

Curriculum Vitae

College of Engineering
Promotion and Tenure

2018 – 2019 Academic Year Curriculum Vitae Format Approved by COE P&T Committee on January 31, 2018

Section 0

Candidate Name: Troy E. Gilmore

Title: Associate Professor

Unit Name: School of Natural Resources and Biological Systems Engineering Dept.

Office Address: 603 Hardin Hall

Email: gilmore@unl.edu

Phone: 402-470-1741

<https://orcid.org/0000-0001-9939-4780>

Section 1 Education and Employment History

Section 1.1 Education History

University of Nebraska – Omaha, M.S., Data Science, 2023-current, *completion anticipated in 2026*

North Carolina State University, Ph.D., Biological and Agricultural Engineering, 2010-2015

Dissertation Topic: Groundwater transit times and the fate of aquifer nitrate: Observations from sampling in stream channels and well nests in an agricultural watershed, North Carolina, USA.

North Carolina State University, B.S., Civil Engineering, Water Resources Emphasis, 2008-2010, Summa Cum Laude

University of Akron, A.A.S, Mechanical Engineering Technology, 1996-2001

Section 1.2 Employment History:

University of Nebraska, Lincoln, NE

- *Associate Professor of Groundwater Hydrology* (June 2021 – present)
 - School of Natural Resources, Conservation and Survey Div. (70%)
 - Biological Systems Engineering Department (30%)
- *Assistant Professor of Groundwater Hydrology* (October 2015 – May 2021)
 - School of Natural Resources, Conservation and Survey Div. (70%)
 - Biological Systems Engineering Department (30%)

Section 2 Research Accomplishments

• Section 2.1 Publication Record

The following subscripts to indicate UNL students for whom I serve/served as chair or co-chair of their advisory committee and UNL postdoctoral researchers who are/were under my direct supervision.

1: Undergraduate student

2: Masters student

3: Ph.D. student

4: Postdoctoral researcher

Section 2.1.1 Numbered list (in reverse chronological order) of Peer Reviewed Journal Articles

1. Chapman, K. W.³, Gilmore, T. E., Mehrubeoglu, M., Chapman, C. D., Mittelstet, A. R., & Stranzl, J. E.³ (2024). Stage and discharge prediction from documentary time-lapse imagery. *PLOS Water*, 3(4), e0000106. <https://doi.org/10.1371/journal.pwat.0000106> (70%)
2. Gibson, J., Franz, T. E., Gilmore, T., Heeren, D., Gates, J., Thomas, S., & Neale, C. M. U. (2024). Groundwater Recharge Response to Reduced Irrigation Pumping: Checkbook Irrigation and the Water Savings Payment Plan. *Water*, 16(20), 2910. <https://doi.org/10.3390/w16202910> (20%)
3. Humphrey, C. E., Solomon, D. K., Gilmore, T. E., MacNamara, M. R., Genereux, D. P., Mittelstet, A. R., et al. (2024). Spatial Variation in Transit Time Distributions of Groundwater Discharge to a Stream Overlying the Northern High Plains Aquifer, Nebraska, USA. *Water Resources Research*, 60(2), e2022WR034410. <https://doi.org/10.1029/2022WR034410> (30%)
4. Jensen, C. R., Genereux, D. P., Solomon, D. K., Knappe, D. R. U., & Gilmore, T. E. (2024). Forecasting and Hindcasting PFAS Concentrations in Groundwater Discharging to Streams near a PFAS Production Facility. *Environmental Science & Technology*, 58(40), 17926–17936. <https://doi.org/10.1021/acs.est.4c06697> (10%)
5. Jensen, C. R., Genereux, D. P., **Gilmore, T. E.**, & Solomon, D. K. (2023). Modified Tracer Gas Injection for Measuring Stream Gas Exchange Velocity in the Presence of Significant Temperature Variation. *Water Resources Research*, 59(6), e2023WR034495. <https://doi.org/10.1029/2023WR034495> (20%)
6. Santarosa, L. V., Gastmans, D., **Gilmore, T. E.**, Boll, J., Betancur, S. B., & Gonçalves, V. F. M. (2023). Baseflow and water resilience variability in two water management units in southeastern Brazil. *International Journal of River Basin Management*, 21(3), 387–400. <https://doi.org/10.1080/15715124.2021.2002346> (10%)
7. Zeyrek, C.³, Mittelstet, A. R., **Gilmore, T. E.**, Zlotnik, V., Solomon, D.K., Genereux, D. P., et al. (2023). Modeling groundwater transit time distributions and means across a Nebraska watershed: Effects of heterogeneity in the aquifer, riverbed, and recharge parameters. *Journal of Hydrology*, 617, 128891. <https://doi.org/10.1016/j.jhydrol.2022.128891> (30%)

8. Zlotnik, V. A., Solomon, D. K., Genereux, D. P., **Gilmore, T. E.**, Humphrey, C. E., Mittelstet, A. R., & Zlotnik, A. V. (2023). Theory of an Automatic Seepage Meter and Ramifications for Applications. *Water Resources Research*, 59(10), e2023WR034766. <https://doi.org/10.1029/2023WR034766>
9. Kishawi, Y., Mittelstet, A. R., **Gilmore, T. E.**, Twidwell, D., Roy, T., & Shrestha, N. (2023). Impact of Eastern Redcedar encroachment on water resources in the Nebraska Sandhills. *Science of The Total Environment*, 858, 159696. <https://doi.org/10.1016/j.scitotenv.2022.159696> (15%)
10. Cherry, M. L.³, **Gilmore, T. E.**, Messer, T., Li, Y., & Westrop, J. (2022). A Pivotal New Approach to Groundwater Quality Assessment. *ACS ES&T Water*, 2(12), 2297–2304. <https://doi.org/10.1021/acsestwater.2c00121>. (50%)
11. Quaggio, C. S., Gastmans, D., Martins, V. T. de S., & **Gilmore, T. E.** (2022). Combined use of statistical Bayesian model and strontium isotopes deciphering the high complexity groundwater flow in the Guarani Aquifer System (GAS). *Applied Geochemistry*, 146, 105473. <https://doi.org/10.1016/j.apgeochem.2022.105473> (10%)
12. Birgand, F., Chapman, K. ³, Hazra, A., **Gilmore, T.**, Etheridge, R., & Staicu, A.-M. (2022). Field performance of the GaugeCam image-based water level measurement system. *PLOS Water*, 1(7), e0000032. <https://doi.org/10.1371/journal.pwat.0000032> (20%)
13. Chapman, K. W. ³, **Gilmore, T. E.**, Chapman, C. D., Birgand, F., Mittelstet, A. R., Harner, M. J., et al. (2022). Technical Note: Open-Source Software for Water-Level Measurement in Images With a Calibration Target. *Water Resources Research*, 58(8), e2022WR033203. <https://doi.org/10.1029/2022WR033203>
14. Humphrey, C. E., Solomon, D. K., Genereux, D. P., **Gilmore, T. E.**, Mittelstet, A. R., Zlotnik, V. A., Zeyrek³, C., Jensen, C.R., MacNamara, M. R. (2022). Using Automated Seepage Meters to Quantify the Spatial Variability and Net Flux of Groundwater to a Stream. *Water Resources Research*, 58(6), e2021WR030711. <https://doi.org/10.1029/2021WR030711> (20%)
15. CUAHSI Officers and Board of Directors. (2022). COVID-19 Impacts Highlight the Need for Holistic Evaluation of Research in the Hydrologic Sciences. *Water Resources Research*, 58(2), e2021WR030930. <https://doi.org/10.1029/2021WR030930> (5%)
16. Jensen, C. R., Genereux, D. P., **Gilmore, T. E.**, Solomon, D. K., Mittelstet, A. R., Humphrey, C. E., MacNamara, M. R., Zeyrek³, C., Zlotnik, V. A. (2022). Estimating groundwater mean transit time from SF6 in stream water: field example and planning metrics for a reach mass-balance approach. *Hydrogeology Journal*, 30(2), 479–494. <https://doi.org/10.1007/s10040-021-02435-8> (15%)
17. Santarosa, L. V., Gastmans, D., **Gilmore, T. E.**, Boll, J., Betancur, S. B., & Gonçalves, V. F. M. (2022). Baseflow and water resilience variability in two water management units in southeastern Brazil. *International Journal of River Basin Management*, 0(ja), 1–37. <https://doi.org/10.1080/15715124.2021.2002346>
18. Eger, G. Z. S., Silva Junior, G. C., Marques, E. A. G., Leão, B. R. C., da Rocha, D. G. T. B., **Gilmore, T. E.**, et al. (2021). Recharge assessment in the context of expanding agricultural activity: Urucuia Aquifer System, western State of Bahia, Brazil. *Journal of South American Earth Sciences*, 112, 103601. <https://doi.org/10.1016/j.jsames.2021.103601> (10%)
19. **Gilmore, T.E.**, Cherry, M.³, Gastmans, D., Humphrey, E., & Solomon, D. K. (2021). The ³H/³He groundwater age-dating method and applications. *Derbyana*,

42. Retrieved from <https://revistaig.emnuvens.com.br/derbyana/article/view/740> (75%)
20. Pétré, M.-A., Genereux, D. P., Koropecj-Cox, L., Knappe, D. R. U., Duboscq, S., **Gilmore, T. E.**, & Hopkins, Z. R. (2021). Per- and Polyfluoroalkyl Substance (PFAS) Transport from groundwater to streams near a PFAS manufacturing facility in North Carolina, USA. *Environmental Science & Technology*, 55(9), 5848–5856. <https://doi.org/10.1021/acs.est.0c07978> (15%)
21. Shrestha, N., Mittelstet, A. R., **Gilmore, T. E.**, Zlotnik, V., & Neale, C. M. (2021). Effects of drought on groundwater-fed lake areas in the Nebraska Sand Hills. *Journal of Hydrology: Regional Studies*, 36, 100877. <https://doi.org/10.1016/j.ejrh.2021.100877> (15%)
22. Shrestha, N., Mittelstet, A. R., Young, A. R., **Gilmore, T. E.**, Gosselin, D. C., Qi, Y., & Zeyrek, C. (2021). Groundwater level assessment and prediction in the Nebraska Sand Hills using LIDAR-derived lake water level. *Journal of Hydrology*, 600, 126582. <https://doi.org/10.1016/j.jhydrol.2021.126582> (15%)
23. Wells, M.J.₂, **Gilmore, T.E.**, Nelson, N., Mittelstet, A., & Böhlke, J. K. (2021). Determination of vadose zone and saturated zone nitrate lag times using long-term groundwater monitoring data and statistical machine learning. *Hydrology and Earth System Sciences*, 25(2), 811–829. <https://doi.org/10.5194/hess-25-811-2021> (60%)
24. Kambhu A., Li, Y, **Gilmore, T.E.**, Comfort, S. (2021) Modeling the release and spreading of permanganate from aerated oxidant candles in a laboratory flow tank. *Journal of Hazardous Materials*, <https://doi.org/10.1016/j.jhazmat.2020.123719> (5%)
25. Richards, G.₂, **Gilmore, T. E.**, Mittelstet, A. R., Messer, T. L., & Snow, D. D. (2021). Baseflow nitrate dynamics within nested watersheds of an agricultural stream in Nebraska, USA. *Agriculture, Ecosystems & Environment*, 308, 107223. <https://doi.org/10.1016/j.agee.2020.107223> (40%)
26. Abimbola, O.P., A.R. Mittelstet and **T.E. Gilmore**. (2020) Geostatistical features of streambed vertical hydraulic conductivities in Frenchman Creek Watershed. *Hydrological Processes*, <https://doi.org/10.1002/hyp.13823> (20%)
27. Korus, J., Fraundorfer, W., **Gilmore, T.E.**, Karnik, K. (2020) Transient streambed hydraulic conductivity in channel and bar environments, Loup River, Nebraska. *Hydrological Processes*, <https://doi.org/10.1002/hyp.13777> (20%)
28. Solomon, D.K., Humphrey, E., **Gilmore, T.E.**, Genereux, D.P., Zlotnik, V. (2020) An Automated seepage meter for soft-bottom streams and lakes. *Water Resources Research: Technical Reports*, <https://doi.org/10.1029/2019WR026983> (25%)
29. Abimbola, O. P., Mittelstet, A. R., **Gilmore, T. E.**, & Korus, J. T. (2020). Influence of watershed characteristics on streambed hydraulic conductivity across multiple stream orders. *Scientific Reports*, 10(1), 1–10. <https://doi.org/10.1038/s41598-020-60658-3> (20%)
30. Cherry, M.₃, **Gilmore, T.**, Mittelstet, A., Gastmans, D., Santos, V., & Gates, J. B. (2020). Recharge seasonality based on stable isotopes: Nongrowing season bias altered by irrigation in Nebraska. *Hydrological Processes*, 34(7), 1575–1586. <https://doi.org/10.1002/hyp.13683> (60%)
31. **Gilmore, T. E.**, Zlotnik, V., & Johnson, M.₂ (2019). Recognition of Regional Water Table Patterns for Estimating Recharge Rates in Shallow Aquifers.

- Groundwater*, 57(3), 443–454. <https://doi.org/10.1111/gwat.12808> (70%)
32. **Gilmore, T. E.**, Johnson, M.₂, Korus, J., Mittelstet, A., Briggs, M. A., Zlotnik, V., & Corcoran, S.₁ (2019). Streambed Flux Measurement Informed by Distributed Temperature Sensing Leads to a Significantly Different Characterization of Groundwater Discharge. *Water*, 11(11), 2312. <https://doi.org/10.3390/w11112312> (70%)
 33. Kirchheim, R. E., Gastmans, D., Chang, H. K., & **Gilmore, T. E.** (2019). The use of isotopes in evolving groundwater circulation models of regional continental aquifers: The case of the Guarani Aquifer System. *Hydrological Processes*, 33(17), 2266–2278. <https://doi.org/10.1002/hyp.13476> (10%)
 34. Mittelstet, A. R., **Gilmore, T. E.**, Messer, T., Rudnick, D. R., & Heatherly, T. (2019). Evaluation of selected watershed characteristics to identify best management practices to reduce Nebraskan nitrate loads from Nebraska to the Mississippi/Atchafalaya River basin. *Agriculture, Ecosystems & Environment*, 277, 1–10. <https://doi.org/10.1016/j.agee.2019.02.018> (25%)
 35. Wells, M.J.₂, **Gilmore, T.**, Mittelstet, A., Snow, D., Sibray, S., (2018). Assessing Decadal Trends of a Nitrate-Contaminated Shallow Aquifer in Western Nebraska Using Groundwater Isotopes, Age-Dating, and Monitoring. *Water*, 10(8), 1047. <https://doi.org/10.3390/w10081047> (70%)
 36. Korus, J. T., **Gilmore, T. E.**, Waszgis, M. M., & Mittelstet, A. R. (2018). Unit-bar migration and bar-trough deposition: impacts on hydraulic conductivity and grain size heterogeneity in a sandy streambed. *Hydrogeology Journal*, 1–12. <https://doi.org/10.1007/s10040-017-1661-6> (15%)
 37. **Gilmore, T. E.**, Genereux, D. P., Solomon, D. K., Farrell, K. M., & Mitasova, H. (2016). Quantifying an aquifer nitrate budget and future nitrate discharge using field data from streambeds and well nests. *Water Resources Research*, 52(11), 9046–9065. <https://doi.org/10.1002/2016WR018976> (85%)
 38. **Gilmore, T. E.**, D. P. Genereux, D. K. Solomon, and J. E. Solder (2016), Groundwater transit time distribution and mean from streambed sampling in an agricultural coastal plain watershed, North Carolina, USA, *Water Resour. Res.*, 52(3), 2025–2044, [doi:10.1002/2015WR017600](https://doi.org/10.1002/2015WR017600). (80%)
 39. **Gilmore, T. E.**, D. P. Genereux, D. K. Solomon, J. E. Solder, B. A. Kimball, H. Mitasova, and F. Birgand (2016), Quantifying the fate of agricultural nitrogen in an unconfined aquifer: Stream-based observations at three measurement scales, *Water Resour. Res.*, 52(3), 1961–1983, [doi:10.1002/2015WR017599](https://doi.org/10.1002/2015WR017599). (80%)
 40. Heilweil, V. M., D. K. Solomon, T. H. Darrah, **T. E. Gilmore**, and D. P. Genereux (2016), Gas-Tracer Experiment for Evaluating the Fate of Methane in a Coastal Plain Stream: Degassing versus in-Stream Oxidation, *Environ. Sci. Technol.*, 50(19), 10504–10511, [doi:10.1021/acs.est.6b02224](https://doi.org/10.1021/acs.est.6b02224). (10%)
 41. Solomon, D. K., **Gilmore, T. E.**, Solder, J. E., Kimball, B., Genereux, D. P. (2015). Evaluating an unconfined aquifer by analysis of age-dating tracers in stream water. *Water Resources Research*, 8883–8899. [doi:10.1002/2015WR017602](https://doi.org/10.1002/2015WR017602) (15%)
 42. Solder, J. E., **Gilmore, T. E.**, Genereux, D. P., Solomon, D. K. (2015). A Tube Seepage Meter for In Situ Measurement of Seepage Rate and Groundwater Sampling. *Groundwater*, 588-595. [doi: 10.1111/gwat.12388](https://doi.org/10.1111/gwat.12388) (30%)

43. **Gilmore, T.E.**, F. Birgand and K. Chapman. (2013). Source and magnitude of error in an inexpensive image-based water level measurement system. *Journal of Hydrology* 496: 178–186. [doi:10.1016/j.jhydrol.2013.05.011](https://doi.org/10.1016/j.jhydrol.2013.05.011) (80%)

Section 2.1.2 Numbered list (in reverse chronological order) of Peer Reviewed Journal

Publications accepted for publication with or without revision. Note that papers with “re-review required” or equivalent should not appear in this category. The citation should include complete bibliographic citation including author names in order they appear on paper, full journal name, date of submittal, date of acceptance, and % of your contribution. An acceptance letter written on official letterhead of the journal or of the appropriate journal letter must be included in Appendix A.

1. ...

Section 2.1.3 Numbered list (in reverse chronological order) of Peer Reviewed Journal

Publications submitted for review but not yet accepted or accepted with “re-review required” or equivalent. Include the name of journal, author list, date submitted and % of your contribution.

1. ...

Section 2.1.4 Numbered List (in reverse chronological order) of Books and Book Chapters, author list, publisher, year, and % of your contribution.

1. Solomon, D. K., & Gilmore, T. E. (2024). Age dating young groundwater: How to determine groundwater age from environmental tracer data. *The Groundwater Project*. <https://doi.org/10.21083/LIU2727> (40%)

Section 2.1.5 Numbered list (in reverse chronological order) of Conference Proceedings: Peer reviewed extended abstract or peer reviewed paper. Include full conference title, author names in order they appear on paper, dates of conference, location of conference, and page numbers (or number of pages).

1. Chavez-Jimenez, C.M., Salazar-Lopez, L.A., Chapman, K. 3, **Gilmore, T.**, Sanchez-Ante, G. (2023). Feature Analysis and Selection for Water Stream Modeling. In: Rodríguez-González, A.Y., Pérez-Espinosa, H., Martínez-Trinidad, J.F., Carrasco-Ochoa, J.A., Olvera-López, J.A. (eds) *Pattern Recognition. MCPR 2023. Lecture Notes in Computer Science*, vol 13902. Springer, Cham. https://doi-org.libproxy.unl.edu/10.1007/978-3-031-33783-3_1

Section 2.1.6 Numbered list (in reverse chronological order) of Conference Proceedings: Other than peer reviewed. Include full conference title, author names in order they appear on paper, dates of conference, location of conference, and page numbers (or number of pages).

1. Adam, O., A.R. Mittelstet, D.M. Heeren, and **T.E. Gilmore**. 2024. Enhancing water sustainability in North Africa: Literature review and synthesis of current knowledge gaps in Sudan. ASABE Annual International Meeting, Paper No. 2400159, Anaheim, California. (10%)
2. Mittelstet A.R., **T.E. Gilmore** and D.R. Rudnick. 2017. Development of multiple

regression models to predict nitrate concentrations in Nebraska surface waters. ASABE Annual International Meeting, Paper No. 1700294, Spokane, WA. <https://doi.org/10.13031/aim.201700294> (20%)

Section 2.1.7 Numbered list (in reverse chronological order) of Conference Presentations and/or

1. Thapa, P., A.R. Mittelstet, **T.E. Gilmore**, E. Haacker. Modeling of nitrate transport in groundwater of Bazile Creek Watershed using MODFLOW. 2025 Graduate Student Symposium. February 21, 2025. Lincoln, Nebraska.
2. Topo, A.R., A.R. Mittelstet, **T.E. Gilmore**. Identification of best management practices to reduce nitrate concentrations in Bazile Creek Watershed using the SWAT Model. 2025 Graduate Student Symposium. February 21, 2025. Lincoln, Nebraska.
3. Lawal, M., A.R. Mittelstet, **T.E. Gilmore**, A. Daigh. Evaluating the impact of management practices on nitrate leaching using Hydrus-1D. 2025 Graduate Student Symposium. February 21, 2025. Lincoln, Nebraska.
4. **Gilmore, T. E.**, Stranzl, J., Harner, M., Johnson, K., Terry, C., Bajelan, J., Wells, M., Smith, M., Chapman, K. Water Segmentation for Water Level Determination using USGS HIVIS Imagery. Poster presented at the American Geophysical Union Annual Meeting. Washington, D.C. December 2024.
5. Stranzl, J., **Gilmore, T. E.**, Harner, M., Terry, C., Chapman, K., Johnson, K., Richardson, A. D., Bajelan, J., Guggilla, P. GRIME-AI: Open-source Software for Ecohydrological Discovery Using Ground-based Time-lapse Imagery. Poster presented at the American Geophysical Union Annual Meeting, Washington, D.C. December 2024.
6. Harner, M., **T. Gilmore**, K. Johnson, J. Bajelan, K. Chapman, P. Guggilla, M. Smith, J. Stranzl Jr., C. Terry, M. Wells, and K. Wetovick. Applications of Ground-based Cameras for Ecohydrological Monitoring and Student Training at an Outdoor Learning Area. Poster presented at the American Geophysical Union Annual Meeting, Washington, D.C. December 2024.
7. Lawal, M., A.R. Mittelstet, **T. Gilmore**, A.L.M. Daigh. Investigating nitrogen transport and its impact on groundwater quality in east-central Nebraska. 2024 ASA, CSSA, SSSA International Annual Meeting, session 187-10, San Antonio, Texas. November 10-13, 2024. Oral presentation.
8. Harner, M., **T. Gilmore**, H. Akin, M. Lundgren, G. Shoener. Using Time-Lapse Images as a Tool for Research, Education, and Communication. Panel presentation at 28th NSF EPSCoR National Conference. October 2024.
9. Freese, E., M. Harner, M. Lundgren, **T. Gilmore**, M. Forsberg. Leveraging imagery to build community and increase understanding of a watershed. AWRA, UCOWR, NIWR Joint Water Resources Conference. St. Louis, MO. October 2024.
10. Harner, M., **T. Gilmore**, K. Johnson, J. Bajelan, K. Chapman, P. Guggilla, M. Smith, J. Stranzl Jr., C. Terry, M. Wells, and K. Wetovick. Interdisciplinary training opportunities for students enabled by camera networks. AWRA, UCOWR, NIWR Joint Water Resources Conference. St. Louis, MO. October 2024.
11. **T. Gilmore**, J. Stranzl Jr., M. Harner, C. Terry, J. Bajelan, M. Smith, P. Guggilla, K. Chapman, K. Johnson. GRIME-AI: Open-Source Software to Facilitate Ecohydrological Research and Education with Ground-Based Time-Lapse Imagery. AWRA, UCOWR, NIWR Joint Water Resources Conference. St. Louis, MO. October 2024.

12. **Gilmore, T. E.** GRIME-AI: Open-source Software for Ecohydrological Science and Education using Ground-based Time-lapse Imagery (poster). Daugherty Water for Food Global Institute. Lincoln, NE. April 23, 2024.
13. Johnson, K., **T. Gilmore**, and M. Harner. GRIME-AI: Semi-automated image classification software for image-based water level monitoring. USGS National Innovation Center (NIC)/Next Generation Water Observing System (NGWOS) External Research and Development Seminar Series. Virtual Seminar. October 5, 2023.
14. **Gilmore, T.E.**, Harner, M., Stranzl, J., Chapman, K., Birgand, F., Richardson, A., Johnson, K., Bajelan, J., Sánchez Ante, G., Young, S., Motlagh, M., Mittelstet, A., Overcoming challenges when using ground-based time-lapse imagery in ecohydrology, ASABE Annual International Meeting, Omaha, Nebraska, July 10, 2023.
15. Bajelan, J., M. Harner, **T. Gilmore**, G. Folk, K. Chapman, K. Wetovick, J. Sikes, B. Ostrom, K. Geluso, J. Stranzl, J., Jonas-Bratten, M. Wuellner, A. Klein, and C. Wagner. An introduction to the Kearney Outdoor Learning Area for place-based learning and research (Talk). Nebraska Environmental Education Conference. Eugene T. Mahoney State Park, Ashland, Nebraska. February 8, 2023.
16. **T.E. Gilmore***, Stranzl, J., Chapman, K., Harner, M. GRIME-AI Open-Source Ecosystem for Time-lapse Imagery. USGS CDI Script-a-thon, October 11, 2022 (virtual, 50+ attendees)
17. Jensen, C.R., D.P. Genereux, D.R.U. Knappe, D.K. Solomon, **T.E. Gilmore**. Current and future PFAS discharge from groundwater to streams near a fluorochemical manufacturing facility in North Carolina. Presentation at the 3rd National PFAS Meeting, June 15-17, 2022, Wilmington NC.
18. Stranzl, J., **T.E. Gilmore**, M. Harner, and K. Chapman. 2022. GRIME-AI software for incorporating information from ground-based camera imagery with other sensor data (talk). Joint Aquatic Sciences Meeting, Grand Rapids, Michigan. May 2022. Oral Presentation.
<https://www.xcdsystem.com/afs/program/RiVp8Is/index.cfm?pgid=205>
19. Humphrey, E.C., Solomon, D.K., Genereux, D.P., **Gilmore, T.E.**, Mittelstet, A.R., Zlotnik, V.A., Zeyrek, C., Jensen, C.R., MacNamara, M.R. Spatial variability and estimation of groundwater flux from local discharge measurements. GSA Annual Meeting, Portland, OR. October 13, 2021. Oral Presentation.
<https://gsa.confex.com/gsa/2021AM/meetingapp.cgi/Paper/366988>
20. Chapman, K., **T.E. Gilmore**, C.D. Chapman, M. Mehrubeoglu, and A.R. Mittelstet. Application of time-lapse imagery and machine learning to improve stream discharge monitoring. AGU Fall Meeting, Virtual. December 1-17, 2020. Poster presentation.
<https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/714982>
21. Duboscq, S., D.P. Genereux, **T.E. Gilmore**, M.A. Pétré¹, D.K. Solomon, D. R. U. Knappe, Z.R. Hopkins and N.J. DeStefano. ³H/³He groundwater ages and discharge of PFAS from groundwater to a coastal plain stream in North Carolina. AGU Fall Meeting, Virtual. December 1-17, 2020. Oral presentation.
<https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/672542>
22. Zeyrek, C., **T.E. Gilmore**, A.R. Mittelstet, V.A. Zlotnik, D.K. Solomon, D.P. Genereux, E. Humphrey, M.R. MacNamara, and C.R. Jensen. A model-based study of the effects of spatial recharge patterns on groundwater transit time distributions in the Nebraska Sandhills. AGU Fall Meeting, Virtual. December 1-

- 17, 2020. Oral presentation.
<https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/682502>
23. Jensen, C.R., D.P. Genereux, **T.E. Gilmore**, D.K. Solomon, A.R. Mittelstet, E. Humphrey, M.R. MacNamara, C. Zeyrek₃, and V.A. Zlotnik. Estimating groundwater age in the Nebraska Sand Hills from SF₆ in stream water: An application of the reach mass-balance approach to groundwater mean transit time. AGU Fall Meeting, Virtual. December 1-17, 2020. Poster presentation.
<https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/674734>
 24. MacNamara, M., D.P. Genereux, **T.E. Gilmore**, D.K. Solomon, A.R. Mittelstet, E. Humphrey, C.R. Jensen, C. Zeyrek₃, and V.A. Zlotnik. Groundwater ¹⁴C Age at the point of discharge in a groundwater dominated stream: Sampling below the streambed in nested watershed sin the Nebraska Sand Hills (USA). AGU Fall Meeting, Virtual. December 1-17, 2020. Poster presentation.
<https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/675554>
 25. Humphrey, E., D.K. Solomon, **T.E. Gilmore**, A.R. Mittelstet, V.A. Zlotnik, D.P. Genereux, C. Zeyrek₃, M.R. MacNamara, and C.R. Jensen. Using empirical transit time distributions to forecast stream water tracer concentrations. AGU Fall Meeting, Virtual. December 1-17, 2020. Poster presentation.
<https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/666576>
 26. Zlotnik, V. A., Solomon, D. K., **Gilmore, T. E.**, Genereux, D. P., and Humphrey, C. E.: 2020. Dynamic Seepage Meter: Theory with Application Examples, EGU General Assembly 2020, Online, 4–8 May 2020, <https://doi.org/10.5194/egusphere-egu2020-3718>
 27. Cherry, M.₃, **T.E. Gilmore**, A.R. Mittelstet, D. Gastmans, J.B. Gates and V. Santos. 2019. Recharge seasonality based on stable isotopes: Nongrowing season bias altered by irrigation in Nebraska. AGU Fall Meeting. San Francisco, CA. December 9-13. Poster presentation.
 28. Shrestha, N., A.R. Mittelstet, O. Abimbola, V.A. Zlotnik, C. Neale and **T.E. Gilmore**. 2019. Exploring the correlation between drought and lake area of groundwater-fed lakes in the western Sandhills. AGU Fall Meeting. San Francisco, CA. December 9-13. Poster presentation.
 29. Brennwald, M.S., A. Lighfoot, W. Mace, D. Genereux, **T.E. Gilmore**, A. Mittelstet, R. Kipfer and D.K. Solomon. 2019. Continuous analysis of dissolved noble gas concentrations to estimate air/water gas exchange rates in streams and other surface waters. Developments in Noble Gas Understanding and Expertise. Zurich, Switzerland. August 15-17, 2019. Oral presentation.
 30. **Gilmore, T.E.**, Cherry, M.₃, Mittelstet, R., Gastmans, D., Gates, J. 2019. Recharge Seasonality Based on Stable Isotopes. ASABE Annual International Meeting, Boston, MA. July 7-10, 2019.
 31. Cherry, M.₃, **T.E. Gilmore**, A. Mittelstet, D. Gastmans, J. Gates, 2019. Isotopic Composition of groundwater and precipitation in Nebraska, USA, Water For Food Global Institute Global Conference, Lincoln, NE, April 2019
 32. Cherry, M.₃, **Gilmore, T.E.**, Mittelstet, A.R., Gastmans, D., and J. Gates. 2018. Isotopic composition of groundwater and precipitation in Nebraska, USA, XX Congresso Brasileiro de Águas Subterraneas, Campinas, SP, Brazil. November 7, 2018.
 33. Cherry, M.₃, **Gilmore, T.E.**, Mittelstet, A.R., Gastmans, D., and J. Gates. 2018. Isotopic composition of groundwater and precipitation in Nebraska, USA, 2018 NIWR Regional Symposium, Lincoln, NE. Oct 24-26, 2018.

34. Richards, G.I.₂, **Gilmore, T.E.**, and A.R. Mittelstet. 2018. Survey of groundwater transit times and nitrate delivery to Bazile Creek, 2018 NIWR Regional Symposium, Lincoln, NE. Oct 24-26, 2018.
35. Abimbola, O., A.R. Mittelstet, **T.E. Gilmore** and J. Korus. 2018. Spatial variability of streambed hydraulic conductivity across multiple stream orders. ASABE Annual International Meeting, Detroit, MI. July 29-August 1, 2018.
36. Abimbola, O., A.R. Mittelstet, **T.E. Gilmore** and J. Korus. 2018. Geostatistical features of streambed vertical hydraulic conductivity in the Frenchman Creek watershed in Western Nebraska. ASABE Annual International Meeting, Detroit, MI. July 29-August 1, 2018.
37. Wells, M.₂, **T.E. Gilmore**, N. Nelson, A.R. Mittelstet, D. Snow and S. Sibray. 2018. Utilizing $^3\text{H}/^3\text{He}$ age-dating tracers to model and evaluate influence of water resources management on groundwater quality, Dutch Flats, NE. ASABE Annual International Meeting. Detroit, MI, July 29-August 1, 2018.
38. **Gilmore, T.E.**, L. Pennisi, D. Martin, J. Korus, E. Ingram. 2018. Watershed Science Training: Perspectives and needs of locally-elected water resources managers. University Council on Water Resources Annual Water Resources Conference, Pittsburgh, PA. June 26, 2018.
39. **Gilmore, T.E.**, Zlotnik, V., Johnson, M. 2017. Increasing the utility of regional water table maps: a new method for estimating groundwater recharge. Poster presented at the American Geophysical Union Fall Meeting, New Orleans, LA, December 15, 2017.
40. A.R. Mittelstet, T.E. Gilmore. 2017. IANR-UNESP-Brazil Collaboration, Department of Biological Systems Engineering Colloquium Series, Lincoln, NE. November 15, 2017.
41. Wells, M.J.₂, **T.E. Gilmore**, S.S. Sibray, D.D. Snow, N.G. Nelson. 2017. Evaluating influence of water resources management and environmental factors on groundwater quantity and quality, Dutch Flats, NE. Poster presentation Nebraska Water Center Symposium, Lincoln, NE. October 26-27, 2017.
42. Johnson, M.J.₂, **T.E. Gilmore**, M. Briggs, and S. Corcoran₁. 2017. Comparison of informed and uninformed sampling using heat as a preliminary indicator of focused groundwater discharge. Poster presentation at Geological Society of America Annual Meeting, Seattle, WA. October 22-25, 2017.
43. Wells, M.J.₂, **T.E. Gilmore**, S.S. Sibray, D.D. Snow. 2017. Examining spatial and temporal patterns in groundwater as water resources management evolves: North Platte Natural Resources District, Nebraska. Oral presentation at American Society of Agricultural and Biological Engineers Annual International Meeting, Spokane, WA. July 16-19, 2017.
44. **Gilmore, T.E.**, J. Korus, L. Pennisi, D. Martin. 2017. Needs Assessment: Delivery of watershed science to locally-elected water resources managers. University Council on Water Resources Annual Water Resources Conference, Fort Collins, CO. June 14, 2017.
45. Wells, M.J.₂, **T.E. Gilmore**, S.S. Sibray, D.D. Snow. 2017. Examining spatial and temporal patterns of nitrate in groundwater as irrigation practice evolves. Poster presentation at Water for Food Global Conference, Lincoln, NE. April 10-12, 2017.
46. Rhoades, M.G., Howard, LM, Steele, CE, Shea, PJ, Beseler, CL, Raikes, HH, Wallman, JJ, Eskridge, KM, Mez,a JL, New-Aaron, MO, VanWormer, E,

- Barnes-Josiah, D, **Gilmore, T.E.**, Rosenquist, TH, Spalding, RF. 2017. Risk of Adverse Birth Outcomes associated with wells testing positive for nitrate and nitrosatable agrichemical compounds in Nebraska: An ecological study. Poster presentation at the National Council for Science and the Environment 17th National Conference and Global Forum on Science, Policy and the Environment. Arlington, VA. January 24-26, 2017.
47. **Johnson, J.¹, T.E. Gilmore.** 2016. Mapping groundwater surface water interactions, Poster presentation at Nebraska Summer Research Symposium, Lincoln, NE. August 10, 2016.
 48. **Gilmore, T.E.**, C. Hobza, D. Hallum, J. Johnson¹. 2016. Going Live: web-based mapping of groundwater-surface water interactions in an irrigated landscape. Poster presentation at American Society of Biological and Agricultural Engineers Annual International Meeting, Orlando, FL. July 17-20, 2016.
 49. **Gilmore, T.E.**, Hobza, C., Hallum, D. 2016. Groundwater-surface water connectivity: real-time monitoring for a dynamic system. Water for Food Institute Global Conference, Lincoln, NE. April 24-26, 2016.
 50. **Gilmore, T.E.**, D.P. Genereux, D.K. Solomon, H. Mitasova, M. Burnette. 2016. Sampling wells versus sampling in streambeds: Observing and Predicting the Effects of a Groundwater Nitrate Legacy. Poster presented at the Nebraska Association of Natural Resources Districts Annual Legislative Conference, Lincoln, NE. January 25-27, 2016.

Section 2.1.8 Numbered list (in reverse chronological order) of Invited talks or Keynote Speeches. Indicate title of presentation, location, sponsor, and date.

1. **Gilmore, T.E.**, J. Westrop, M. Cherry. Center Pivot Irrigation Systems as Subsurface Redox Indicators. (invited talk). 2024 American Chemical Society Midwest Regional Meeting, Omaha, NE. October 14, 2024.
2. **Gilmore, T. E.**, M. Harner, J. Stranzl³, J. Bajelan, C. Terry, K. Chapman, P. Guggilla², M. Smith, M. Wells, A. Mittelstet. GRIME-AI: Open-source Software for Ecohydrological Science and Education using Ground-based Time-lapse Imagery (invited talk). Water Observing Technology Forum. Tuscaloosa, AL. April 23, 2024.
3. **T.E. Gilmore***. Groundwater in Nebraska: A Tracer Tour. University of Texas – Arlington Department of Earth and Environmental Science Seminar Series, October 14, 2022, Arlington, TX.
4. **Gilmore, T. E.**, Johnson, M.², Korus, J., Mittelstet, A., Briggs, M. A., Zlotnik, V., & Corcoran, S.¹ Comparison of groundwater discharge estimates with and without guidance from FO-DTS. AGU Fall Meeting – FO-DTS Workshop, Virtual. December 11, 2021. Oral (virtual) presentation.
5. **Gilmore, T.E.**, Chapman, K., Stranzl, J., and Harner, M. Discussions on camera-based monitoring applications and data processing. United States Geological Survey Next Generation Water Observation System Sub-Program Managers and Scientists, December 7, 2021 (virtual).
6. **Gilmore, T.E.**, Harner, M., Stranzl, J., and Chapman, K. Advancing interdisciplinary watershed research with ground-based cameras and dedicated software. National Ecological Observatory Network Science Seminars, November 9, 2021 (virtual).

7. **Gilmore, T.E.**, Johnson, M.², Korus, J., Mittelstet, A., Briggs, M. A., Zlotnik, V., & Corcoran, S.¹ Comparison of groundwater discharge estimates with and without guidance from FO-DTS. AGU Fall Meeting – FO-DTS Workshop, Virtual. December 2, 2020. Oral presentation.
<https://agu.confex.com/agu/fm20/meetingapp.cgi/Session/101675>
8. **Gilmore, T.E.**, M. J. Wells², N. Nelson, A.R. Mittelstet, J.K. Bohlke and D.D. Snow, 2018. Decadal changes in groundwater recharge and nitrate concentrations in a shallow aquifer under changing agricultural practices: application of repeat sampling and machine learning approaches. Invited presentation at the American Geophysical Union Fall Meeting, Washington, D.C., December 13, 2018.
9. **Gilmore, T.E.** 2018. Age-dating young groundwater (presentation and panel discussion), XX Congresso Brasileiro de Águas Subterraneas, Campinas, SP, Brazil. November 7, 2018.
10. **Gilmore, T.E.** 2017. Groundwater: Age and Nitrate Sources. Nebraska Water Center Symposium, Lincoln, NE. October 26-27, 2017.
11. **Gilmore, T.E.** and A.R. Mittelstet. 2017. Groundwater in Nebraska, Presentation to Geological Survey of Brazil (CPRM) Novo Horizonte, SP, Brazil. October 2, 2017.
12. **Gilmore, T.E.** 2017. Groundwater-Surface Water Interaction in Agricultural Landscapes, Universidade Estadual Paulista de Rio Claro, Brazil. September 29, 2017.
13. **Gilmore, T.E.**, Wells, M.², Snow D., Sibray, S. 2017. Groundwater system response to water resources management in North Platte NRD. Nebraska Water Center Faculty Retreat and Daugherty Water for Food Global Institute Faculty Dialogue. Lincoln, NE. September 19, 2017.
14. **Gilmore, T.E.** 2017. Water Resources Management in Nebraska, Presentation to Chinese Delegation from USDA Foreign Agricultural Service 2017 U.S. - China Scientific Cooperation Exchange Program (SCEP). Lincoln, NE. August 7, 2017.
15. **Gilmore, T.E.** 2017. Groundwater Hydrology. Daugherty Water for Food Global Institute's Visiting Delegation from Bahia, Brazil, Lincoln, NE. April 6, 2017.
16. **Gilmore, T.E.** 2017. Assessment of aquifer nitrate from sampling in streambeds, Nebraska Department of Environmental Quality, Lincoln, NE. March 7, 2017.
17. **Gilmore, T.E.** 2016. Aquifer Nitrate: perspectives from streambed sampling. Nebraska Groundwater Monitoring Advisory Council and Nebraska Surface Water Monitoring Advisory Council Joint Meeting, Lincoln, NE. October 27, 2016.
18. **Gilmore, T.E.**, 2016. Environmental tracers in groundwater: applications for Nebraska, Invited oral presentation at the Nebraska Association of Resource Districts Annual Conference, Kearney, NE. September 26-27, 2016.
19. **Solomon, D.K.**, **T.E. Gilmore**, D.P. Genereux, J. Georgek, V.M. Heilweil, J.E. Solder. 2016. Characterizing unconfined aquifers using seep- and stream-based measurements of groundwater age. Invited oral presentation at Geological Society of American Annual Conference, Denver, CO. September 25-28, 2016.

Section 2.1.9 Numbered list (in reverse chronological order) of Other Publications

1. **Gilmore, T. E.** (2025). Kearney Outdoor Learning Area (KOLA) Water Levels from Sensor, Staff Gauge, and GRIME2 Image-based Water Level Software, HydroShare, <http://www.hydroshare.org/resource/a152931d41c44de2935cc02ced44a5c2>
2. **Gilmore, T. E.** (2025). Kearney Outdoor Learning Area (KOLA) Noon and Midnight Imagery for Water Level Analysis in GRIME2 Software, HydroShare, <http://www.hydroshare.org/resource/f04d7a7260d6482e86b195c19eb8853c>
3. **Gilmore, T. E.** (2025). Kearney Outdoor Learning Area (KOLA) Calibration Files for Image-based Water Level Analysis in GRIME2 Software, HydroShare, <http://www.hydroshare.org/resource/c800d02aadba446486b63ace27223b31>
4. **Gilmore, T. E.** (2025). Kearney Outdoor Learning Area (KOLA) Overlay Results Images from Water Level Analysis in GRIME2 Software (Noon and Midnight only), HydroShare, <http://www.hydroshare.org/resource/1ea43e4f535f4a77a9aefb78e338422f>
5. **Gilmore, T. E., M. J. Harner, C. Terry, J. Bajelan, K. W. Chapman** (2025). Kearney Outdoor Learning Area (KOLA) Data, HydroShare, <http://www.hydroshare.org/resource/aa3daa303523441b94a5ae93570acf76>
6. **Gilmore, T.E., J.E. Stranzl, Jr.3, M.J. Harner, K. Johnson, C. Terry, M. Wells, M. Smith, D. Kosmicki, J. Bajelan, J. Uddin, and P. Guggilla.** 2025. GRIME AI Water Segmentation Model for the USGS Lake Serene at Edgewood Camera Monitoring Site, MD, 2022-2024 ver 2. Environmental Data Initiative. <https://doi.org/10.6073/pasta/9bada1c7b4787668da570c24a566d464> (Accessed 2025-09-25).
7. **Gilmore, T.E., J.E. Stranzl, Jr. 3, M.J. Harner, K. Johnson, C. Terry, M. Wells, M. Smith, D. Kosmicki, J. Bajelan, J. Uddin, and P. Guggilla.** 2025. GRIME AI Water Segmentation Model for the USGS Platte River near Grand Island, NE, 2023-2024 ver 1. Environmental Data Initiative. <https://doi.org/10.6073/pasta/5ee563fa168a79cba0fabb606a111d53> (Accessed 2025-09-23).
8. **Gilmore, T.E., J.E. Stranzl, Jr. 3, M.J. Harner, K. Johnson, C. Terry, M. Wells, M. Smith, D. Kosmicki, J. Bajelan, J. Uddin, and P. Guggilla.** 2025. GRIME AI Water Segmentation Model for the USGS Monitoring Site Discovery Farms Waterway AO1 Near Antigo, WI, 2023-2024 ver 1. Environmental Data Initiative. <https://doi.org/10.6073/pasta/390888a5c8cf25ef4da4d789c7896f85> (Accessed 2025-09-23).
9. **Gilmore, T.E., J.E. Stranzl, Jr. 3, M.J. Harner, K. Johnson, C. Terry, M. Wells, M. Smith, D. Kosmicki, J. Bajelan, J. Uddin, and P. Guggilla.** 2025. GRIME AI Water Segmentation Model for the USGS Monitoring Site Beggars Bridge Creek Near Dawley Corners, VA, 2023-2024 ver 1. Environmental Data Initiative. <https://doi.org/10.6073/pasta/a1955ca4e90fd348d2dfac471ed7316f> (Accessed 2025-09-24).
10. **Gilmore, T.E., J.E. Stranzl, Jr. 3, M.J. Harner, K. Johnson, C. Terry, M. Wells, M. Smith, D. Kosmicki, J. Bajelan, J. Uddin, and P. Guggilla.** 2025. GRIME AI Water Segmentation Model for the USGS Monitoring Site Chippewa River at Grand Ave at Eau Claire, WI, 2023-2024 ver 1. Environmental Data Initiative. <https://doi.org/10.6073/pasta/c2fd2726db4b592b80a6443e13b1561a> (Accessed 2025-09-24).
11. **Gilmore, T.E., J.E. Stranzl, Jr. 3, M.J. Harner, K. Johnson, C. Terry, M. Wells, M. Smith, D. Kosmicki, J. Bajelan, J. Uddin, and P. Guggilla.** 2025. GRIME AI Water Segmentation Model

- for the USGS Monitoring Site East Branch Brandywine Creek below Downingtown, PA, 2023-2024 ver 1. Environmental Data Initiative. <https://doi.org/10.6073/pasta/23719fc153c42199cba32fafcd010ed8> (Accessed 2025-09-24).
12. **Gilmore, T.E.**, J.E. Stranzl, Jr. 3, M.J. Harner, K. Johnson, C. Terry, M. Wells, M. Smith, D. Kosmicki, J. Bajelan, J. Uddin, and P. Guggilla. 2025. GRIME AI Water Segmentation Model for the USGS Monitoring Site at East River at County Trunk HWY ZZ near Greenleaf, WI, 2023-2024 ver 1. Environmental Data Initiative. <https://doi.org/10.6073/pasta/a392605d48242c61953185d22c7c0e74> (Accessed 2025-09-24).
 13. **Gilmore, T.E.**, J.E. Stranzl, Jr. 3, M.J. Harner, K. Johnson, C. Terry, M. Wells, M. Smith, D. Kosmicki, J. Bajelan, J. Uddin, and P. Guggilla. 2025. GRIME AI Water Segmentation Model for the USGS Monitoring Site at Missouri River at Hermann, MO, 2022-2024 ver 1. Environmental Data Initiative. <https://doi.org/10.6073/pasta/9c70635890e5b79502a622113b84426a> (Accessed 2025-09-24).
 14. **Gilmore, T.E.**, J.E. Stranzl, Jr. 3, M.J. Harner, K. Johnson, C. Terry, M. Wells, M. Smith, D. Kosmicki, J. Bajelan, J. Uddin, and P. Guggilla. 2025. GRIME AI Water Segmentation Model for the USGS Monitoring Site at Rio Grande below Elephant Butte Dam, NM, 2023-2024 ver 1. Environmental Data Initiative. <https://doi.org/10.6073/pasta/20633fc43e0c894f5df463286353ebbb> (Accessed 2025-09-24).
 15. **Gilmore, T.E.**, J.E. Stranzl, Jr. 3, M.J. Harner, K. Johnson, C. Terry, M. Wells, M. Smith, D. Kosmicki, J. Bajelan, J. Uddin, and P. Guggilla. 2025. GRIME AI Water Segmentation Model for the USGS Monitoring Site at Kearney Outdoor Learning Area, NE, 2024-2024 ver 1. Environmental Data Initiative. <https://doi.org/10.6073/pasta/453d2f956466467f3e870259de21e882> (Accessed 2025-09-24).
 16. **Gilmore, T.E.**, J.E. Stranzl, Jr. 3, M.J. Harner, K. Johnson, C. Terry, M. Wells, M. Smith, D. Kosmicki, J. Bajelan, J. Uddin, and P. Guggilla. 2025. GRIME AI Water Segmentation Model for the USGS Monitoring Site at Pecos River near Acme, NM, 2022-2024 ver 1. Environmental Data Initiative. <https://doi.org/10.6073/pasta/9851734435fc3dc104ee136dfcb29a05> (Accessed 2025-09-24).

- **Section 2.2 Research Funding Record**

In Appendix B, a copy of the project summary page from NUGrant and a copy of the award notification with SAP WBS Account Number are included for funded grants. Documentation is provided in the same order as listed in Sections 2.2.1, 2.2.2 and 2.2.3.

Section 2.2.1 Numbered list (in reverse chronological order) of Internally Funded Research Grants. Include the title of the project, funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to you (as listed in NUGrant), SAP WBS Account Number.

<i>Project Title</i>	<i>Sponsor</i>	<i>Role (PI or Co-PI)</i>	<i>Dates</i>	<i>Total Amount (no UNL cost share)</i>	<i>% Attributed to Candidate (no UNL cost share)</i>
Pilot and Assessment of Cyberinfrastructure for Image-based Environmental Monitoring and Education	NRI/Collaboration Initiative	Co-PI	July 2023 – June 2025	\$150,000	25
Nitrate transport in playa wetlands and their substratum soils of the Rainwater Basin	NRI/Collaboration Initiative	Co-PI	July 1, 2023 – June 30, 2025	\$64,385	10
Extending USDA-requested Passive Sampling for Stream Water Age in Bazile Creek Watershed	ARD Strategic	PI	November 21, 2022 – December 31, 2023	\$14,000	100
LTAR Research: Extending USDA-requested Passive Sampling for Stream Water Age in Bazile Creek Watershed	ARD/LTAR	PI	November 21, 2022 – December 31, 2023	\$10,000	30
Increasing the applicability of image-based water level measurement techniques	Research Council Grants-in-Aid (John C. and Nettie V. David Memorial Trust Fund)	PI	Jan 2022 – Dec 2022	\$10,000	80
LTAR Research: Testing a Novel Groundwater Age-dating Technique in the Bazile Creek watershed	ARD	Co-PI	November 2019 – October 2022 (extended to 2022 due to COVID)	\$33,648	30

Influence of recharge patterns on the sustenance of groundwater-fed streams Year 1 and Year 2	Daugherty Water for Food Global Institute	PI	July 1, 2019 – June 30, 2022	\$52,500 (3 years at \$17,500/year)	100
Managing Water Resources at the U.S. Meat Animal Research Center	ARD & US MARC Research Collaborations	Co-PI	July 2017 – December 2019	\$83,612	20
Streambed water flux dynamics at coupled groundwater-surface water monitoring stations Year 2	Daugherty Water for Food Global Institute	PI	July 1, 2017 – June 30, 2018	\$16,000	100
Risk of Adverse Birth Outcomes Associated with Maternal Exposure to Nitrate and Nitrosatable Compounds in Drinking Water	Food For Health Initiative	Co-PI	July 2017 – June 2019	\$149,964	15
Application of isotopic tracers to determine water residence times in multi-scale water management	IANR-FAPESP-SPRINT	PI	April 2017 – March 2019	\$19,983	50
Assessing the long-term water savings of reduced irrigation pumping in western Nebraska	Research Council Grants-In-Aid	Co-PI	(January 2017 – December 2017)	\$10,000	30
Streambed water flux dynamics at coupled groundwater-surface water monitoring stations Year 1	Daugherty Water for Food Global Institute	PI	July 1, 2016 – June 30, 2017	\$16,000	100

1. Pilot and Assessment of Cyberinfrastructure for Image-based Environmental Monitoring and Education (July 2023 – June 2025)

Sponsor: NRI/Collaboration Initiative

PI: H. Akin

Co-PI: T. Gilmore, M. Harner

Total Amount: \$150,000

SAP WBS Account Number: 25-6238-0915-002

The primary purpose of this proposed two-year project is to support an

extramural grant application, specifically to address reviewers comments and make an NSF Geoinformatics grant resubmission more competitive. The research team from UNL and UNK includes faculty members, graduate students, and early-career professionals whose disciplinary expertise spans engineering, computer science, ecosystem ecology, science and data literacy, social science, and digital storytelling. The teams long-term objective is to enable scientific discovery, science communication, and student training using imagery from ground-based camera networks. Existing camera networks in North America include Platte Basin Timelapse (based at UNL), PhenoCam, and USGS HIVIS projects. Collectively these networks have amassed archives of millions of images that contain ecohydrological data, convey system change, and provide captivating visuals. The resulting imagery, graphics, and data have the potential to work together to communicate complex ecological and scientific topics in compelling ways for multiple types of users and audiences. However, the science communication and science education capacity of sharing content created from ground-based camera systems is not well understood. The specific aims for this collaborative project are to 1) evaluate how to broaden science engagement using environmental imagery and data and 2) develop and pilot a cyberinfrastructure reference project for camera-based environmental sensing and outreach. Activities will focus on imagery and other field data from the Kearney Outdoor Learning Area (KOLA), a site adjacent to Kearney High School near the Platte River. Outcomes of the project will generate preliminary social science research and a cyberinfrastructure reference project (i.e., an example project to demonstrate feasibility of a larger, longer-term project) that support Intellectual Merit, Broader Impacts, and broader participation objectives, and enhance development of our collaborative research team and experiential learning and training opportunities for students and early-career professionals in place-based research enabled by ground-based cameras and supporting cyberinfrastructure.

2. Nitrate transport in playa wetlands and their substratum soils of the Rainwater Basin and the implications for groundwater aquifer contamination (July 2023 – June 2025)

Sponsor: NRI/Collaboration Initiative

PI: J. Hribljan

Co-PI: T. Gilmore (10%), K. Deuerling, P. Ayayee

Total Amount: \$64,385

SAP WBS Account Number: 21-6238-6013

Our overarching goal is to understand what portion of nitrate runoff from agricultural land can be processed by playa wetlands and how much is transferred to the underlying groundwater aquifer. Drs. Hribljan and Ayayee have received a three-year (2023-2026) USGS 104G grant that will focus on measuring current nitrate loading into playas and the effect it has on playa function. Our funding request through this UN collaborative grant will support the second component of our long-term objective, examining the movement of nitrate from the playas to the aquifer.

3. Extending USDA-requested Passive Sampling for Stream Water Age in Bazile Creek Watershed (November 2022 – December 2023)

Sponsor: ARD Strategic

PI: T. Gilmore (100%)

Total Amount: \$14,000

SAP WBS Account Number: 25-6238-0915-002

This award, which was packaged with the \$10,000 LTAR funds, extends our collaboration with USDA to test a new groundwater/surface water sampling technique for age dating. The new technique is based on pesticide degradates with limited years of manufacture, which allows for assessment of the approximate era that groundwater was recharged. The new method will be compared to established groundwater age-dating techniques.

4. LTAR Research: Extending USDA-requested Passive Sampling for Stream Water Age in Bazile Creek Watershed (November 2022 – December 2023)

Sponsor: ARD

PI: T. Gilmore (100%)

Total Amount: \$10,000

SAP WBS Account Number: 25-6238-0915-002

This award, which was packaged with the \$14,000 ARD Misc Strategic grant, extends our collaboration with USDA to test a new groundwater/surface water sampling technique for age dating. The new technique is based on pesticide degradates with limited years of manufacture, which allows for assessment of the approximate era that groundwater was recharged. The new method will be compared to established groundwater age-dating techniques.

5. Increasing the applicability of image-based water level measurement techniques (January 2022 – December 2022)

Sponsor: Research Council Grants-in-Aid (John C. and Nettie V. David Memorial Trust Fund)

PI: T.E. Gilmore (80%)

Co-I: A. Mittelstet (20%)

Total Amount: \$10,000

SAP WBS Account Number: 26-6238-9001-019

Imagery of watershed scenes provides intuitive information about environmental change and human interaction with water resources. This type of information is crucial for understanding the resilience of human-impacted ecosystems and for water and food security. The visual nature of ground-based imagery makes it useful for science communication and education that supports greater science literacy around ecosystems and watersheds. Ground-based time-lapse imagery offers a more intimate view than aerial or satellite imagery that is routinely used to observe and quantify environmental change (i.e., remote sensing). The frequency and intimacy of ground-based imagery also allows observation of ephemeral environmental processes (e.g., intermittent streams) at spatial and temporal scales not easily observed by remote sensing. However, there is no robust cyberinfrastructure for routine extraction of environmental or hydrological

information from land-based time-lapse imagery. This project expands on the capabilities of existing open-source software to allow routine extraction of hydrological data from imagery, including images available from the National Ecological Observatory Network (NEON) and camera-equipped United States Geological Survey (USGS) stream gauges. We will build on prior open-source image-based water level measurement software (see <https://gaugecam.org>) now being used in industry (Idaho Power) and academia (e.g., University of Kansas). The new capabilities will accommodate the use of a wider range of image scenes for water-level measurement and provide guidance for future camera installation for hydrologic studies. The requested funding will support the PhD student developing the new software features as we continue submitting proposals to the National Science Foundation (NSF).

6. LTAR Research: Testing a Novel Groundwater Age-dating Technique in the Bazile Creek watershed (November 2019 – October 2020)

Sponsor: ARD

PI: T. Messer (50%)

Co-PI: T.E. Gilmore (30%), A. Mittelstet (20%)

Total Amount: \$33,648

SAP WBS Account Number: 25-6238-0915-002

This study is a collaboration with USDA to test a new groundwater/surface water sampling technique for age dating. The new technique is based on pesticide degradates with limited years of manufacture, which allows for assessment of the approximate era that groundwater was recharged. The new method will be compared to established groundwater age-dating techniques.

7. Influence of recharge patterns on the sustenance of groundwater-fed streams Year 1 (July 1, 2019 – June 30, 2021)

Sponsor: Daugherty Water for Food Global Institute

PI: T.E. Gilmore (100%)

Total Amount: \$35,000 (2 years at \$17,500/year)

SAP WBS Account Number: 26-6811-0001-173

Sandhills streams are critical for agriculture in Nebraska, starting in the headwaters where drainages flow from sub-irrigated hay meadows and meander through rangeland, to larger river channels that are diverted for irrigation before flowing to and sustaining the Platte River during drought years. Thus, the project is focused on a key source of water for the ecosystem, row-crop agriculture and for drinking water for downstream users such as Lincoln and Omaha. Furthermore, this research addresses fundamental questions regarding how to improve groundwater modeling to better predict the timescales over which groundwater contaminants will be flushed from aquifers to streams. These results will be directly applicable to many other areas in Nebraska where groundwater is contaminated by nitrate and pesticides, and stream water quality and ecosystems are threatened by the long-term discharge of legacy nutrients. Improved understanding of system lag times is critical for communicating with regulators and agricultural producers regarding (1) how long it may take for current actions, such as the implementation of best management practices, to improve water quality, and

(2) the importance of patience and persistence in improving current management practices to avoid long-term storage of excess N in the subsurface.

8. Managing Water Resources at the U.S. Meat Animal Research Center (July 2017 – December 2019)

Sponsor: ARD & US MARC Research Collaborations

PI: A. Mittelstet (50%)

Co-PI: T. Messer (30%), T.E. Gilmore (20%)

Total Amount: \$83,612

SAP WBS Account Number: 25-6211-0020-010

The U.S. Meat Animal Research Center removes water from May to October to irrigate 15 pivots from the Big Sandy Creek tributary at the discharge point (where treated groundwater is discharged into the channel) and reservoir (Figure 1). Six of ten dams along the channel have the capability to control the discharge by adding or removing stoplogs. Often, by October, there is not enough water to irrigate the crops. To better manage the water resources, a water balance of the tributary, Big Sandy Creek and reservoir is needed. The overall goal of this project is to identify water inputs and outputs, both temporally and spatially, to aid researchers at the Animal Research Center.

9. Streambed water flux dynamics at coupled groundwater-surface water monitoring stations (Year 2 renewal: July 1, 2017 – June 30, 2018)

Sponsor: Daugherty Water for Food Global Institute

PI: T.E. Gilmore (100%)

Total Amount: \$16,000

SAP WBS Account Number: 26-6811-0001-143

Direct observation of groundwater-surface water interaction is critical for evaluating the effectiveness of conjunctive management of water resources in Nebraska, but the task is difficult due to spatial and temporal limitations of current measurement tools. Current in-stream measurement tools such as reach mass-balance, seepage meter measurements, Darcian flux measurements, and temperature sensing, are limited spatially, temporally, or both. Continuous monitoring of surface water and near-stream groundwater elevation (i.e., coupled monitoring stations) is a more feasible long-term monitoring approach compared to in-stream measurements. However, the approach does not provide a direct estimate of water fluxes, or the spatial distribution of those fluxes, through the streambed. The goal of the proposed research is to evaluate relationships between groundwater-surface water signals from a monitoring station and actual streambed water fluxes measured near the station.

10. Risk of Adverse Birth Outcomes Associated with Maternal Exposure to Nitrate and Nitrosatable Compounds in Drinking Water (July 2017 – June 2019)

Sponsor: Food For Health Initiative

PI: P. Shea (25%)

Co-PI: K. Eskridge (15%), J. Meza (15%), T.E. Gilmore (15%), H. Raikes (15%), D. Barnes-Josiah (15%)

Total Amount: \$149,964

SAP WBS Account Number: 21-3218-0022

Our proposed Food for Health Initiative Formed/Forming Team Seed Grant project focuses on exposure to chemical mixtures in water and food, and pathways leading to adverse health outcomes, including developmental abnormalities and cancers. Water is the most important link between food and health. Nitrate and atrazine are widely-used agrichemicals found in U.S. drinking water. A more toxic compound, *N*-nitrosoatrazine (NNAT), can form *in vivo* after ingesting nitrate and atrazine. Our preliminary studies provide evidence that exposure to nitrate and nitrosatable compounds such as atrazine, and potentially other agrichemicals and pharmaceuticals, may lead to adverse health outcomes in particularly vulnerable individuals and populations, such as rural agricultural communities. Exploratory work suggests that nitrate and atrazine exposure in Nebraska drinking water is associated with increased risk of non-Hodgkin lymphoma and adverse birth outcomes. We also observed developmental abnormalities in avian embryos administered NNAT. Our research team is comprised of experts at the University of Nebraska in chemistry, toxicology, developmental biology, hydrology/hydrogeochemistry, epidemiology, geographic information systems (GIS), statistics and child development. We are further strengthening the team to include genetics, molecular biology and social science expertise. Understanding the underlying mechanism(s) and associated gene-environment interactions will provide new knowledge and help achieve the long-term goal of developing strategies that prevent or reduce adverse health outcomes from exposure to nitrate and nitrosatable compounds. The research team will design and test a case-control study to evaluate the association between maternal exposure to nitrate and nitrosatable compounds (focusing on atrazine) and risk of adverse birth outcomes. Participant perception will be studied to improve subject recruitment and retention. Research supported by the seed grant will increase our competitiveness for future federal funding, such as through the National Institute of Environmental Health Sciences, which has expressed preliminary support of the proposed project via program officer feedback.

11. Application of isotopic tracers to determine water residence times in multi-scale water management (April 2017 – March 2019)

Sponsor: IANR-FAPESP-SPRINT

PI: T.E. Gilmore (50%)

Co-PI: A. Mittelstet (30%), J. Korus (20%)

Amount: \$19,983

UNL Cost Share: \$0

Total Amount: \$19,983

SAP WBS Account Number: 21-6238-1055

Sustainable use and management of aquifers and their interaction with rivers and lakes requires qualitative and quantitative assessment of aquifer hydrogeology and dynamics, and the use of conceptual and/or hydrologic models. Recently, isotope techniques such as groundwater age-dating (where age is the time between recharge and sampling), are being used to develop conceptual models of groundwater flow and provide information for model calibration. Such models are critical tools that water resources managers can use to create defensible policies for groundwater management. A wide

number of isotopes can be used to estimate groundwater ages ranging from decades to thousands of years, and each tracer has advantages and disadvantages. Field sampling requirements for different tracers, as well as the model assumptions and corrections necessary to estimate groundwater ages, are non-trivial, especially when applied in different climatic and hydrogeological settings. The goal of this project is to combine the expertise of the University of Nebraska-Lincoln Water Cluster research group (UNL-WC) in age-dating young groundwater with the expertise of scientists at Universidade Estadual Paulista (UNESP) in age-dating old groundwater to improve ongoing studies (including FAPESP-funded research).

12. Assessing the long-term water savings of reduced irrigation pumping in western Nebraska (January 2017 – December 2017)

Sponsor: Research Council Grants-In-Aid

PI: T. Franz (70%)

Co-PI: T.E. Gilmore (30%)

Amount: \$10,000

UNL Cost Share: \$0

Total Amount: \$10,000

SAP WBS Account Number: 26-6238-9001-016

Global trends in consumptive water use indicate a growing yet unsustainable reliance on groundwater resources. Our long-term goal is to develop effective strategies to improve the efficiency of water use in irrigated agriculture. The goal of the proposed work is to quantify water savings from technology adoption in irrigation scheduling provided by a cost-share program. Our central hypothesis is that the water savings will only last during a finite window of time where near-surface activity impacting soil moisture will eventually propagate to the water table.

13. Streambed water flux dynamics at coupled groundwater-surface water monitoring stations (Year 1: July 1, 2016 – June 30, 2017)

Sponsor: Daugherty Water for Food Global Institute

PI: T.E. Gilmore (100%)

Total Amount: \$15,000

SAP WBS Account Number: 26-6811-0001-143

Direct observation of groundwater-surface water interaction is critical for evaluating the effectiveness of conjunctive management of water resources in Nebraska, but the task is difficult due to spatial and temporal limitations of current measurement tools. Current in-stream measurement tools such as reach mass-balance, seepage meter measurements, Darcian flux measurements, and temperature sensing, are limited spatially, temporally, or both. Continuous monitoring of surface water and near-stream groundwater elevation (i.e., coupled monitoring stations) is a more feasible long-term monitoring approach compared to in-stream measurements. However, the approach does not provide a direct estimate of water fluxes, or the spatial distribution of those fluxes, through the streambed. The goal of the proposed research is to evaluate relationships between groundwater-surface water signals from a monitoring station and actual streambed water fluxes measured near the station.

Section 2.2.2 Numbered list (in reverse chronological order) of Externally Funded Research Grants. Include the title of the project, funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to you, SAP WBS Account Number.

<i>Project Title</i>	<i>Sponsor</i>	<i>Role (PI or Co-PI)</i>	<i>Dates</i>	<i>Total Amount</i>	<i>% Attributed to Candidate</i>
				<i>(do not include UNL cost share)</i>	<i>(do not include UNL cost share)</i>
DESC: Type I: Repurposing Batteryless SmartPhones as Long-lived and Adaptable Sensors for Sustainable and Scalable Environmental Monitoring	NSF	Co-PI	08/01/2025 – 07/31/2028	\$120,000	
Innovative Resources: Cyberinfrastructure and community to leverage ground-based imagery in ecohydrological studies	NSF	PI	01/01/2025 – 12/31/2027	\$599,801	80
Monitoring monthly groundwater level variation in the NSH using remote sensing	USGS	Co-PI	09/2024 – 08/2025	\$14,716	15
Elucidating Groundwater Processes in 3D for Targeted Management of Agricultural Nitrogen	USDA	Co-PI	07/01/2024 – 06/30/2028	\$749,883	10

Cultivate ACCESS to Data Science in Agriculture	USDA-NIFA	Co-PI	September 1, 2023 – August 31, 2027	\$749,825	10
Advancing image-based techniques for stream gage applications	U.S. Geological Survey	PI	February 20, 2023 – February 20, 2025	\$271,000	70
Using a Coupled Surface Water/Groundwater Model Informed by Groundwater Age, Geophysics, and Vadose Zone Coring to Identify Type and Placement of Management Practices to Reduce Legacy Groundwater Nitrate Concentrations	U.S. Geological Survey	Co-PI	January 1, 2023 – December 30, 2025	\$249,977	40
FY2022 Statemap	U.S. Geological Survey	Co-PI	September 20, 2022 – September 19, 2023	\$107,223	5
Vadose Zone Nitrate Accumulation Lower Loup Natural Resources District Area 30, Relation to Manure Application, Fertilizer Management and Groundwater Nitrate Concentrations	Lower Loup NRD	Co-PI	August 1, 2022 – July 31, 2024	\$67,506	20

Application of Remote Sensing and Hydrologic Modeling to Reduce Highway Flooding in the Nebraska Sandhills	Ne Dept of Transportation	Co-PI	July 1, 2021 - May 31, 2023	\$143,166	20
Image-Based Streamflow and Water Quality Modeling	USGS (via Nebraska Water Center)	PI	Oct 1, 2021 – Sept 30, 2022	\$20,000	70
Planning Grant Engineering Research Center for ENGINEERED Solutions for rUral RESilience--ENSURE: Food, Energy, Environment, and Infrastructure	National Science Foundation	Co-PI	September 2019 – August 2020	\$99,907 (all to Kansas State Univ.)	20
Hydrological Science as a Key to Promote Effective Water Use and Conservation in Complex Productive Systems	CAPES-PRINT EDITAL 02 - NETWORK	Co-PI	September 2019 – August 2020	\$10,000 (approximate equivalent in US dollars; funds to UNESP-Rio Claro)	20
Groundwater age and PFAS concentration and PFAS Testing Network	North Carolina Policy Collaboratory – Challenge Grant	Co-PI	July 2018 – December 2020	\$31,136	30
NASA Nebraska Space Grant Fellowship 2018-2019 Flynn	UNO-NASA Space Grant	PI	August 2018 – February 2019	\$4,000	100
Isotopes of Nitrate in Bazile Creek Headwaters	Upper Elkhorn Natural Resources District	Co-PI	September 2018 – August 2019	\$4,162	50
Collaborative Research:	National Science	PI	June 2018 – June	\$387,030	45

Groundwater transit time distributions: bridging the gap between advanced tracer techniques and numerical modeling	Foundation – Hydrologic Sciences		2021		
Upper Little Blue River Basin Hydrologic Monitoring	Tri-Basin NRD, sub-award from Nebraska Environmental Trust	Co-PI	July 2018 – June 2021	\$145,924	45
Survey of Groundwater Transit Times and Nitrate Delivery to Bazile Creek	Nebraska Department of Environmental Quality	PI	June 2018 – May 2020	\$30,000	50
Middle Republican NRD Observation Well Network	Middle Republican NRD	Co-PI	July 2017 – June 2019	\$70,500	33
Using fiber optic distributed temperature sensing and point-scale measurements to quantify groundwater-surface water flux	Center for Transformative Environmental Monitoring Programs	PI	January 2017 - December 2017	\$1,700	100
Spatial variability of streambed hydraulic conductivity across multiple stream orders	U.S. Geological Survey	Co-PI	March 2017 – February 2018	\$19,992	40
Evaluation of changing irrigation management on ground water recharge and quality	U.S. Geological Survey	PI	March 2016 – February 2017	\$15,000	50

Section 2.2.3 Numbered list (in reverse chronological order) of External Research Grants that have been submitted through the University of Nebraska-Lincoln Office of Sponsored Programs. Include the title of the project, funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to you, and date of submission.

1. DESC Type I: Repurposing Batteryless SmartPhones as Long-lived and Adaptable Sensors for Sustainable and Scalable Environmental Monitoring (**Funded** in 2025) (08/01/2025 - 07/31/2028)
Submitted: September 11, 2024

Sponsor: National Science Foundation

PI: P.V. Nguyen (UMass)

Co-PIs: D.K. Ganesan, A.D. Richardson, T.E. Gilmore, H. Guan

UNL Amount: \$120,000

UNL Cost Share: \$0

Total Amount: \$600,000

SAP WBS Account Number: N/A

This project aims to repurpose old smartphones as sustainable, battery-free alternatives to conventional Internet of Things (IoT) sensors, creating a long-lived platform for environmental monitoring. With most smartphones replaced every 2-3 years and billions of IoT devices in use globally, the environmental and economic costs of short device lifespans are substantial. This project addresses these concerns by integrating repurposed smartphones into real-world monitoring networks for tree phenotyping and river dynamics. Equipped with biocompatible, energy-harvesting phone cases, these smartphones operate without batteries or manual maintenance. This work promotes the progress of science by extending the utility of existing devices, reducing infrastructure costs, and supporting environmental science through scalable, real-time data collection. The project also supports graduate and undergraduate research and encourages the reuse of computing resources in sustainable applications.

The project develops models, algorithms, hardware platforms, and foundational methods for creating an ultra-long-lived, maintenance-free remote sensing platform for environmental applications. It focuses on transforming old smartphones into reusable, battery-free sensors equipped with custom-designed, energy-harvesting phone cases. These systems operate reliably under intermittent power conditions using capacitor-based energy storage rather than conventional batteries. The research includes the development of battery-free computing techniques, energy-aware scheduling strategies, and domain adaptation algorithms to ensure robust performance across a wide range of smartphone models and environmental conditions. The system supports continuous monitoring of tree canopies and river systems, with sensing tasks such as image capture and data logging. Evaluation is conducted through iterative hardware-software co-design and extensive field testing in diverse geographic regions. The resulting platform contributes to ecological monitoring, embedded computing, and the broader understanding of sustainable sensing in resource-constrained environments.

17. Innovative Resources: Cyberinfrastructure and community to leverage ground-based imagery in ecohydrological studies (Funded in 2024)

(01/01/2025 – 12/31/2027)

Submitted: December 1, 2023

Sponsor: National Science Foundation

PI: T.E. Gilmore

Co-PIs: M. Harner, N. Shrestha, A. Richardson (Northern Arizona University)

UNL Amount: \$599,801

UNL Cost Share: \$0

Total Amount: \$599,801

SAP WBS Account Number: 25-6238-1140-001

Images are a powerful tool for observing and understanding the natural world. Ground-based imagery, such as from time-lapse and trail cameras, captures short- and long-term environmental processes that cannot be measured in other ways and has the potential to contribute visual information to multiple fields. Applications include understanding a changing water cycle, developing new technologies to monitor streamflow and river depth, and measuring changes to vegetation. These data can then be used in computer simulations that are enabled by artificial intelligence and machine learning (AI/ML) to model and predict different conditions and scenarios. Imagery is well-suited for environmental monitoring that integrates data from different sources, where variables extracted from imagery complement data derived from other sensors located near cameras. However, there are significant barriers to capturing quality imagery and extracting scientifically useful information from imagery. Computer software and training resources will be developed to lower those barriers, allowing people with different levels of technical expertise and backgrounds to advance science using image-based methods.

This project will develop a robust scientific community and accompanying cyberinfrastructure (CI) for using ground-based imagery to study environmental processes. This CI will complement existing remote sensing capabilities using satellite or airborne imagery, where tools such as ArcGIS and QGIS have opened new measurement capabilities and pathways to scientific discovery for a wide range of users. Ground-based imagery has potential for enabling new ecohydrological discoveries, and well-designed CI can empower people with the skills and tools needed for impactful and reproducible science. The specific goals of this Geoinformatics project are to develop: (1) Open-source software (GaugeCam Remote Image Manager Educational ? Artificial Intelligence; GRIME-AI) that streamlines and documents reproducible workflows, (2) Benchmark data products (including data from PhenoCam archives) that promote method development and data standards, and (3) Training resources for broadened participation in the emerging scientific community that uses ground-based fixed cameras in ecohydrological research. The CI, available through GaugeCam.org and other public repositories, will be inviting and educational for a broad range of users, including those who may not currently have a strong STEM or data science identity. The project will focus on building community across disciplines through training for new users and increasing the ease of scientific discovery.

18. Monitoring monthly groundwater level variation in the NSH using remote sensing
(Funded in 2024)

Submitted: Approx April 2024

Date: September 2024-August 2025

PI: Nawaraj Shrestha

CoPIs: Troy Gilmore, Aaron Young, Aaron Mittelstet, Matt R Joeckel

UNL Amount: \$14,716

USGS Amount: \$14,716
UNL Cost Share: (if any)
Total Amount: \$29,432
SAP WBS Account Number: 25-6211-0088-045
Brief description or abstract:

Variations in groundwater levels are frequently estimated using hydraulic heads measured in observation wells. Groundwater levels estimated from sparsely distributed observation wells produce uncertain estimates at unsampled locations that can be highly problematic for groundwater management. In areas where surface water and groundwater intersect, [remote sensing](#) provides reliable estimates of hydraulic heads. We propose the application of satellite light detection and ranging (LiDAR) to measure the water levels of lakes in the Nebraska Sand Hills (NSH), a landscape sensitive to climate change, and critical for regional groundwater recharge. Through these measurements, we can closely estimate the local elevation of groundwater and derive a much-improved understanding of groundwater-level change. The research uses hundreds of shallow, interdune lakes that intersect with the regional unconfined aquifer in the NSH. Our proposed research builds upon a previous study demonstrating efficacy of aerial LiDAR for estimating groundwater levels through lake levels in the NSH1. We will test the feasibility of monthly groundwater-level estimated using repeated observations from Global Ecosystem Dynamics Investigation (GEDI) and Ice, Cloud, and land Elevation Satellite 2 (ICESat-2). Our estimates will provide the most precise basis for monitoring groundwater levels and unparalleled assessment of spatial variation. Our proposal portends a dramatic increase in the efficacy of decision-making that is highly beneficial to society and the environment.

19. Elucidating Groundwater Processes in 3D for Targeted Management of Agricultural Nitrogen (Funded in 2024)
(07/01/2024 – 06/30/2028)
Submitted: September 7, 2023
Sponsor: USDA
PI: J. Korus
Co-PIs: T.E. Gilmore, M. Aboushanab, A. Daigh, J. Westrop, K. Cameron
UNL Amount: \$749,883
UNL Cost Share: \$0
Total Amount: \$749,883
SAP WBS Account Number: 25-6238-1127-001

Groundwater nitrate contamination under agricultural landscapes poses a pervasive and multifaceted challenge with serious implications for human health and the environment. In Nebraska, nearly one in five drinking-water wells statewide contain nitrate concentrations above drinking water standard (10 mg/L). However, aquifer contamination is not uniform across space nor is it consistent with cropland management practices. Aquifer and vadose zone denitrification mechanisms remain unclear, and their spatial variability is inadequately characterized. These knowledge gaps hinder

effective precision-based agricultural practices to meet agronomic and human health needs. To address these challenges, the goal of this integrated research and Extension project is to advance understanding of groundwater nitrate processes, thereby informing evidence-based land management, policy, and groundwater monitoring. Objectives will: (1) Co-develop a field investigation program with stakeholders using rust staining on center-pivot irrigation systems as a guide to subsurface biogeochemical and hydrologic conditions; (2) Build high-resolution, 3D framework models of vadose zone and aquifer properties at select sites and interpret depositional environments; (3) Quantify denitrification in the vadose zone and aquifer associated with various geological deposits and materials and predict fluxes with a 3D physics-based transport model; and (4) Co-develop a roadmap with stakeholders that will enable irrigation managers and producers to implement targeted nitrate management outside the study area. Ultimately, this work will directly contribute to Program Area Priority A1411, Water Quantity and Quality, by protecting water quality groundwater systems through improved nutrient management and evaluating the interactions, fluxes, fate, transport, transformation, and storage of nitrate.

20. Cultivate ACCESS to Data Science in Agriculture (September 1, 2023 – August 31, 2027)

Submitted: March 30, 2023

Sponsor: USDA-NIFA

PI: J. Keshwani

Co-PIs: E. Ingram, L. Sandall, D. Keshwani, E. Blankenship, T.E. Gilmore (10%)

UNL Amount: \$749,825

UNL Cost Share: \$ 0

Total Amount: \$749,825

SAP WBS Account Number: 25-6238-1074-001

Youth equipped to pursue careers in agriculture and natural resources will tackle the challenges of climate change, limited natural resources, and a growing population by balancing agricultural production with responsible natural resource management. Cultivate ACCESS to Data Science in Agriculture (Cultivate Data Science) uses an integrated systems thinking, virtual near-peer mentoring, and community influencing approach to empower youth with an expanded vision for data infused agricultural technologies as socially integrated while encouraging underrepresented student populations to consider diverse perspectives when identifying and solving complex, ambiguous problems (Figure 1). Cultivate Data Science learning experiences align with the AFRI Farm Bill Priority area agricultural systems and technology and will address advanced data science transformative technologies including GIS, artificial intelligence, and image processing. We anticipate reaching 20 high school aged youth each year matched with 5 college students totaling 60 youth and 15 college students over the funding period.

The long-term goal of Cultivate Access to Data Science in Agriculture is to promote youth a) acquisition of systems thinking (ST) skills, b) cultivation of teamwork and resiliency skills, c) development of collective action skills

to enhance consumer confidence in ag technologies, and d) awareness and understanding of STEM-related careers. We aim to achieve this goal through the expansion of the USDA-funded Cultivate ACCESS virtual mentoring program to include learning modules and games to support participants in sharing their knowledge through social media and other community action activities.

21. Advancing image-based techniques for stream gage applications

(February 20, 2023 – February 20, 2025)

Submitted: Fall 2022

Sponsor: U.S. Geological Survey

PI: T.E. Gilmore

Co-PIs: M. Harner (40%)

UNL Amount: \$271,000

UNL Cost Share: \$ 0

Total Amount: \$271,000

SAP WBS Account Number: 25-6238-1074-001

Ground-based observations from fixed-mount cameras have the potential to fill an important role in environmental sensing, from direct measurement of ecohydrological processes (streamflow, water level, and response of organisms to these changes) to qualitative observation of research sites that is otherwise impossible based on infrequent site visits. All of this is theoretically possible for anyone who can install a trail camera (as opposed to very few individuals who have any control on launching a satellite). High accessibility for acquisition of ground-based imagery has resulted in millions of environmental images stored, some of which are public data (based on funding, agency policies), and many of which have not been used effectively for scientific purposes. The goal of this proposal is to develop and document key image processing and machine learning workflows to increase the use and value of existing and emerging archives of imagery that is relevant to ecohydrological processes.

22. Using a Coupled Surface Water/Groundwater Model Informed by Groundwater Age, Geophysics, and Vadose Zone Coring to Identify Type and Placement of Management Practices to Reduce Legacy Groundwater Nitrate Concentrations (January 1, 2023 – December 30, 2025)

Submitted: May 3, 2022

Sponsor: U.S. Geological Survey

PI: A.R. Mittelstet

Co-PIs: T.E. Gilmore (40%), E. Haacker, D. Snow

UNL Amount: \$249,977

UNL Cost Share: \$ 249,989

Total Amount: \$499,966

SAP WBS Account Number: 25-6211-0109-001

Nitrate concentrations in groundwater-fed streams reflect current and past agricultural practices, integrating the effects of surface processes and the storage and release of legacy nitrogen from subsurface compartments. This project is focused on integration of vadose zone nitrate, groundwater age, remote sensing,

and subsurface geophysics information into coupled groundwater-surface water models to identify type and placement of best management practices most likely to yield water quality improvements. Bazile Creek is a groundwater-fed, high-nitrate stream in an agriculturally intensive watershed within the Bazile Groundwater Management Area in Eastern Nebraska. Nitrate concentrations within Bazile Creek and tributaries range from 2.7 to 15 mg L⁻¹. Prior vadose zone coring and groundwater age-dating show that nitrate released from subsurface storage compartments is a major contributor and long-term threat to both groundwater and surface water quality. Aerial electromagnetic surveys, with borehole data as ground truth, have revealed subsurface heterogeneity that is important to incorporate in groundwater modeling. Building on these data with additional groundwater age-dating and vadose zone coring, we will build a coupled surface water (Soil and Water Assessment Tool) and groundwater model (MODFLOW) model to simulate stream discharge, groundwater head and nitrate transport. The model will then be used to identify the optimal locations and type of management practices within the watershed to reduce nitrate concentrations in coming decades. Simulations will run through 2100 using three global climate change models, based on the 5th, 50th and 95th percentile aridity index. The data on nitrate transport within the vadose zone and groundwater age travel time will assist in identifying the expected time required to have reduced nitrate contributions within the watershed based on the implemented management practices. Agronomic data from past and ongoing on-farm demonstrations and agricultural performance competitions will be used to constrain anticipated performance of management practices. This project will demonstrate a holistic modeling effort that can be duplicated in other agricultural watersheds to produce actionable information for anticipating time lags and improving water quality.

23. FY2022 Statemap (September 20, 2022 – January 15, 2024)

Submitted: December 16, 2021

Sponsor: U.S. Geological Survey

PI: P. Hanson

Co-PIs: A. Young, M. Joeckel, J. Turk, M. Marxsen, T.E. Gilmore (5%)

UNL Amount: \$171,494

UNL Cost Share: \$173,478

Total Amount: \$344,972

SAP WBS Account Number: 25-6238-1058-001

The Nebraska Geological Survey (NGS) proposes mapping the surficial geology of five 1:24,000 quadrangles during FY2022 in two subprojects. These proposed mapping efforts will address six major goals established by the NGS and the Nebraska STATEMAP Advisory Committee. The proposed total cost of the FY2022 STATEMAP proposal is \$171,494 to map the five quadrangles. The work will provide important technical information applicable to groundwater resources, mining, and other natural resource issues in two areas of the state. Our work will also address salient scientific uncertainties about the stratigraphy and geomorphic evolution of the Great Plains in the recent geologic past. The proposal has been fully vetted with the Nebraska STATEMAP Advisory Committee, which has expressed strong support for this proposal and our greater mapping efforts.

24. Vadose Zone Nitrate Accumulation Lower Loup Natural Resources District Area 30, Relation to Manure Application, Fertilizer Management and Groundwater Nitrate Concentrations (August 1, 2022 – July 31, 2024)

Submitted: December 7, 2021

Sponsor: Lower Loup NRD

PI: D. Snow

Co-PIs: T.E. Gilmore (33%), A. Mittelstet

UNL Amount: \$67,506

UNL Cost Share: \$74,304

Total Amount: \$141,810

SAP WBS Account Number: 26-6211-0097-001

This project will focus on investigation of nitrogen in the vadose (unsaturated) zone and relationship to groundwater nitrate occurrence and transport in Water Quality Area 30 of the Lower Loup Natural Resources District (LLNRD). This area is located northeast of the city of Columbus, Nebraska (Figure 1) and supports 162 registered wells divided between 84 domestic wells, 70 irrigation wells and 8 designated for livestock use. Annual median nitrate concentrations in wells sampled from this area have been steadily increasing since regular monitoring began in the 1970's (LLNRD, 2019). The present distribution of groundwater nitrate-N concentrations (Figure 1) suggests that over half of the wells sampled exceed the 10 mg/L NO₃-N USEPA maximum contaminant level for drinking water. Groundwater sampling and nitrate isotope characterization in 2020 suggest that leached nitrogen is likely a mix of commercial fertilizer and organic (livestock manure) nitrogen sources. Because some areas have a high density of livestock operations and manure application, it will be helpful to collect deep and shallow cores for characterization of nitrogen forms in the vadose zone, potential for organic nitrogen mineralization and movement. Comparison of concentration profiles with nitrogen loading based on fertilizer and manure application rates will help evaluate storage and transport to the water table at selected locations.

25. FY2022 Statemap (September 20, 2022 – September 19, 2023)

Submitted: December 16, 2021

Sponsor: Lower Loup NRD

PI: P. Hanson

Co-PIs: T.E. Gilmore, M. Joeckel, M. Marxsen, J. Turk, A. Young

UNL Amount: \$107,223

UNL Cost Share: \$173,478

Total Amount: \$

SAP WBS Account Number: 25-6238-1058-001

The Nebraska Geological Survey (NGS) proposes mapping the surficial geology of five 1:24,000 quadrangles during FY2022 in two subprojects. These proposed mapping efforts will address six major goals established by the NGS and the Nebraska STATEMAP Advisory Committee. The proposed total cost of the FY2022 STATEMAP proposal is \$171,494 to map the five quadrangles. The work will provide important technical information applicable to groundwater resources, mining, and other natural resource issues in two areas of the state. Our work will also address salient scientific uncertainties about the stratigraphy and geomorphic

evolution of the Great Plains in the recent geologic past. The proposal has been fully vetted with the Nebraska STATEMAP Advisory Committee, which has expressed strong support for this proposal and our greater mapping efforts.

26. Mittelstet, A. (Principal Investigator), Gilmore, T. (Investigator), 137818, Grant, "Modeling to Reduce Highway Flooding", Ne Dept of Transportation, State Agencies, Research, \$143,166.00, Awarded. (sub: December 9, 2020, start: July 1, 2021, end: May 31, 2023).

This research will help NDOT quantify the frequency, duration and depth of highway flooding in the NSH and assist NDOT in identifying the location to place culverts under the highway and where to place the highway elevation relative to the groundwater elevation. The objectives of this project are to 1) identify the location, duration and frequency of highway flooding in the NSH; 2) determine lag time and climatic conditions of highway flooding; 3) identify frequency curves of highway flooding and 4) prioritize highways based on frequency of flooding.

27. Image-Based Streamflow and Water Quality Modeling (October 1, 2021 – September 30, 2022)

Submitted: October 28, 2020

Sponsor: Ne Water Center-USGS

PI: T.E. Gilmore (50%)

Co-PIs:

Mary Harner (UNK), Andrew Harms, Michael Forsberg

UNL Amount: \$20,000

UNL Cost Share: \$43,617

Total Amount: \$63,617

SAP WBS Account Number: TBD

Ground-based imagery of small streams contains large amounts of information about watershed function and streamflow conditions. This qualitative and quantitative information from images is a powerful complement to traditional environmental sensors. However, there are significant barriers to extracting information from imagery and incorporating that information in quantitative watershed studies. In this project, we are focused on the specific question of filling gaps in time series data from traditional sensors. We will use features calculated from daytime imagery captured by a watershed documentary project (www.plattebasintimelapse.com) and then combine those image features with in-stream sensor data to build and test machine learning models of stream discharge and stream water quality. The machine learning models will be used to fill simulated data gaps in sensor data from a small stream in the Nebraska Sand Hills region. Simulated data gaps in time series will range in length from days to months for stream stage and discharge, and hours to days for water quality (specific conductance, nitrate, and dissolved organic carbon). The developed workflows will be documented and streamlined for training graduate and undergraduate students in data management and analysis.

28. Groundwater age and PFAS concentration and PFAS Testing Network (July 2018 – December 2020)

Submitted: March 22, 2019

Sponsor: North Carolina Policy Collaboratory – Challenge Grant

PI: T.E. Gilmore (30%)

UNL Amount: \$14,371

UNL Cost Share: \$0

Total Amount: \$14,371

SAP WBS Account Number: 26-6238-0888-001

**note:* funds for this project and the PFAS Testing Network were entered as the same contract in NUgrant

In this project, funds are requested from the North Carolina Policy Collaboratory at UNC-CH (<https://collaboratory.unc.edu/>) to pursue research on the relationship between groundwater age and groundwater concentrations of PFAS (per- and polyfluoroalkyl substances) in North Carolina. The project builds on methodological and scientific advances from research carried out with related NSF funding, and also supports related tasks and inquiry under the separate PFAST project funding the NC Policy Collaboratory. Sampling will focus on an area of known PFAS contamination near the Chemours chemical plant in Bladen County NC. Groundwater samples will be collected and analyzed for PFAS in the Department of Civil, Construction, and Environmental Engineering at NC State, in a laboratory under the direction of Dr. Detlef Knappe. Analysis of groundwater age-dating tracers will be done at the University of Nebraska, in partnership with collaborator Dr. Troy Gilmore at the University of Nebraska.

29. NASA Nebraska Space Grant Fellowship 2018-2019 Flynn (August 2018 – February 2019)

Submitted: July 11, 2018

Sponsor: UNO-NASA Space Grant

PI: T.E. Gilmore (100%)

UNL Amount: \$4,000

UNL Cost Share: \$0

Total Amount: \$4,000

SAP WBS Account Number: 26-6238-0868-001

Fellowship for Amanda Flynn, MS student. The goal of this project is to produce a map of groundwater areas that are likely to be impacted by anthropogenic contamination. Contamination of groundwater is a growing concern worldwide as more groundwater is being utilized for human consumption. NASA satellite data (<https://earthobservatory.nasa.gov/GlobalMaps/?eocn=topnav&eoci=globalmaps>) shows the impacts of human civilization and climate change, and one can see civilizations are growing into previously uninhabited areas. NASA is pioneering new initiatives to monitor water quality in surface water bodies (<https://landsat.gsfc.nasa.gov/unesco-launches-a-pioneering-tool-to-monitor-water-quality/>), but due to pollution pointed out in these studies, groundwater may be a better option for drinking water sources.

30. Isotopes of Nitrate in Bazile Creek Headwaters (September 2018 – November 2019)

Submitted: August 30, 2018

Sponsor: Upper Elkhorn Natural Resources District

PI: Dan Snow (50%)

Co-PI: T.E. Gilmore (50%)

UNL Amount: \$4,162

UNL Cost Share: \$0

Total Amount: \$4,162

SAP WBS Account Number: 26-6211-0056-001

We will sample Bazile Creek and tributaries seasonally (four times/year) and during different hydrologic conditions to gauge whether nitrate source changes substantially over time in tributaries or in the main channel. It is possible that during baseflow the source is groundwater-derived and therefore mostly from commercial fertilizer source. Under different hydrologic conditions, or during different seasons nitrogen could potentially shift toward more organic sources from runoff or from cattle having access to the stream.

31. Survey of Groundwater Transit Times and Nitrate Delivery to Bazile Creek. (June 2018 – May 2020)

Submitted: November 10, 2017

Sponsor: Nebraska Department of Environmental Quality

PI: T.E. Gilmore (50%)

Co-PI: A. Mittelstet, T. Messer

Amount: \$30,000

UNL Cost Share: \$20,000

Total Amount: \$50,000

SAP WBS Account Number: 26-6238-0866-001

The proposed work is a first step toward the overall goals of (1) understanding groundwater contribution to these spatial and temporal trends in stream-water nitrate, and (2) gauging the magnitude and timing of future groundwater nitrate loadings to Bazile Creek. The specific objectives addressed by this project are (a) survey nitrate concentration in groundwater that discharges to Bazile Creek (b) quantify timescales for delivery of groundwater nitrate to Bazile Creek, and (c) compare solute concentrations in streams to solute concentrations in groundwater. Achievement of these objectives will improve estimates of timescales between implementation of best management practices and subsequent reductions in stream-water nitrate concentrations.

32. Upper Little Blue River Basin Hydrologic Monitoring (July 2018 – June 2021; no-cost extension to Dec 2021)

Submitted: August 30, 2017

Sponsor: Tri-Basin NRD/Nebraska Environmental Trust

PI: T.E. Gilmore (45%)

Co-PI: D. Divine (30%)

Co-PI: D. Martin (25%)

Amount: \$145,924

UNL Cost Share: \$184,800

Total Amount: \$330,724

SAP WBS Account Number: 26-6238-0859-001

The Tri-Basin and Little Blue Natural Resources Districts (TBNRD and LBNRD, respectively) request funds to improve groundwater quality and quantity monitoring, and to promote coordinated groundwater management between the NRDs. The project consists of three major objectives,

including hydrogeological characterization, (2) expansion of monitoring well networks in critical areas and (3) application of groundwater quantity and quality information, isotopes, and age-dating to evaluate groundwater movement in the vicinity of the groundwater mound in the TBNRD, and in areas of groundwater decline in the TBNRD and the LBNRD. The project will rely on age-dating of groundwater that discharges to the Little Blue River to help characterize water movement. Information from the project will enhance implementation of the Little Blue Basin Water Management Plan for the TBNRD and LBNRDs, in addition to the voluntary Integrated Management Plan currently in development. An educational component of the project will benefit the general public and water resources managers. Advancements from the project will provide a foundation for improved monitoring of water resources within and across NRD boundaries that will be useful for these and other NRDs for years into the future.

33. Collaborative Research: Groundwater transit time distributions: bridging the gap between advanced tracer techniques and numerical modeling (June 2018 – June 2021)

Submitted: May 19, 2017

Sponsor: National Science Foundation – Hydrologic Sciences

PI: T.E. Gilmore (45%)

Co-PI: A. Mittelstet (45%), V. Zlotnik (10%)

UNL Amount: \$387,030

UNL Cost Share: \$0

Total Amount: \$387,030

SAP WBS Account Number: 25-6238-0862-001

Total Amount of collaborative proposal award: \$880,944 (including awards to collaborators at Univ. of Utah and North Carolina State Univ.):

Determination of groundwater transit time distributions (TTDs) is a critical component of any effort to forecast the effects of contaminated aquifer discharge on stream water quality. Currently, field studies that utilize groundwater sampling in streambeds and analysis of age-dating tracers show TTDs with far less young groundwater than is typically calculated from groundwater modeling studies. This discrepancy between field studies and modeling leads to very different forecasts of contaminant discharge from aquifers, which has important implications for stream water quality. The overall goals of this project are to (1) evaluate why there is currently a discrepancy between TTDs derived from measurements (i.e., field sampling of age-dating tracers in groundwater) and groundwater models, (2) determine what processes that drive the shape of the groundwater TTDs, and (3) how these processes may be better captured using field measurements in multiple stream orders and a watershed-scale groundwater model. We propose determination of groundwater TTDs across multiple stream orders in a watershed overlying the High Plains aquifer in the Nebraska Sand Hills, where groundwater accounts for approximately 90% of annual discharge. The TTDs will be determined using age-dating tracers for both young (e.g., ^3H and ^3He) and old (e.g., ^{14}C and ^4He) groundwater, coupled with discharge measurements in streams and groundwater discharge measurement in streambeds. The field-based TTDs will be compared to groundwater TTDs derived from particle tracking simulations in a numerical groundwater model

(MODFLOW), at both the reach and watershed scale. A sensitivity analysis will be used to determine critical locations and level of detail necessary for refinement of geological and hydrologic variables in the model (with an initial focus on patterns of recharge in contributing areas and across the landscape), and the model will be recalibrated to evaluate how TTDs compare to field-based estimates after refinement.

34. Middle Republican NRD Observation Well Network. (July 2017 – June 2019)

Submitted: September 1, 2016

Sponsor: Middle Republican NRD

PI: J. Korus (45%)

Co-PI: T.E. Gilmore (33%), D. Hallum (22%)

Amount: \$70,500

UNL Cost Share: \$85,954

Total Amount: \$156,454

SAP WBS Account Number: 26-6238-0828-001

Conservation and Survey Division (CSD) personnel will conduct a preliminary hydrogeologic assessment of the Middle Republican Natural Resources District (MRNRD) to identify target areas for observation wells. Spatial statistics (e.g. kriging) and other techniques will be used to identify areas in which uncertainty in groundwater levels (i.e., aquifer storage), recharge rates, water quality, and potential for groundwater-surface water interaction is greatest in the MRNRD. Staff and graduate students will compile data, conduct a review of historical information, and create a database and GIS for hydrogeological information.

35. Spatial variability of streambed hydraulic conductivity across multiple stream orders
(March 2017 – February 2018)

Submitted: October 20, 2016

Sponsor: U.S. Geological Survey

PI: A. Mittelstet (60%)

Co-PI: T.E. Gilmore (40%)

Amount: \$19,992

UNL Cost Share: \$40,091

Total Amount: \$60,083

SAP WBS Account Number: 25-6211-0020-010

A recent coupling of the Soil and Water Assessment Tool (SWAT) and MODFLOW – two powerful hydrological modeling tools that have historically only been used individually in Nebraska – presents an opportunity to more accurately represent the surface and groundwater processes. One key parameter for the SWAT-MODFLOW model is the streambed hydraulic conductivity (K). It is one of the most important parameters controlling the movement of water from the stream to the aquifer, and from the aquifer to the stream. To measure streambed K throughout the watershed is not feasible for most projects; therefore, modelers use literature values or limited measurements and assume streambed K doesn't vary across the watershed. We propose a method to estimate the variability of streambed K throughout a watershed using SSURGO data. Our central hypothesis is that streambed K will vary between the same and multiple stream orders as a function of soil

type of the contributing watershed.

36. Evaluation of changing irrigation management on ground water recharge and quality
(March 2016 – February 2017)

Submitted: September 28, 2015

Sponsor: U.S. Geological Survey

PI: T.E. Gilmore (50%)

Co-PI: D. Snow (25%)

Personnel: Steve Sibray (25%)

Amount: \$15,000

UNL Cost Share: \$31,888

Total Amount: \$46,888

SAP WBS Account Number: 25-6211-0020-003

The proposed research is designed to evaluate the use of groundwater age-dating tracers, isotopes, and dissolved nitrogen measurement to quantify the impact of recent watershed-scale changes in irrigation management on groundwater recharge rates, source, and quality. The research will be conducted in an alluvial aquifer where groundwater recharge rates and quality were assessed in the 1990s, prior to a recent shift from flood to center pivot irrigation.

Section 2.2.4 Numbered list (in reverse chronological order) of External Research Grants that have been submitted through other institutions. Include the title of the project, where the proposal was submitted (e.g. university x, consulting company y), funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to you, and date of submission.

1. Planning Grant Engineering Research Center for ENgineered Solutions for rUral REsilience--ENSURE: Food, Energy, Environment, and Infrastructure (September 2019 – August 2020)

Submitted: June 3, 2019

Sponsor: National Science Foundation

PI: Stacy Hutchinson (award to Kansas State University)

Co-PI: T.E. Gilmore (20%), J. Boll, M. Derby, N. Hendricks

UNL Amount: \$0

UNL Cost Share: \$0

Total Amount: \$99,907

Kansas State University (KSU) will partner with the University of Nebraska (UNL) and Washington State University (WSU) to plan for the Engineering Research Center for ENgineered Solutions for rUral Resilience - ENSURE: Food, Energy, Environment, and Infrastructure. ENSURE seeks to create sustainable rural communities through engineering innovations and in partnership with rural stakeholders.

2. Hydrological Science as a Key to Promote Effective Water Use and Conservation in Complex Productive Systems (September 2019 – August 2020)

Submitted: May 2019

Sponsor: CAPES-PRINT EDITAL 02 - NETWORK

PI: Didier Gastmans (award to UNESP-Rio Claro)

Co-PI: T.E. Gilmore (20%), J. Boll (WSU)

UNL Amount: \$0

UNL Cost Share: \$0

Total Amount: \$10,000 (approximate equivalent in US dollars)

This proposal for CAPES PRINT aim to support the development of an interdisciplinary and international network of scientists and graduate students to advance an exchange of knowledge, as well as a long-term research project, using hydrological science to promote water conservation in variable economic environments water dependent, such as agriculture and relates agroindustry, as well as ecosystems associated, in countries involved in this proposal. Together, all the participants attempt to understand the influences on hydrological cycle due to the main economic activities water dependent, such as corn and soya bean in USA, sugar cane in Brazil, and coffee in Costa Rica, and the role played by ecological conservations programs, integrating knowledge, data, and models from comparable study sites. Based on this initial integration our proposal will lead toward an intensive educational exchange program between graduate students from the universities involved in this proposal, based on the solution of practical problems related to water issues.

10. Using fiber optic distributed temperature sensing and point-scale measurements to quantify groundwater-surface water flux. (January 2017 - December 2017)

Submitted: January 10, 2017

Sponsor: Center for Transformative Environmental Monitoring Programs

PI: T.E. Gilmore (100%)

Amount: \$1,700

UNL Cost Share: \$0

Total Amount: \$1,700

Groundwater-surface water (GW-SW) flux measurement techniques, such as reach mass-balance, seepage meters, Darcian flux and temperature sensing can be applied simultaneously to provide multiple lines of evidence but challenges remain for directly linking results from different spatial and temporal scales of measurement. For smaller streams where groundwater discharge is a significant percentage of stream discharge into the reach (typically $\geq 10\%$), the integrated groundwater flux from point measurements can be compared to a larger-scale (i.e. 10^2 - 10^3 m reach length) approach to confirm results. But for reaches in larger stream (river) systems, the stream-groundwater discharge ratio is usually much too large to use reach mass balance as a direct point of comparison. A promising approach for linking point measurements and testing interpolation techniques in large river systems is fiber-optic distributed temperature sensing (FO-DTS). FO-DTS uses a fiber- optic cable to detect groundwater discharge through the streambed along the length of the cable (typically ≤ 1 km). This may be an effective way to “connect the dots” between point measurements of groundwater discharge in large systems, when other techniques like reach mass balance, are not feasible.

Section 2.2.5 Numbered list (in reverse chronological order) of External Research Grants Submitted through the University of Nebraska Lincoln Office of Sponsored Programs but **not Funded**. Include the title of the project, funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to you, and date of submission.

1. Monitoring effectiveness of conservation reserve program in wetlands using proximal and satellite remote sensing in the arid and semi-arid regions
Submitted: June 7, 2024
Sponsor: USDA
PI: N. Shrestha
Co-PI: H.D., Vimalajeewa, T.E. Gilmore, A. Mittelstet
Amount: \$973,724
Cost Share: \$0
Total Amount: \$973,724
2. Collaborative Research: MRA: Assessing snowscape interactions with ecosystem function and climate system feedbacks across the northern United States using NEON and PhenoCam data
Submitted: November 13, 2023
Sponsor: National Science Foundation
PI: T.E. Gilmore
Collaborating Institutions: Notre Dame (Lead Institution; A. Rocha) and Northern Arizona University (A. Richardson)
UNL Amount: \$277,318
3. CATALYTIC: Cyberinfrastructure to leverage ground-based image libraries for ecohydrological studies
Submitted: August 16, 2021
Sponsor: National Science Foundation
PI: T.E. Gilmore
Co-PIs: Mary Harner (UNK), Andrew Harms, Ruby Mehrubeoglu (TAMU-CC), Aaron Mittelstet
UNL Amount: \$692,615 (including sub-awards to UNK and TAMU-CC)
4. Data CI Pilot: Facilitating quantitative image-based watershed research and education for non-CI experts (Oct 1, 2021 - Sept 31, 2023)
Submitted: 3/23/2021
Sponsor: NSF
PI: T. Gilmore
Co-PI: A. Harms, with sub-awards to M. Harner (UNK), R. Mehrubeoglu (TAMU-CC), F. Birgand (NCSU)
Amount: \$887,479
UNL Cost Share: \$0
Total Amount: \$887,479
5. Implications of Microplastic Contributions from Fertilizer Application Practices to the Nitrogen Cycle in Agroecosystems (August 1, 2020 - July 31, 2024)

Submitted: April 8, 2020
Sponsor: USDA-NIFA
PI: T. Messer
Co-PI: S. Bartlett-Hunt, A. Schmidt, T.E. Gilmore (15%)
Amount: \$498,548 UNL
Cost Share: \$0 Total
Amount: \$498,548

6. Ag Chemicals, Water, and Genetics (March 2017 – February 2018) *Submitted:* December 2, 2019
Sponsor: National Institutes of Health
PI: M. Rhoades
Co-PI: T.E. Gilmore (5%), D. Reynolds, R. Franco, P. Shea, K. Eskridge, T. Donohue, P. Bierman, C. Beseler, R. Finnell
Amount: \$1,105,782
UNL Cost Share: \$0
Total Amount: \$0
7. Groundwater Age-dating with ^{39}Ar (January 2020 – December 2020)
Submitted: October 15, 2019
Sponsor: UNL – Layman Award
PI: T.E. Gilmore (100%)
Amount: \$0
UNL Cost Share: \$0
Total Amount: \$10,000
8. Multi-scale and multi-dimensional visualization and decision support for managing groundwater quality in agriculturally intensive regions (January 2020 – December 2024)
Submitted: August 7, 2019
Sponsor: Foundation for Food & Agriculture Research
PI: Jesse Korus
Co-PIs: T.E. Gilmore (10%), L. Bodnar, T. Franz, E. Haacker, D. Snow
UNL Amount: \$517,504
UNL Cost Share: \$520,759
Total Amount: \$1,038,263
9. Groundwater Transit Time Distributions: Seasonality and Modeling Approaches from Multiple Age-dating Tracers at Municipal Supply Wells in the High Plains Aquifer (September 1, 2018 – August 31, 2021)
Submitted: June 15, 2018
Sponsor: Dept of Interior-GS
PI: C. Ray (0%)
Co-PIs: T.E. Gilmore (75%), J. Korus (25%)
UNL Amount: \$250,000
UNL Cost Share: \$250,465
Total Amount: \$500,465
10. Nebraska Ecosystem Services Corridor Master Plan, Nebraska Environmental

Trust (July 2018 – June 2019)
Submitted: September 5, 2017
Sponsor: Nebraska Environmental Trust
PI: K. Lodl
Co-PIs: T.E. Gilmore (5%), D. Ferraro, E. Janning, L. Powell, S. Shepherd, E. VanWormer
UNL Amount: \$163,500
UNL Cost Share: \$158,105
Total Amount: \$321,605

11. Advancing Smart Decision-Making: ReNU-U Able Water for Agriculture.
(June 1, 2017 – May 2022)
Submitted: August 4, 2016
Sponsor: Dept of Agriculture-NIFA
PI: S. Bartelt-Hunt
Co-PIs: M. Dekraai, T.E. Gilmore (10%), X. Li, F. Munoz-Arriola, D. Rosenbaum, D. Snow, E. Thompson
UNL Amount: \$4,999,555
UNL Cost Share: \$0
Total Amount: \$4,999,555
12. Sand Hills streamflow: more than a faucet? (March 2017 – February 2018)
Sponsor: NE Water Center-USGS
PI: S. Thomas (40%)
Co-PIs: S. Thomas, T.E. Gilmore (30%), D. Gosselin, T. Messer
UNL Amount: \$20,000
UNL Cost Share: \$40,004
Total Amount: \$60,004

Section 2.2.6 Numbered list (in reverse chronological order) of External Research Grants
Submitted through other entities but not Funded. Include the title of the project, where the proposal was submitted (e.g. university x, consulting company y), funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to you, and date of submission.

1. Pre-proposal to Kansas State University Sponsored Programs for EPSCOR
Track 2: Harnessing Big Data for Water Solutions through Engineering and Computing Research and Integrated Training capacity: Water SECuRITY
(2020 – 2024)
Submitted:
Sponsor: National Science Foundation
PI: Melanie Derby (KSU)
Co-PIs: T.E. Gilmore (10%), S. Hutchinson, J. McMaine, S. Mohebbi
Senior Personnel: S. Bartelt-Hunt, S. Hutchinson, J. Vogel
UNL Amount: \$1,700,000
UNL Cost Share: \$0
Total Amount: \$5,829,566

- **Section 2.3 Other (Non-Research) Funding Record**

Section 2.3.1 Numbered list (in reverse chronological order) of Internally Funded Non-Research Grants. Include the title of the project, funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to you (as listed in NUGrant), SAP WBS Account Number.

<i>Project Title</i>	<i>Sponsor</i>	<i>Role (PI or Co-PI)</i>	<i>Dates</i>	<i>Total Amount</i> <i>(do not include UNL cost share)</i>	<i>% Attributed to Candidate</i> <i>(do not include UNL cost share)</i>
2018 American Geophysical Union Fall Meeting	ARD	PI	December 2018	\$500	100

1. 2018 American Geophysical Union Fall Meeting (December 2018)

Submitted: October 24, 2018

Sponsor: Agricultural Research Division (ARD)

PI: T.E. Gilmore (100%)

Total Amount: \$500

Travel award to support trip to the 2018 AGU Fall Meeting, where I gave an invited talk on groundwater nitrate and transit times.

Section 2.3.2 Numbered list (in reverse chronological order) of Externally Funded Non-Research Grants. Include the title of the project, funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to the candidate, SAP WBS Account Number.

Not applicable.

Section 2.3.3 Numbered list (in reverse chronological order) of External Non-Research Grants that have been submitted through the University of Nebraska-Lincoln Office of Sponsored Programs. Include the title of the project, funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to you, and date of submission.

Not Applicable

Section 2.3.4 Numbered list (in reverse chronological order) of External Non-Research Grants that have been submitted through other institutions. Include the title of the project, where the proposal was submitted (e.g. university x, consulting company y), funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to you, and date of submission.

Not Applicable

Section 2.3.5 Numbered list (in reverse chronological order) of External Non-Research Grants Submitted through the University of Nebraska Lincoln Office of Sponsored Programs but not Funded. Include the title of the project, funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to you, and date of submission.

Not Applicable

Section 2.3.6 Numbered list (in reverse chronological order) of External Non-Research Grants Submitted through other entities but not Funded. Include the title of the project, where the proposal was submitted (e.g. university x, consulting company y), funding agency, dates of project, PI and Co-PI's, sponsor amount, UNL Cost share amount, total amount, amount attributable to you, and date of submission.

Not Applicable

- **Section 2.4 Research Patents and Awards**

Section 2.4.1 Numbered list of Patents, including title, list of all inventors, date of publication and patent number

Not Applicable

Section 2.4.2 Numbered list of all National and International Research Awards and Recognition (*see documentation in Appendix D*)

1. University Council on Water Resources Ph.D. Dissertation Award – Honorable Mention, June 14, 2017.

Section 2.4.3 Numbered list of all Regional and Local Research Awards and Recognition

1. 2018 College of Engineering Recognition for Highly Impactful Research

- **Section 2.5 Other Research Accomplishments**

Section 2.5.1 Numbered list of Student Research Awards and Recognition

1. Galen Richards: Second place in Student Poster Contest, 2018 NIWR Regional Symposium (\$300)
2. Galen Richards: Chancellor's Fellowship (\$4,000/yr for 2 years), starting Fall 2018
3. Mikaela Cherry: Othmer Fellowship (\$8,000/yr for 3 years), starting Fall 2018

Section 2.4.1 Numbered list of funded proposals for mentored students (**NOTE: these funded and/or proposed projects are not included in my total research funding calculations**)

1. Mapping groundwater and surface water interaction in western Nebraska
Sponsor: Undergraduate Creative Activity and Research (UCARE, June 6, 2016 – August 12, 2016)
PI: J. Johnson
Faculty Mentor: T.E. Gilmore
Amount: \$2,400
UNL Cost Share: \$0
Total Amount: \$2,400
This research will explore the relationship between groundwater and surface water in western Nebraska using existing data and infrastructure, specifically to identify gaining and losing streams and create an online tool which identifies them as trends change. It is hypothesized that streams alternate between states of gaining and losing depending on various factors, such as

time of year, weather patterns, and human activities. Identifying gaining and losing streams in real time will demonstrate and increase understanding of the dynamic nature of groundwater-surface water interactions.

2. Using isotopes and isotopomers to evaluate nitrate source and fate in the vadose zone and groundwater (May 15, 2017 – Sept 15, 2017)

Sponsor: Indo-U.S. Science and Technology Forum (WARI Program)

PI: A. Kumar

Co-Mentor: D. Snow

Co-Mentor: T.E. Gilmore

Amount: \$9,000 (3-month stipend plus travel expenses for PI)

UNL Cost Share: \$2,200 (3-month stipend plus lab fee stipend from WFI)

Total Amount: \$11,200 (**note:** this proposal was routed through WFI, not NUgrant)

The only possible way to learn analysis of nitrate isotope is from internship outside India. Though India is rapidly advancing in field of research, still universities and institutes lack the expertise to measure nitrogen and oxygen isotope of nitrate extracted from water. The University of Nebraska is a fully functional lab and has the expertise to extract and measure nitrate in water.

Learning from the experts of University of Nebraska would ensure high quality training in this field. Apart from this, the technique for extraction and analysis of intramolecular distributions of ^{15}N in N_2O (isotopomers) would also be investigated. This would help to tightly constraint the source and sink relation of N_2O gas.

Section 2.4.2 Numbered list of Solicited Pre-Proposals/White Papers Submitted but not Funded

1. Platte River Recovery Implementation Program: Research Concepts for Test-scale Recharge Cells. Platte River Recovery Implementation Program (solicited pre-proposal, funding amount and dates are approximate; (**note:** this proposal was not routed through NUgrant)), \$75,000, August 1, 2016 – July 31, 2017, PI
2. North Platte Natural Resources District Research Concepts. North Platte Natural Resources District (solicited pre-proposal, funding amount and dates are approximate; (**note:** this proposal was not routed through NUgrant)), \$50,000, June 1, 2016 – December 31, 2017, PI

Section 3 Teaching Accomplishments (other than classroom instruction)

For Sections 3.1 through 3.6, only provide information for which the home university (e.g. UNL, other) officially recognizes your role.

• Section 3.1 Postdoctoral Researchers

Section 3.1.1 Numbered list (in reverse chronological order) of Postdoctoral researchers supervised. Include designated co-supervisors (if any), affiliation (e.g. UNL or other institution), % funding that you provided to the researchers, and the start and end dates of their appointments. Information on their current employment is also encouraged.

Not Applicable

Section 3.1.2 Numbered list (in reverse chronological order) of Postdoctoral researchers currently in progress under your supervision. Include designated co-supervisors (if any), affiliation (e.g. UNL or other institution), % funding that you provide to the researchers, and the start and expected end dates of their appointments.

Not Applicable

• **Section 3.2 PhD Students**

Section 3.2.1 Numbered list (in reverse chronological order) of PhD students whom you have supervised as chair or co-chair of their doctoral committees. Include designated co-supervisors (if any), affiliation (e.g. UNL or other institution), dissertation title, % funding that you provided to the student, and graduation date. Information on their current employment is also encouraged.

1. Mikaela Cherry, 80% (co-advised with Jesse Korus, UNL), Fall 2021, “Assessment and visualization of controls on groundwater transport and nitrate contamination”; currently employed at United States Geological Survey, Lincoln, NE
2. Caner Zeyrek, 100%, 2022 (co-advised with Aaron Mittelstet)
3. Kenneth Chapman, 100%, December 2023

Section 3.2.2 Numbered list (in reverse chronological order) of PhD students currently in progress whom you are supervising as chair or co-chair of their doctoral committees. Include designated co-supervisors (if any), affiliation (e.g. UNL or other institution), % funding that you provide to the student, and expected graduation date.

1. John Stranzl, 100%, 2026
2. Amit Topno, 20%, 2028 (co-advised with Aaron Mittelstet)

Section 3.2.3 Incomplete Ph.D. students

1. Griff Nuzzo, 50%, left PhD program Dec 2021 (co-advised with Aaron Mittelstet)

• **Section 3.3 MS Students**

Section 3.3.1 Numbered list (in reverse chronological order) of MS students (thesis option) whom you have supervised as chair or co-chair of their thesis committees. Include designated co-supervisors (if any), affiliation (e.g. UNL or other institution), thesis title, % funding that you provided to the student, and graduation date. Information on their current employment is also encouraged.

1. Martin Wells, 100%, Fall 2018, “Assessing the Relationship Between Groundwater Nitrate Concentrations and Environmental Variables Through Repeat Sampling and Statistical Machine Learning: Dutch Flats, Nebraska” Currently employed with USDA-NRCS in Washington State.
2. Galen Richards, 60% (co-advised with A. Mittelstet), Fall 2020, “Nitrate dynamics and source within nested watersheds of an agricultural stream, Nebraska, USA” Currently in PhD program, University of Idaho.

Section 3.3.2 Numbered list (in reverse chronological order) of MS students (thesis option) currently in progress whom you are supervising as chair or co-chair of their thesis committees. Include designated co-supervisors (if any), affiliation (e.g. UNL or

other institution), % funding that you provide to the student, and expected graduation date.

1. Prajwol Thapa, 20% (co-advised with Aaron Mittelstet), 2025
2. Muili Lawal, 20% (co-advised with Aaron Mittelstet), 2025

Section 3.3.3 Numbered list (in reverse chronological order) of MS students (thesis option) currently in progress, funded in other departments or not supervising as chair or co-chair.

1. Pavan Guggilla, School of Computing, 100%, Started Fall 2024, anticipated graduation in 2025
2. Jahir Uddin, 100%, School of Computing, Started Spring 2025, anticipated graduation in 2025

Section 3.3.4. Incomplete MS students

1. Mason Johnson, 100%, completed all research and draft thesis, but unable for final defense

Section 3.3.5 Total number of non-thesis option graduate students advised

1. Dakota Altman, 0% (M. Forsberg funding), 2023

Section 3.3.6 Total number of graduate student independent research projects supervised

• **Section 3.4 Undergraduate Students**

Section 3.4.1 Numbered list (in reverse chronological order) of undergraduate students supervised in independent research study. Include full name, year, semester and credit hours.

1. Joshua Johnson, Spring 2018 – Spring 2020 (undergraduate research in the Groundwater Lab and in field work)
2. Sydney Corcoran, Summer 2017 – 2019 lab and field work; includes advising for Environmental Studies capstone project in Spring 2019
3. Josiah Johnson, Fall 2015 and Summer 2016 (UCARE project for Groundwater Lab)

Section 3.4.2 Average number of undergraduate students advised per year: 1

• **Section 3.5 Visiting Scholars and Students**

Section 3.5.1 Numbered list (in reverse chronological order) of visiting scholars and students whom you have supervised during their official visit to UNL. Include the scholar/student's name, title (e.g. visiting PhD student, visiting professor), home affiliation, and dates of visit to UNL.

1. Glauco Eger, visiting PhD student, January-June 2020

• **Section 3.6 Graduate Student Committee Membership**

Section 3.6.1 Numbered list (in reverse chronological order) of UNL PhD students for whom you have served as a doctoral committee member. Include graduation date.

1. Karisma Yumnam (in progress; J. Keshwani)
2. Chandan Kumar (in progress; A. Malakar)
3. Nawaraj Shrethna (Summer 2021)
4. Femi Abimbola (Fall 2019)
5. Ann Kambhu (Fall 2018)

6. Justin Gibson (Fall 2018)

Section 3.6.2 Numbered list (in reverse chronological order) of UNL Masters thesis-option students for whom you have served as a masters committee member. Include graduation date.

1. Jacki Polashek (Fall 2019)
2. Wil Fraundorfer (Spring 2018)

Section 3.6.3 Numbered list (in reverse chronological order) of other PhD students at other universities for whom you have served as an external PhD reviewer. Include the student's home university and graduation date.

1. Craig Jensen, North Carolina State University, Spring 2024

Section 3.6.4 Numbered list (in reverse chronological order) of other students at other universities for whom you have served as a graduate committee member. Include the student's home university and graduation date.

1. Juan Camacho, PhD, University of Texas at Arlington, anticipated 2027
2. Markus MacNamara, MS, North Carolina State University, Spring 2022
3. Eric Humphrey, Ph.D., University of Utah, Spring 2023

- **Section 3.7 Teaching Awards and Recognition**

Section 3.7.1 Numbered list of International and National Teaching Awards and Recognition

Not Applicable

Section 3.7.2 Numbered list of Regional, Local and University Teaching Awards and Recognition

Not Applicable

- **Section 3.8 Other Teaching Accomplishments**

Section 3.7.1 Guest Lectures

1. ITESM (Mexico) Computer Science (Instructor: Professor Elizabeth López Ramos) Business Solution Development Capstone Course Project Advisor – 2023
 - a. KOLA Data Portal: <https://gaugecam.org/2023/08/16/itesm-capstone-collaboration-kola-data-portal/>
 - b. WaterFront: <https://gaugecam.org/2023/08/16/itesm-capstone-waterfront-software/>
 - c. Data Fusion: <https://gaugecam.org/2023/12/04/itesm-collaboration-data-fusion-project/>
2. NRES 453/853 (Instructor: Trenton Franz) – 2016 through 2022
3. NRES 115 (Instructors: Hanson/McNeil) – 2023 through 2024
4. BSE 350 (Instructor: Aaron Mittelstet) – 2021 through 2024
5. BSE 354 (Instructor: Aaron Mittelstet) – 2021 through 2024
6. ITESM (Mexico) Computer Science (Instructor: Gildardo Sanchez Ante) Advanced Artificial Intelligence for Data Science Course Project Advisor – 2022
 - a. <https://gaugecam.org/2022/11/30/gaugecam-itesm-collaboration-on-artificial-intelligence-for-camera-based-hydrology/>

Section 4 Service Accomplishments

- **Section 4.1 Professional Service**

Section 4.1.1 Numbered list (in reverse chronological order) of Journal Editorships or Associate Editorships including dates of service

Not Applicable

Section 4.1.2 Numbered list (in reverse chronological order) of Journals for which you have reviewed papers including number completed for that journal each year (e.g. 5 reviews in 2017).

1. Anais da Academia Brasileira de Ciências
 - a. 2022 (1)
2. Journal of American Water Resources Association
 - a. 2022 (1)
3. Journal of American Water Resources Association
 - a. 2022 (2)
4. Journal of Cleaner Production
 - a. 2022 (1)
5. Geophysical Research Letters
 - a. 2022 (1)
6. Agrosystems, Geosciences and Environment
 - a. 2022 (1, included grad student as prof dev)
7. Journal of Hydrology: Regional Studies
 - a. 2024 (1)
 - b. 2022 (2)
 - c. 2017 (2)
8. Science of the Total Environment
 - a. 2023 (1)
 - b. 2022 (1)
 - c. 2021 (3)
 - d. 2018 (1)
9. Journal of Hydrology
 - a. 2024 (2)
 - b. 2021 (1)
 - b. 2019 (1)
 - c. 2018 (3)
 - d. 2017 (1)
10. Hydrological Processes
 - a. 2023 (2)
 - b. 2021 (1)
 - c. 2020 (1)
 - d. 2019 (1)
11. Hydrology and Earth Systems Sciences
 - a. 2021 (1, with graduate student as prof dev)
12. Groundwater
 - a. 2020 (1)
13. Groundwater Monitoring and Remediation
 - b. 2024 (1)
14. American Society of Biological and Agricultural Engineers (ASABE)
 - a. 2023 (1)
 - b. 2019 (2)

- c. 2017 (2)
- 15. Hydrogeology Journal
 - a. 2106 (1)
- 16. Limnology and Oceanography Letters
 - a. 2023 (1)
- 17. Water Resources Research
 - a. 2017 (3)
 - b. 2015 (2)

Section 4.1.3 Numbered list (in reverse chronological order) of Leadership Positions in International and National Organizations

1. Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), Treasurer, 2021-2023
2. American Society of Biological and Agricultural Engineers, Standards Committee Member (2016-2021); NRES-25 (2015-2021); NRES-28 (2019-2021)
3. University Council on Water Resources (UCOWR), UNL Delegate, 2016 – present
4. Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), UNL Representative, 2016 – 2021

Section 4.1.4 Numbered list (in reverse chronological order) of Leadership Positions in Regional and Local Organizations

1. Nebraska Onsite Wastewater Advisory Committee (2021-present)
2. Nebraska Water Resources Association advisory (non-voting) board member, (Nov 2020-present)

Section 4.1.5 Numbered list (in reverse chronological order) memberships in Professional Organizations

1. American Geophysical Union, 2012 – present
2. Geological Society of America, 2018 – 2023
3. American Society of Biological and Agricultural Engineers, 2010 – 2020, 2023
4. National Groundwater Association, 2012 – 2019
5. American Water Resources Association, 2018 – 2019

Section 4.1.6 Numbered list (in reverse chronological order) of National and International Service Awards

Not Applicable

Section 4.1.7 Numbered list (in reverse chronological order) of Regional and Local Service Awards

Not Applicable

Section 4.1.8 Numbered list (in reverse chronological order) of Research Review panels and dates of service

1. National Science Foundation Review Panel, April 19-21, 2021

• **Section 4.2 University Service**

Section 4.2.1 Numbered list of leadership positions on university wide committees. Include committee name, dates, and title.

Not Applicable

Section 4.2.2 Numbered list of membership positions on university wide committees. Include committee name, dates, and title.

Not Applicable

- **Section 4.3 College Service**

Section 4.3.1 Numbered List of leadership positions on college wide committees. Include committee name, dates, and title.

Not Applicable

Section 4.3.2 Numbered list of membership positions on college wide committees. Include committee name, dates, and title.

Not Applicable

- **Section 4.4 Unit Service**

Section 4.4.1 Numbered list of leadership positions on unit committees. Include committee name, dates, and title.

1. School of Natural Resources Environmental Science Program Area, 2024-present, Program Leader
2. School of Natural Resources Community Engagement Committee, August 2018 – 2022, Secretary

Section 4.4.2 Numbered list of membership positions on unit committees. Include committee name, dates, and title.

1. Biological Systems Engineering Rogers Memorial Farm Committee, 2024-present, Member
2. School of Natural Resources Promotion and Tenure Committee, 2019 – 2024, Member
3. Biological Systems Engineering Department Faculty and Staff Success Committee, 2021 – present, Member
4. Biological Systems Engineering Computer Committee, 2018
5. School of Natural Resources Community Engagement Committee, 2017 – present, Member
6. School of Natural Resources Digital First Team (website evaluation and re-organization), 2016 – 2019, Member
7. School of Natural Resources Environmental Science Program Committee, October 2015 - present, Member
8. Biological Systems Engineering Department Awards Committee, 2015 – 2017, and 2019 – 2020, Member
9. School of Natural Resources Curriculum Review Committee, November 2015 - 2016, Member

- **Section 4.5 Other Service Accomplishments**

1. Conservation and Survey Division Social Media Coordinator, 2016 - 2020

Section 5 Extension Accomplishments

Note: This section was added to the standard COE C.V. template to account for my 30% Extension appointment.

Documentation for funded grants is included in Appendix C.

- **Section 5.1 Extension Grantsmanship**

Section 5.1.1 Numbered list of Externally Funded Extension Grants. See also Appendix B.

1. Delivery of Watershed Science Education to Decision Makers: A Multi-Agency Collaboration (April 2019 – March 2022)

Sponsor: Nebraska Environmental Trust

PI: T.E. Gilmore (40%)

Co-PI: K. Pekarek (15%), M. Taylor (15%), E. Ingram (15%), L. Pennisi (10%), J. Korus (5%)

Amount: \$225,204

UNL Cost Share: \$270,071

Total Amount: \$495,275

A watershed science training program will be delivered to water resources decision makers in Nebraska. Programming will be delivered collaboratively, leveraging the strengths and educational missions of partner agencies. The program will provide environmental benefits through strengthened natural and water resources management, delivering approximately \$112,500 in savings to Nebraskans (conservative estimate, details below). The initial audience is Natural Resources District (NRD) board members, building on a robust needs assessment and pilot materials delivered via

www.NebraskaWatershedScience.org. We envision a much broader audience developing over time. The project consists of (1) assessing existing water resources education efforts from water resources entities in Nebraska to find synergies between programs (2) development of a watershed science training program for NRD board members and related adult stakeholders (e.g. elected officials, water users) which utilizes online module development and facilitated education with UNL Extension Educators and NRD staff, and (3) robust evaluation of learning outcomes and impact of the training program. The collaborative program involves the Nebraska Association of Resources Districts, individual NRDs, Nebraska Department of Environmental Quality, Nebraska Department of Natural Resources, and the University of Nebraska. Collectively, in-kind and monetary contributions account for >50% of the project budget.

2. A Pilot Watershed Management Curriculum for Water Resources Managers (January 2017 – December 2017)

Sponsor: Nebraska Academy of Sciences

PI: T.E. Gilmore (50%)

Co-PI: J. Korus (50%)

Amount: \$3,000

UNL Cost Share: \$5,400

Total Amount: \$8,400

Currently, there is no comprehensive Watershed Management training program for NRD board members, who are elected officials with a wide range of educational and professional experience. We propose a pilot Curriculum that is highly accessible for NRD board members and that is focused on basic watershed science. Evaluation of the pilot training program will be used to improve the basic watershed science modules and to expand the curriculum to address more complex or site-specific issues faced by NRDs across Nebraska. This project includes collaborators in the Science Literacy Initiative (Cory Forbes and Erin Ingram), Human Dimensions research area (Lisa Pennisi), and Biological Systems Engineering Department (Derrel Martin).

Section 5.1.2 Numbered list of Internally Funded Extension Grants. See also Appendix B.

1. Watershed Science Curriculum: Training Resource for Water Resources Managers in Nebraska and Beyond (March 2017 – February 2018)

Sponsor: Nebraska Extension

PI: T.E. Gilmore (40%)

Co-PI: J. Korus (25%), L. Pennisi (15%), D. Martin (10%), E. Ingram (10%)

Collaborators: K. Pekarek, D. Divine, D. Hallum, S. Olafson-Lackey, S.

Sibray, A. Young, J. Groskopf

Amount: \$10,000

External Matching Funds: \$2,500

Total Amount: \$12,500

The proposed Watershed Science Training Program will use a blended learning approach (web-based + face-to-face) with training modules developed through construct-centered design. Currently, there is no readily accessible, comprehensive Watershed Science training program for Natural Resource District (NRD) board members in Nebraska. Individual NRDs must provide training materials or technical expertise for board members. The web-based program will be designed to meet the demands of learners with widely varying educational backgrounds and demographics, and it will provide an additional source of training beyond what NRD staff members can provide alone. Curriculum development includes a detailed plan for incorporating feedback from the learners. We propose a robust needs assessment and development of a curriculum that is highly accessible for NRD board members and that is focused on basic watershed science. Evaluation of the training program will be used to improve the basic watershed science modules and to expand the curriculum to address more complex or site-specific issues faced by NRDs across Nebraska. This program will be far-reaching. The NRD system is being studied by other states and countries, as water resources managers look for management models to improve water resource management. As a result, this program has the potential to be broadly applicable in Nebraska, in the United States, and globally.

Section 5.1.3 Numbered list of Extension Grant Proposals Submitted.

Not Applicable

- **Section 5.2 Extension Citizenship**

Section 5.2.1 Extension Issue Team Development and Implementation

1. WICS Water Quality Theme Lead, Fall 2022
2. Issue Teams #11 and #15 Joint Meeting on Water Quality in Nebraska, Fall 2018
3. Issue Team #11 (Water Use Efficiency) Planning Retreat, March 8-9, 2016, Aurora, NE.
4. Issue Team #11 Progress Report Video, August 29, 2016.
5. Issue Team #11 (Water Efficiency) Planning Sessions, Joint NCEA and UNL Extension Fall Conference, November 11-13, 2015.
6. Issue Team #15 (Water Quality) Planning Sessions, Joint NCEA and UNL Extension Fall Conference, November 11-13, 2015.

Section 5.2.2 Extension Committees and Planning Groups

1. 2021-2022 Aqua-Africa Water Curriculum Specialist
2. 2021 WICS Fall planning meeting, Kearney, Nebraska
3. 2021 National Envirothon Planning Committee (assisted with planning and grading for 2021 event)
4. 2020 Crops and Water Hub Planning, February 7, Kearney Nebraska
5. 2019 National Envirothon Planning Committee (developing content, scenarios, and assisting NRDs with preparation for the 2020 National Envirothon Competition in Lincoln, NE (*Summer 2020 event cancelled due to COVID-19*))
6. H₂O Today Exhibit Committee (reviewing and developing content for the American Museum of Natural History – Smithsonian exhibit for Nebraska State Museum in Morrill Hall) (September 2019 – January 2020)
7. Bazile Groundwater Management Area committee meetings (occasional attendee/participant, 2018 – 2019)
8. UNL Nitrate Team
9. Water Web Content Manager (Co-Manager, J. Korus) for Groundwater content on www.water.unl.edu, October 2015 – present.
10. School of Natural Resources Extension Retreat, Spring and Fall meetings in 2016, Hardin Hall – UNL East Campus, Lincoln, NE.
11. Water Well Interference Ad-hoc Committee (UNL, LENRD, LPSNRD), 2 roundtable discussions in 2016, Lower Platte South Natural Resources District Office, Lincoln, NE.

Section 5.2.3 Reviewer

1. State Climate Office Climate Report Reviewer (Groundwater and Surface Water sections), 2024

- **Section 5.3 Extension Workshops and Field Training**

Section 5.3.1 Numbered list of Extension Workshops Conducted

1. **Gilmore, T.E.**, Schuerman, B. Groundwater quantity and quality in Nebraska, Aqua-Africa Team Teacher Training II, Omaha, NE, 2022
2. **Gilmore, T.E.**, Schuerman, B. Groundwater quantity and quality in Nebraska, Aqua-Africa Team Teacher Training I, Omaha, NE, 2022
3. **Gilmore, T.E.**, A Survey of Bazile Creek and Groundwater Nitrate, Bazile

Creek Groundwater Management Area Field Day, Creighton, NE, September 9, 2021

4. Ingram, E., **Gilmore, T.E.**, Writing Nebraska's Water Management Story: Nebraska Watershed Science Collaborative Workshop, March 31, 2020 (virtual).
5. ***Gilmore, T.E.**, Korus, J., Groundwater and Sandhills Streams (presentation and field demonstration), Nebraska Ag Builders Meeting, Gudmundsen Sandhills Research Laboratory, Whitman, NE, July 23, 2019 (approx. 50 attendees).
6. **Gilmore, T.E.**, A. Mittelstet, G. Richards, Field demonstration of groundwater-surface water interaction measurement techniques, Creighton, NE, June 8, 2019 (approx. 15 attendees).
7. Cherry, M., **Gilmore, T.E.**, Field training on methods for groundwater age dating sample collection ($^3\text{H}/^3\text{He}$) and use of dissolved oxygen water quality probe. Tri-basin NRD and Little Blue NRD, Holdrege, NE. October 10, 2018. (4 attendees).
8. **Gilmore, T.E.**, Groundwater recharge: techniques and challenges, Nebraska Association of Resource Districts Vadose Zone Short Course, Kearney, NE. March 1, 2017. (50 attendees)
9. **Gilmore, T.E.**, J. Solder, J. Korus. Field workshop on methods for streambed and groundwater-surface water interaction measurement techniques. Platte River near Leshara, NE. June 24, 2016. (8 attendees)

- **Section 5.4 Extension Presentations**

Section 5.4.1 Numbered list of Extension Presentations

1.
2. **Gilmore, T.E.** Rusty Pivots as Indicators of Subsurface Conditions, Nebraska Well Drillers Annual Conference, Kearney, NE, February 11, 2025. (talk)
3. **Gilmore, T.E.** An Overview of Groundwater in Nebraska, Nebraska Sustainable Agriculture Society Annual Conference, Nebraska City, NE, February 1, 2025. (talk)
4. **Gilmore, T.E.**, Schuerman, B. Groundwater Flow and Rusty Pivots, Norris High School High School visit to UNL, Lincoln, NE, January 30, 2025 (workshop).
5. **Gilmore, T.E.**, Stranzl, J., Harner, M., Johnson, K., Terry, C., Bajelan, J., Wells, M., Smith, M., Chapman, K. Monitoring Water with AI and Imagery, Nebraska Legislature Natural Resources Committee visit to School of Natural Resources, Lincoln, NE, January 21, 2025 (poster).
6. **Gilmore, T.E.**, Water Research in the Sandhills, 25th Annual Gudmundsen Sandhills Laboratory Open House, Whitman, NE, August 21, 2024. (poster)
7. **Gilmore, T.E.**, Nitrate in Nebraska, Iowa Nutrient Research Center Fall 2024 Water Research Seminar Series: Trends, September 11, 2024. (virtual)
<https://go.iastate.edu/OM0HRP>
8. Akin, H., Harner, M., **Gilmore, T.E.**, Keshwani, J., Thompson, D., Public Engagement with Conservation-based Time-lapse Imagery and Data, Nebraska Environmental Education Conference, Ponca, NE, February 28-29, 2024.
9. **Gilmore, T.E.**, Nebraska WAVES Update to Natural Resources District Information and Education Committee, NRD Legislative Conference, Lincoln, NE, January 23-24, 2024.
10. ***Gilmore, T.E.**, How (Grasslands Feed the) Groundwater (that) Feeds the Unique

and Steady Sandhills Streams, Lincoln, NE, August 28, 2023.

11. **Gilmore, T.E.**, Groundwater nitrate and the red pivot project, Haskell Ag Lab Science & Ag Family Field Day, Concord, NE August 10, 2023.
12. *Cherry, M., **Gilmore, T.E.**, Red Pivot Study and How Water Moves in Our Aquifer in the Central Nebraska Area, Central Plains Irrigation Association (CPIA) Conference, Kearney, NE, February 28, 2023.
13. **Gilmore, T.E.**, *Cherry, M., Groundwater Research in the Upper Little Blue Basin, Little Blue NRD Board Meeting, Davenport, NE, February 14, 2023.
14. **Gilmore, T.E.**, *Cherry, M., Groundwater: Local conditions, groundwater movement, and the red pivot project, Central City Extension Day, February 14, 2023.
15. *Cherry, M., **Gilmore, T.E.**, A Pivotal New Approach to Groundwater Quality Assessment, South Central Water Conference, Holdrege, NE, January 31, 2023.
16. *Cherry, M., **Gilmore, T.E.**, Groundwater Mound Anomaly in South Central Nebraska, NRD 2022 Water Programs Conferences, Kearney, NE, March 1, 2022
17. ***Gilmore, T.E.**, Mittelstet, A.R., Zlotnik, V., Harner, M., Zeyrek, C., Stranzl, J., Chapman, K. Water at GSL: Research Update. Gudmundsen Sandhills Laboratory Advisory Board Meeting, Whitman, NE, January 24, 2022 (hybrid, delivered via Zoom)
18. ***Gilmore, T.E.**, Challenge: Watershed Science for Citizens who Manage Nebraska's Natural Resources, WICS Faculty Meeting, Lincoln, NE, September 30, 2021
19. ***Gilmore, T.E.**, Cherry, M. Update on groundwater research in the Upper Little Blue Basin, Tri-Basin Natural Resources District and Little Blue Natural Resources District Joint Integrated Management Plan Meeting, Hastings, NE September 9, 2021
20. **Gilmore, T.E.**, Cherry, M. Stable isotopes, Tri-Basin Natural Resources District Meeting, August 18, 2021 (virtual)
21. ***Gilmore, T.E.**, Water at GSL (presentation and discussion with U.S. Congressman Adrian Smith), Gudmundsen Sandhills Laboratory, Whitman, NE, July 13, 2021
22. ***Gilmore, T.E.**, A survey of nitrate dynamics and groundwater age in Bazile Creek watershed, Nebraska Ground Water Monitoring Council, April 13, 2021 (virtual)
23. ***Gilmore, T.E.**, A survey of groundwater transit times and delivery of nitrate in Bazile Creek, April 1, 2021 (virtual)
24. ***Gilmore, T.E.** Groundwater hydrology and nitrate in Bazile Creek. Bazile Groundwater Management Area Virtual Winter Meeting, March 5, 2021 (virtual)
25. Powers, C. (organizer), **Gilmore, T.E.** (presenter), Cherry, M., Groundwater Recharge Seasonality Roundtable, June 22, 2020 (virtual).
26. **Gilmore, T.E.** Watershed Science Education: Needs Assessment and Development, North Central Agricultural and Natural Resources Water Academy, Omaha, NE, February 12, 2020.
27. *Divine, D., **Gilmore, T.E.**, Cherry, M., Interpretive Geologic Maps and Cross Sections for Phelps, Kearney, and Adams Counties in Nebraska, Joint Tri-Basin and Little Blue NRD Board Meeting at the Nebraska Legislative Conference, Lincoln, NE, January 29, 2020.
28. ***Gilmore, T.E.** Hydrology Update. Gudmundsen Sandhills Laboratory

- Advisory Board Meeting, Whitman, NE, December 20, 2019.
29. ***Gilmore, T.E.**, Watershed Science Educational Resources, Water Center Tour with Legislative Staff, Lincoln, NE, October 30, 2019.
 30. ***Gilmore, T.E.** NRD Information and Education Staff Meeting, October 22, 2019.
 31. ***Gilmore, T.E.**, Groundwater Age: A Tool for Understanding Aquifer Impacts on Stream Water Quality 2019 North Central Region Water Network Webinar, October 9, 2019.
 32. ***Gilmore, T.E.**, Groundwater: Primary Source of Sandhills Streamflow, Center for Grasslands Studies Seminar Series, Lincoln, NE, September 30, 2019.
 33. **Gilmore, T.E.**, Korus, J., Pekarek, K., Pennisi, L., Ingram, E., Designing educational tools for locally-elected water resources directors, American Water Resources Association Spring Specialty Conference, Omaha, NE, March 25-27, 2019.
 34. ***Gilmore, T.E.**, Recent Groundwater Recharge Studies, Nebraska Department of Natural Resources Brown Bag Seminar, Lincoln, NE, March 29, 2019.
 35. ***Gilmore, T.E.**, Recent Groundwater Recharge Studies, 2019 Nebraska Water Industries Annual Convention, Kearney, NE, February 12, 2019.
 36. **Gilmore, T.E.**, Groundwater and Sandhills Streams, Sandhills Symposium, Lincoln, NE, February 8, 2019.
 37. ***Gilmore, T.E.**, Watershed Science Curriculum Concept, NRD Information and Educational Staff Meeting, Alma, NE, July 19, 2018.
 38. ***Gilmore, T.E.**, Watershed Curriculum Update, NRD Managers Meeting, Gothenberg, NE, June 6, 2018.
 39. ***Gilmore, T.E.**, Update on Watershed Science Curriculum, Upper Niobrara-White NRD Board of Directors Meeting, Chadron, NE, May 10, 2018.
 40. ***Gilmore, T.E.**, Watershed Science Curriculum and Dutch Flats Groundwater Nitrate Studies, North Platte NRD Board of Directors Meeting, Scottsbluff, NE, May 10, 2018.
 41. ***Gilmore, T.E.**, Watershed Science Training: Evaluating a proof of concept, 2018 NRD Water Programs Conference, Kearney, NE, March 6, 2018.
 42. ***Gilmore, T.E.**, Nebraska's Conservation Survey Division and Groundwater Hydrology Research, Agricultural and Groundwater Management Workshop, Barreiras, Bahia, Brazil, March 1, 2018.
 43. ***Gilmore, T.E.**, and G.C. Silva, Groundwater management in Nebraska, Staff and Stakeholder meeting at the Minister of Economic Development Office, Salvador, Bahia, Brazil, February 28, 2018.
 44. ***Gilmore, T.E.**, Groundwater resources in Nebraska and the High Plains Aquifer, Nebraska Independent Crop Consultant Association, Lincoln, NE. February 20, 2018.
 45. ***Gilmore, T.E.**, Legacy nitrogen and lag times in the subsurface, Nebraska Agri-Business Association, Kearney, NE. February 14, 2018.
 46. ***Gilmore, T.E.**, Watershed Curriculum Update, NRD Managers Meeting, Lincoln, NE, January 2018.

Section 5.4.2 Numbered list of Media Interviews, Articles or other recognition

1. Lab boosts understanding of water bodies, creates student opportunities | Nebraska

- Today. (2024, April 18). Retrieved January 6, 2025, from <https://news.unl.edu/article/lab-boosts-understanding-of-water-bodies-creates-student-opportunities>
2. Dizmang, H. (2024, February 26). A Different Midwest Wave. Retrieved January 6, 2025, from https://www.listennotes.com/podcasts/nebraska-on-tap/a-different-midwest-wave-dGBDeNHmp_I/
 3. Rust-stained irrigation pipes hint at lack of nitrate in groundwater | Nebraska Today | University of Nebraska–Lincoln. (2022, December 7). Retrieved January 6, 2023, from <https://news.unl.edu/newsrooms/today/article/rust-coated-irrigation-pipes-hint-at-lack-of-nitrate-in-groundwater/> (also picked up by [Phys.org](https://phys.org), [ScienceDaily](https://www.sciencedaily.com) and [Smart Water Magazine](https://www.smartwatermagazine.com))
 4. **Gilmore, T.E.**, The Nebraska WAVES programs aims to educate busy Nebraskan water citizens and Natural Resource District Directors on watershed management. (2021, July 29). Retrieved January 4, 2022, from <https://northcentralwater.org/the-nebraska-waves-programs-aims-to-educate-busy-nebraskan-water-citizens-and-natural-resource-district-directors-on-watershed-management/>
 5. Jones, N., Groundwater recharge in Nebraska, 2019 Strategic Discussions for Nebraska, recorded February 14, 2019; released November 2019.
 6. ***Gilmore, T.E.**, Groundwater recharge in Nebraska, UNL Market Journal video/television program, recorded November 19, 2018; released January 2019.
 7. Groundwater age-dating research highlighted on UNL Chancellor Ronnie Green’s Football Halftime Radio Address (<https://mediahub.unl.edu/media/10031>)
 8. Schrage, S. Need a refill? New approach streamlines estimation of groundwater recharge. UNL Pocket Science, September 21, 2018. <https://news.unl.edu/newsrooms/today/article/need-a-refill-new-approach-streamlines-estimation-of-groundwater-recharge/>
 9. Staff Writer, Husker-led team aims to track the age of groundwater. Nebraska Today, September 25, 2018. <https://news.unl.edu/newsrooms/today/article/husker-led-team-aims-to-track-the-age-of-groundwater/>

• **Section 5.5 Extension Publications**

Section 5.5.1 Numbered list of Non-Refereed Publications

1. Powers, C., Snow, D., **Gilmore, T.E.**, Groundwater Nitrate in Nebraska: Key Factors and Timescales of Movement* | UNL Water | Nebraska. (2024, May 8). Retrieved January 6, 2025, from <https://water.unl.edu/article/groundwater/groundwater-nitrate-nebraska-key-factors-and-timescales-movement/>
**NOTE: This online article is a duplicate of the Groundwater Nitrate Fact Sheet developed on request of Nebraska Legislative Staffer*
2. **Gilmore, T.E.**, Korus, J.T., (2024) Groundwater in Nebraska (ESN-11): University of Nebraska-Lincoln, Conservation and Survey Division, Earth Science Notes ESN-11, 2 pp. <https://digitalcommons.unl.edu/conservationsurvey/846/> (75%)
3. **Gilmore, T. E.** (2019). Why does groundwater nitrate vary so much across Nebraska? UNL Water. Retrieved November 13, 2019, from <https://water.unl.edu/article/groundwater/why-does-groundwater-nitrate-vary->

[so-much-across-nebraska](#) (90%)

4. **Gilmore, T.E.**, M. Johnson. (2016) Groundwater age and transit times in Nebraska. University of Nebraska-Lincoln School of Natural Resources. Created June 2016, Revised February 4, 2019. <http://snr.unl.edu/data/water/groundwater/GWAge/index.aspx>. (80%)

Section 5.5.2 Numbered list of Educational Videos, Modules, and Research Stories (Videos are short (<7 min) trailers introducing water resources/management topics, Modules are interactive and provide deeper educational experience, while Research Stories translate research results for extension presentations and direct access for stakeholders and citizens of Nebraska)

1. **Gilmore, T.E.**, Humphrey, E., Young, A. (2022, September 1). Groundwater and Sandhills Streams. Retrieved September 16, 2022, from <https://go.unl.edu/GWSS>
2. McCullough, C., Pekarek, K., and **Gilmore, T.E.** (2022). Nebraska's Nitrate Challenge. Retrieved from https://www.youtube.com/watch?v=BgZ1IjLN_fI
3. McCullough, C., Pekarek, K., and **Gilmore, T.E.** (2022). Nitrate in Nebraska -The Basics. Retrieved from <https://www.youtube.com/watch?v=9koZIifdIGY>
4. **Gilmore, T.E.**, Cherry, M. (2022, March 29). Red Pivots and Nitrate. Retrieved July 8, 2022, from <https://go.unl.edu/RustyPivots>
5. **Gilmore, T.E.**, Richards, G., Mittelstet, A. R., Snow, D. D., & Messer, T. L. (2021, December 9). Research Story: Bazile Creek and Groundwater Nitrate. Retrieved January 4, 2022, from <https://go.unl.edu/BCNitrate>
6. McCullough, C., Pekarek, K., **Gilmore, T.E.**, Korus, J., and Ingram, E. (2021) Video: Integrated Management Plans – The Basics. <https://nebraskawaves.org/managing-groundwater-resources-the-nebraska-way/>
7. McCullough, C., Pekarek, K., **Gilmore, T.E.**, Korus, J., and Ingram, E. (2021) Video: Integrated Management Plans – The People. <https://nebraskawaves.org/managing-groundwater-resources-the-nebraska-way/>
8. Pekarek, K., McCullough, C., **Gilmore, T.E.**, Korus, J., and Ingram, E. (2021) Video: What is NPS?. <https://nebraskawaves.org/managing-water-quality-the-nebraska-way/>
9. Pekarek, K., McCullough, C., **Gilmore, T.E.**, Korus, J., and Ingram, E. (2021) Video: Why Manage for NPS?. <https://nebraskawaves.org/managing-water-quality-the-nebraska-way/>
10. **Gilmore, T.E.**, Ingram, E., Pekarek, K., and Korus, J. (2020). Video: Integrated Management Plans – The Process. <https://nebraskawaves.org/managing-groundwater-resources-the-nebraska-way/> (80%)
11. **Gilmore, T.E.** (2019) Groundwater age, nitrate, and recharge. Interactive Educational Module for Natural Resources District Board Members and Staff, University of Nebraska-Lincoln School of Natural Resources and Department of Biological Systems Engineering. Created November 2019. <https://nebraskawatershedscience.org/curriculum/view/10> (90%)
12. **Gilmore, T.E.**, Korus, J., Ingram, E., Young, A. (2017) Groundwater Quantity. Interactive Educational Module for Natural Resources District Board Members and Staff, University of Nebraska-Lincoln School of Natural Resources and Department of Biological Systems Engineering. Created October 2017; revised October 2019. <http://nebraskawatershedscience.org/module1/> (60%)

13. **Gilmore, T.E.**, Korus, J., Ingram, E. (2017) Groundwater-Surface Water Interaction. Interactive Educational Module for Natural Resources District Board Members and Staff, University of Nebraska-Lincoln School of Natural Resources and Department of Biological Systems Engineering. Created November 2017. <http://nebraskawatershedscience.org/module2/> (60%)
14. **Gilmore, T.E.**, Korus, J., Ingram, E. (2017) Watershed Management Basics. Interactive Educational Module for Natural Resources District Board Members and Staff, University of Nebraska-Lincoln School of Natural Resources and Department of Biological Systems Engineering. Created November 2017. <http://nebraskawatershedscience.org/module3/> (60%)

Section 5.5.3 Numbered list of Educational Videos produced as part of WAVES team, or delivered via NebraskaWAVES.org

1. Korus, J. (2024). Airborne Electromagnetic Surveys. Retrieved from <https://youtu.be/L1bPnkXyfnC>
2. Heeren, D. (2023). NebGuide: Consumptive Use in Irrigation. Retrieved from https://youtu.be/otw_p2OwikI
3. McCullough, C., Pekarek, K. (2022). Nitrate and Human Health - Nebraska WAVES. Retrieved from <https://www.youtube.com/watch?v=7EPjhQlruKQ>
4. McCullough, C., Pekarek, K. (2022). Managing Nebraska's Water Quality for Nonpoint Source Pollution. Retrieved from <https://youtu.be/j7ZVc3ldad8>

Section 5.5.4 Numbered list of Publications in Peer-Reviewed Journals

1. **Gilmore, T. E.**, Korus, J., Pennisi, L., Martin, D., & Pekarek, K. (2019). Needs Assessment: Watershed Science for Water Resources Directors. *Journal of Extension*, 57(4). Retrieved from <https://archives.joe.org/joe/2019august/rb7.php>

Section 5.5.5 Numbered list of Publications submitted to Peer-Reviewed Journals

Not Applicable

• **Section 5.6 Extension Awards and Recognition**

Section 5.6.1 Numbered list of International and National Extension Awards and Recognition (*see documentation in Appendix D*)

1. National Winner of the Communications Award for Educational Video Recordings from the National Association of County Agricultural Agents for McCullough, C., Pekarek, K., and Gilmore, T.E. (2022). Nitrate in Nebraska - The Basics. Retrieved from <https://www.youtube.com/watch?v=9koZlfdlIGY>
Team members: T.E. Gilmore, J. Korus, D. Martin, K. Pekarek, E. Ingram, L. Pennisi
2. American Society of Agricultural and Biological Engineers (ASABE) Educational Aids Blue Ribbon Award for Pilot Watershed Science Curriculum for Natural Resources Districts, ASABE Annual International Meeting, Detroit, MI. July 29-Aug 1, 2018. *Team members: T.E. Gilmore, J. Korus, D. Martin, K. Pekarek, E. Ingram, L. Pennisi*

Section 5.6.2 Numbered list of regional, local and University Extension Awards and Recognition (*see documentation in Appendix D*)

1. University of Nebraska Extension Excellence in Extension Award for
Exceptional Teaching and Learning: Aqua-Africa/Build-a-Hut Program