023-2024. "Drone Imagery and Mapping: Gold Mine Site San Juan River, Utah." $4,103.67 (PI)
19. US Army Corps of Engineers, 2022-2023. "Improving the Computation of Large Wood and Other Geomorphic Parameters in Rivers." $125,000 (PI)
20. NASA/ Boise State University, 2021-2025, "Integrating remote sensing and ecological forecasting into decision support for beaver rewilding." $259,161 (Co-PI)
21. Luckiamute Watershed Council, 2021-2024, Mid-Willamette Beaver Restoration Assessment Tool (BRAT) Oregon, $43,052 (PI)
22. Utah Division of Wildlife Resources, 2022-2023, "White River Enhancement Project." Awarded $47,963 (PI)
23. Utah Division of Wildlife Resources, 2021-2023, "Lower San Rafael & Price River Riparian Corridor Habitat Improvement, Phase 2." $30,125 (PI)
24. Utah Division of Wildlife Resources, 2021-2022, "Eastern La Sal Watershed Restoration Project Phase II." $5,700 (PI)
25. Utah Division of Wildlife Resources, 2021-2023. "Ranch Canyon, Bear Creek Riparian Enhancement." $47,963 (PI)
26. Anabranch Solutions, 2020, Task orders 1-9. Awarded $80,000. (PI)
27. Eco Logical Research, 2020-2024, "Riverscape Context for LCT Conservation and Restoration Planning". Awarded $195,028 (PI)
28. US Bureau of Land Management, 2020-2025, "Montana/Dakotas Fisheries and Aquatic Resource Management". 5-year co-op agreement: $610,000 (Co-PI)
29. US Bureau of Land Management, 2017-2023, "Making Regional Assessment of Rivercapes Useful." 5-year co-op agreement: $584,375 (PI)
30. US Bureau of Reclamation, 2019-2021, "Cottonwood Wash Geomorphic Change Detection." Awarded $20,000 (PI)
31. US Fish and Wildlife Service, 2020 -2025, "Planning & Prioritizing Low-Tech Process Based Restoration in the Upper Klamath & Sprague River Watersheds." 5-year co-op agreement: 1st year awarded $89,028 (Co-PI)
32. US Forest Service, 2019-2024, "Riverscapes Network Analysis & Comparison with Reach-Scale Monitoring." 5-year co-op agreement: $288,981 (PI)
33. US Forest Service, 2017-2022, "Whitebark Pine Cumulative Mortality Study", 5-year co-op agreement, $110,397 (PI)
34. National Park Service, 2021-2024, "Restoring Habitat and Fluvial Processes in Great Basin National Park with Low-Tech Restoration." $41,073 (PI)
35. Utah Department of Environmental Quality, 2019-2020, "Otter Creek Riparian and Water Quality Restoration Project." Awarded $65,000 (PI).
36. Utah Department of Environmental Quality. 2020-2023, "Otter Creek Riparian and Water Quality Restoration Project: Phase 1a." Awarded $20,000 (PI).
37. Utah Division of Wildlife Resources, 2020 "Grouse Creek Watershed Stream Restoration Phase II." Awarded $18,492 (PI).
38. Utah Division of Wildlife Resources, 2020, "White River Enhancement Project Phase 6." Awarded $10,000 (PI)

Teaching

Invited/solicited workshops organized

Instructor*; Instructor & Co-Organizer **

1. **National Fish and Wildlife Foundation.** Low-Tech Process-based Riverscape Restoration: Flashy Desert Streams Workshop. October 10-11, 2024. The Canyonlands Research Center Dugout Ranch, Utah. **
2. **Bonneville Environmental Foundation OR BRAT Initiation Project**. OR BRAT Workshop. July 29, 2024. Prineville, OR. *
3. **Bonneville Environmental Foundation OR BRAT Initiation Project**. OR BRAT Workshop. July 31, 2024: Tillamook, OR. *
4. **NASA**. Mesic Ecosystem Monitoring Workshop, Boise, Idaho, January 31, 2023. BRAT model presentation *
5. **Mid-Willamette Beaver Partnership**. July 19-21, 2023.BRAT classroom and field workshop. *
6. **Mid-Willamette Beaver Project.** July 2022, Beaver Restoration Assessment Tool Workshop. Corvallis, OR. **
7. **Utah State University Restoration Consortium.** April 2019, Beaver Translocation Workshop, Logan UT**
8. **North Fork John Day Watershed Council**. October 2019, John Day Beaver Restoration Assessment Tool. John Day, OR. **
9. **Greater Yellowstone Area Working Group**. June 2019, Greater Yellowstone Beaver Restoration Assessment Tool. Alpine, WY. **
10. **Greater Yellowstone Area Working Group**. May 2019, Greater Yellowstone Beaver Restoration Assessment Tool. Bozeman, MT.**
11. **Idaho Department of Fish & Game**. February 2018, Idaho Beaver Restoration Assessment Tool. Boise, ID.*
12. **Powder Basin Watershed Council**. October 2018, Burnt River Beaver Restoration Assessment Tool. Baker City, OR. **
13. **Pheasants Forever & NRCS Sage Grouse Initiative,** September 2018, Partnering with Beaver in Restoration Design. Logan, UT.*
14. **Sage Grouse Initiative, Pheasants Forever & NRS**, September 2016, 'Partnering with Beaver in Restoration Design', Logan, UT. *
15. **Partnering with Beaver in Restoration**, Utah State University. 2015. Intermountain Center for River Rehabilitation and Restoration. *
16. **Partnering with Beaver in Restoration Workshop**, Utah State University. 2012. Intermountain Center for River Rehabilitation and Restoration. *
17. **US Army Corps of Engineers,** May 2012. – 'Geomorphic Change Detection Workshop', Kansas City, MO.*
18. **International Development Enterprise: Rural Prosperity Initiative**, 2008. Provided week long GIS and GPS hands-on training. Kathmandu, Nepal. **
19. **International Development Enterprise: Rural Prosperity Initiative**, 2008 Provided week long GIS and GPS hands-on training. Addis Ababa, Ethiopia. **
20. **International Development Enterprise: Rural Prosperity Initiative,** 2007. Provided week long GIS and GPS hands-on training course. Lusaka, Zambia. **

21. **Western Wildlands Environmental Threats Assessment Center**. Provided 2-day Training Workshop: GMWest System -- A GIS-based Risk Assessment System for Gypsy Moth Introductions. Portland, Oregon. **

Supervisions

Postgraduate Researchers Supervised at USU
1. Chase Gunnell 2023-present
2. Dallin Baker 2023-present
3. Natalie D'Souza 2023-2024
4. Jonas Hattman 2024-present
5. Mary Buford Turnage, 2022-2023, GIS Technician
6. Tansy Remiszewski, Master's Graduate Committee Member 2020-2022
7. Matt Holland, Masters of Natural Resources Committee Member, 2022-2023
8. Ally Smith, 2022-2023, GIS Technician
9. Cashe Rasmussen, 2019-2023, GIS Analyst/Drone Pilot
10. Lauren Herbine, 2020-2023, GIS Technician
11. Shelby Sawyer, 2020-2023, GIS Technician
12. Karen Bartelt, 2018-2020, GIS Technician
13. Matt Meier, 2016-2019, Research Technician, Surveyor and Geospatial Analyst
14. Geoff Stevens, 2016-2018, Research Technician, Surveyor and Geospatial Analyst
15. Gary O'Brien, 2012-2018, Research Associate, Fluvial Geomorphologist
16. Elijah Portugal 2016-2017, Research Associate
17. Scott Shahverdian 2017-present, Research Associate, Fluvial Geomorphologist
18. Sara Bangen, 2013-2019, Research Associate, Habitat Analyst
19. Chalese Hafen, 2015-2020, Senior Cartographer
20. Martha Jensen, 2013-2016, Senior Cartographer
21. Micael Albonico, 2016-2019, GIS Analyst
22. Josh Gilbert, 2015-2018, GIS Analyst/Surveyor
23. Jordan Gilbert, 2015-2018, Computer Programmer
24. Tyler Hatch, 2019-2021, Computer Programmer

Undergraduate Researchers Supervised at USU
1. Jordan Burningham, 2012-2014, GIS Technician
2. Chris Smith, 2013-2014, GIS Technician
3. Taylor Dudunake, 2015-2017, GIS Technician
4. Christopher Brown, 2016, GIS Technician
5. Adan Banda, 2016-2018, GIS Technician
6. Landon Haycock 2017-2018, GIS Technician
7. Michael Hilmes 2017, GIS Technician
8. Braden Anderson, 2017-2019, Computer Programmer
9. Brittany Graham, 2018-2019, Computer Programmer
10. Maggie Hallurud, 2018-2020, Computer Programmer

11. Chad Garlick, 2018-2021, GIS Technician/Drone Pilot
12. Gabe Henry, 2018-2020, GIS Technician
13. Tyler Gibby, 2019-2020, GIS Technician
14. Tyler Hatch, 2019-2021, GIS Technician
15. Brian Ferrerra, 2020, GIS Technician
16. Dylan Baum, 2020, GIS Technician
17. Tanner Nielson, 2021-2022, GIS Technician
18. Paige Sargeant, 2022-Present, GIS Technician (Undergraduate Research Mentor, for Goldwater scholarship)
19. Hunter Lyells 2024-2024, GIS Technician
20. Matthew Gehring 2023-2024, GIS Technician (Faculty Mentor: BIOL 5800 Undergraduate Research)
21. Addison Gallup, 2023 - 2023, GIS Technician
22. Marie Wood, 2024 - present, GIS Technician
23. Alex Fielder, 2025 – present, Jr. GIS Technician

Recent Media

- On KMVT 11 on the role beavers are playing in stream restoration

- In MSN News on beaver reintroduction successes

- On NASA News with Nick Bouwes and Wally Macfarlane on beaver reintroduction

- Featured as "Science Highlight" in 2023 Canyonland Research Center's annual Sundial publication

Recent Service
- Worked with Shoshone Bannock tribe to setup a beaver sign survey