

# Katherine Goode

RESEARCH AND DEVELOPMENT STATISTICIAN

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## Research Interests

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Model Assessment, Explainable Machine Learning, Data Visualization, Random Forests, R Package Development

## Education

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### Iowa State University

[Ames, IA](#)

DOCTOR OF PHILOSOPHY, STATISTICS

2016-2021

- Dissertation: Visual Diagnostics for Explaining Machine Learning Models
- Major Professor: Dr. Heike Hofmann

### University of Wisconsin, Madison

[Madison, WI](#)

MASTER OF SCIENCE, STATISTICS

2013-2015

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### Lawrence University

[Appleton, WI](#)

BACHELOR OF ARTS, MATHEMATICS

2009-2013

- Graduated Magna Cum Laude
- Senior Capstone: An Explanation of Double-Error-Correcting BCH Codes

## Awards

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### Midwest Statistical Machine Learning Colloquium Poster Award

AWARDED FOR POSTER USING LIME TO INTERPRET A RANDOM FOREST MODEL WITH AN APPLICATION TO BULLET MATCHING DATA

2019

### ISU Department of Statistics Dan Mowrey Consulting Excellence Award

AWARDED IN RECOGNITION OF OUTSTANDING CONTRIBUTIONS IN THE AREA OF STATISTICAL CONSULTING WHILE WORKING TOWARD A GRADUATE DEGREE.

2018

### ISU Department of Statistics Award for Experiential Development

PRESENTED TO A GRADUATE STUDENT FOR EXCELLENT PERFORMANCE IN MULTIPLE STATISTICAL EFFORTS (TEACHING AND CONSULTING) AS PART OF THE GRADUATE PROGRAM.

2017

## Experience

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### Postdoctoral Researcher

[Sandia National Laboratories](#)

STATISTICAL SCIENCES DEPARTMENT

Sep 2021 - Current

- Performed research on inverse models with functional data
- Implemented shape analysis methods with national security data
- Prepared manuscript for submission to peer reviewed journal

### Research and Development Intern

[Sandia National Laboratories](#)

STATISTICAL SCIENCES DEPARTMENT

Dec 2019 - Sep 2021

- Performed research on neural networks explainability with functional data
- Applied explainability methods to machine learning models
- Presented on work at internal and external events

### Graduate Research Assistant

[Iowa State University](#)

NATURAL RESOURCE ECOLOGY AND MANAGEMENT

Jan 2021 - June 2021

- Developed R Shiny application to predict taxonomy of fish eggs using random forests
- Assisted in writing manuscript to present the application
- Advised by Dr. Michael Weber and Dr. Philip Dixon

## Statistical Consultant

AGRICULTURE EXPERIMENT STATION

Iowa State University

May 2016 - Dec 2020

- Senior consultant from May 2018 to May 2020
- Helped with administrative decisions and trained new consultants
- Provided statistical support on research projects for graduate students, professors, and staff from the colleges of agriculture and life sciences, engineering, human sciences, liberal arts and sciences, and veterinary medicine
- Assisted with the implementation of analyses in R, SAS, JMP, and SPSS

## Graduate Research Assistant

DEPARTMENT NATURAL RESOURCE ECOLOGY AND MANAGEMENT

Iowa State University

May 2019 - Aug 2019

- Assisted with analysis of toxicology study of monarch butterfly larvae exposed to insecticides
- Wrote R code to compute profile confidence intervals for dose response curve models
- Collaboration with Dr. Steven Bradbury and PhD Student Niranjana Krishnan

## Data Analyst

RESEARCH ADMINISTRATION OFFICE

Lawrence University

2015

- Analyzed data from a study to compare the academic success and mood towards the university of undergraduates from freshman to sophomore years
- Performed statistical analyses using SPSS

## Data Collection Assistant

RESEARCH ADMINISTRATION OFFICE

Lawrence University

Sep 2014 May 2015

- Assisted with the data collection for a study on the evaluation of warning lights installed at a busy crosswalk on the university campus
- Used Tracker software to determine the deceleration rate of vehicles from videos taken of cars approaching the crosswalk

## Publications

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1. English, L. J., N., B., W., K., G., & M., L. (2023). Understanding the variation in vegetation composition of prairie restorations within crop yields. *Submitted to Ecological Restoration*.
2. Goode, K., Weber, M. J., & Dixon, P. M. (2023). WhoseEgg: Classification software for invasive carp eggs. *Submitted to PeerJ Life and Environment*.
3. Ausdemore, M. A., McCombs, A., Ries, D., Zhang, A., Shuler, K., Tucker, J. D., Goode, K., & Huerta, J. G. (2022). A probabilistic inverse prediction method for predicting plutonium processing conditions. *Frontiers in Nuclear Engineering*, 1. <https://doi.org/10.3389/fnuen.2022.1083164>
4. Goode, K., Weber, M. J., Matthews, A., & Pierce, C. L. (2022). Evaluation of a random forest model to identify invasive carp eggs based on morphometric features. *North American Journal of Fisheries Management*. <https://doi.org/https://doi.org/10.1002/nafm.10616>
5. Goode, K., & Hofmann, H. (2021). Visual diagnostics of an explainer model: Tools for the assessment of LIME explanations. *Statistical Analysis and Data Mining: The ASA Data Science Journal*, 14(2), 185–200. <https://doi.org/https://doi.org/10.1002/sam.11500>
6. Ball, E. E., Goode, K. J., & Weber, M. J. (2020). Effects of transport duration and water quality on age-0 walleye stress and survival. *North American Journal of Aquaculture*, 82(1), 33–42. <https://doi.org/https://doi.org/10.1002/naaq.10114>
7. Dixon, P. M., Goode, K., & Lay, C. (2020). *Profile likelihood confidence intervals for ECx*. <https://dr.lib.iastate.edu/entities/publication/7e0d7d0a-f514-4642-9814-c3b7bd821cc0>
8. Goode, K., Ries, D., & Zollweg, J. (2020). Explaining neural network predictions for functional data using principal component analysis and feature importance. *AAAI FSS-20: Artificial Intelligence in Government and Public Sector*. <https://doi.org/10.48550/ARXIV.2010.12063>