

Arkansas Cooperative Fish & Wildlife Research Unit

2026 Annual Report





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1. INTRODUCTION

The Cooperative Research Units program was established in 1935 to facilitate research and technical assistance between natural resource agencies and universities on topics of mutual concern and enhance graduate education in fisheries and wildlife sciences. Today, there are 43 Cooperative Research Units in 41 states, with a National Program Office located at the U.S. Geological Survey in Reston, Virginia.

The Arkansas Cooperative Fish and Wildlife Research Unit first opened its doors in August of 1988. The Arkansas Cooperative Research Unit currently manages a portfolio of >$5 million in 12 Arkansas-based research projects with 11 graduate students advised by two federal scientists. Over the past 39 years, the Arkansas Cooperative Research Unit has proudly trained and graduated over 86 graduate students, most of which are now working as professional biologists. Presently, those students are employed by federal, state, and private agencies, colleges and universities, or are continuing their graduate degrees at other schools. Arkansas Cooperative Research Unit leaders and students have published over 200 peer-reviewed publications. To learn more about the current members of the Arkansas Cooperative Research Unit, funding, research projects, and the activities and productivity of the current faculty and staff visit the official website at:

https://www1.usgs.gov/coopunits/unit/Arkansas

2. DIRECTION STATEMENT

The Arkansas Cooperative Fish and Wildlife Research Unit performs research designed to address the needs of Cooperators, bridging the gap between applied and basic wildlife and fisheries science. Collectively, unit scientists address questions relating to hunting/angling, private lands conservation, wildlife habitat restoration, invasive species prevention and eradication, sports fish conservation, wild turkey harvest, habitat responses to fire and fire risk, and many more natural resource issues. The unit works with many taxa, including birds, reptiles, freshwater fish and crayfish, mammals, and insects. Other research topics are addressed as needed, in keeping with the Cooperative Research Program's mission to prioritize the needs of our Cooperators by remaining flexible and open to new areas of inquiry.

Unit scientists will advance the training and education of graduate and undergraduate students at the University of Arkansas by teaching up to one graduate-level course per year in Biological Sciences, recruiting, training, and mentoring exceptional undergraduate and graduate students as well as postdoctoral researchers, and serving on graduate committees of non-Unit students.

The Arkansas Unit will endeavor to find opportunities for interaction and engagement between unit students and Cooperators as well as collaboration potential with fellow faculty at the University of Arkansas. Technical support and training will be provided to Cooperators and other agencies as the need exists.

3. NEWS and UPDATES

**All individuals listed alphabetically by last name.*

3.1. Where are they now?

- **Magoulick Lab:**
  - *Dr. Kearstin Findley*: postdoctoral researcher at The Ohio State University
  - *Dr. Sarah Sorensen*: postdoctoral researcher at University of Wyoming

3.2. Awards

- Lindsey LaBrie
  - Arkansas Chapter American Fisheries Society Natural State Scholarship 2026 Annual Meeting ($1000)
- Josh Tivin
  - Arkansas Chapter American Fisheries Society Outstanding Subunit member 2026 Annual Meeting
- Anne Puchalsky
  - Awarded an Arkansas Audubon Society Trust Grant 2026 ($500)
  - Second Place Oral Presentation at The Arkansas Chapter of the Wildlife Society Annual Meeting
  - Outstanding NWTF Benton County Longbeards Chapter Volunteer of the Year for 2026

3.3. Unit students and post-docs in action

- Michael Ferrara
  - Michael successfully defended his master's thesis, which assessed avian community composition in and around solar photovoltaic energy facilities
  - Michael was elected and currently serves Vice President of Arkansas Bird Alliance (formerly Arkansas Audubon Society)
  - Michael served as Publicity Director for Arkansas Bird Alliance (formerly Arkansas Audubon Society)
- Lindsey LaBrie
  - Lindsey was elected Treasurer of the University of Arkansas student subunit of the American Fisheries Society.
  - She presented her research at the Arkansas Chapter American Fisheries Society meeting, and the Southern Division American Fisheries Society meeting
- Gavin Saenz
  - Gavin was elected Vice-president of the University of Arkansas subunit of the American Fisheries Society
  - Gavin was elected Vice-president of the Biology Graduate Student Association of the University of Arkansas
- Josh Tivin
  - Josh and Dan published "Seasonal and Hydrologic Variation Influences Habitat and Functional Structure of Stream Fish Assemblages" in Frontiers of Environmental Science.
  - Josh was elected President of the University of Arkansas student subunit of the American Fisheries Society

    - Josh presented his research at Southern Division American Fisheries Society, Society for Freshwater Science, and the American Fisheries Society Annual Meeting
    - Josh was selected as the University of Arkansas team captain for the AFS Collegiate Fishing Initiative
- Anne Puchalsky
    - Anne was elected President of the University of Arkansas chapter of The Wildlife Society
    - Anne won 2nd place in graduate student presentations at the 2026 Arkansas Chapter of The Wildlife Society.
    - Anne presented her research at The Waterbirds Society, the Lower Mississippi Valley Joint Venture Waterfowl Symposium, and the Annual Arkansas Wildlife Society Conference.
- Lauren Luther
    - Lauren was elected Secretary of the University of Arkansas Chapter of the Wildlife Society.

4. RESEARCH PROJECTS

4.1. FY26 Completed Projects

- Assessing Wild Pig Impacts to Ecosystem Services: A Case Study on Diet, Density, and Space Use of Wild Pigs on the South Arkansas National Wildlife Refuge Complex
- Developing a Bioacoustic Classifier for Automated Detection of Priority Avian Species in the Lower Mississippi Valley Region
- Effect of current and future climate on Endangered Yellowcheek Darter (*Etheostoma moorei*) growth, survival and refuge use
- Effect of seasonality and flow regime on the functional structure of Ozark stream fish assemblages

4.2. Ongoing

- Wild Turkey Research in Arkansas that Meets Stakeholder Needs
- Quantifying and communicating successes in savanna restoration on Arkansas private lands
- Exploring Nest Success and Movement Patterns of King Rail in Southeastern Arkansas
- A statewide decision support tool for turkey conservation in Arkansas: mapping habitat suitability, population growth rates, and where management will be most impactful
- A National-Scale Early Detection And Ecosystem Service Impact Assessment Tool For Invasive Terrestrial Plants
- WildSNaP: Biodiversity in Solar through Native Planting
- Integrating spatial data for predicting the influence of altered hydrologic and thermal conditions on fish assemblage traits and taxa across stream flow regimes
- Examining effects of invasive crayfish and drought on *Faxonius marchandi*, an Ozark-endemic petitioned crayfish

- Landscape- and local-scale habitat influences on distribution and abundance of the crayfish *Faxonius eupunctus, Faxonius wagneri and Faxonius roberti* in the Spring River, Strawberry River and Eleven Point River drainages
- REU: Site: assessment and sustainable management of ecosystem services at the nexus of food, energy, and water systems
- Quantifying invasive carp range extents and impacts of invasive carp on native fish communities using environmental DNA metabarcoding
- Quantifying the role of flow regime in mediating fish trait – global change relationships across the Interior Highlands
- Environmental Thresholds Differentiating Native and Non-native Fish Occurrence in Great Plains Streams.
- Investigating the Response of *Nocomis* and *Lepomis* species and their Nest Associates to Anthropogenic and Hydrological Stressors in the Interior Highlands of Arkansas
- Effects of repeated fire and fire recency on shortleaf pine woodland understory and seed bank composition and diversity

4.3. Upcoming and Potential Projects

- Evaluating outcomes and learning from large-scale, landowner-led pine savanna restoration
- Influence of environmental thresholds on trajectories of freshwater assemblages with implications for building climate resilience across prairie landscapes
- Predicting fish community response to global change projections across the Interior Highlands
- Remnants of Land Use Past: Examining Effects of Historical and Contemporary Gravel Mining on Aquatic Communities in the Ozarks

5. PROJECT UPDATES

5.1. Fisheries



Non-invasive surveys for endangered Yellowcheek Darter (*Nothonotous moorei*) in the Little Red River

Funding Source: U.S. Geological Survey
Project Duration: August 2020 – June 2026
Principal Investigator: Dan Magoulick
Graduate Student: Kearstin Findley (Ph.D.)

Research Objectives:

- Non-invasively assess current Yellowcheek Darter and co-occurring species populations in the Little Red River (LRR), Arkansas by using underwater cameras.
- Evaluate abiotic factors that influence darter density in the Little Red River, Arkansas from field measurements and video footage.

Management Implications:

- Our study provides management with an alternative technique to sample fishes in clear streams without causing harm to individuals or damaging habitats.
- The use of cameras allows for community sampling and microhabitat evaluation that can be compared to other survey techniques.
- Our goal is to provide information for the Yellowcheek Darter Recovery Plan by non-invasive measures that could be used for a variety of species including other threatened and endangered species.

Project Summary:

1. Biodiversity is declining due to habitat loss and fragmentation, more extreme temperature and precipitation events, and additional anthropogenic factors. Historic methods of fish

population monitoring are associated with some degree of mortality and stress to individuals. Yellowcheek Darter (*Nothonotus moorei*) are an endangered and endemic species in the Little Red River (LRR) that would benefit from continued monitoring. However, current kick seine practices cause harm to the species and habitat and require a federal permit. We evaluated a non-invasive survey technique for Yellowcheek Darters and the community of fishes that co-occur in the LRR.

2. Snorkel surveys were used to estimate current population densities, detection probabilities, and microhabitat-use of darter species. Underwater cameras were used to assess the community of fishes in the LRR. Snorkeling used line-transect surveys, and underwater cameras recorded 30 minutes of footage per camera, both taking place in pool, run, and riffle habitat sequences across 13 sites over two summers (2021-2022). Microhabitat data was collected during surveys by establishing transects across each habitat and measuring area, depth, velocity, and substrate. Additionally, individual fish microhabitat variables were collected at snorkeling observation points. Video recordings were manually scored for MaxN (i.e. maximum number of individuals of each species on screen at the same time) turbidity, and percent cover.
3. Yellowcheek Darters were observed via snorkeling in riffle and run habitats during both years with density estimates being higher in 2021 (2.64 individuals per m^2) than 2022 (0.67 individuals per m^2) and detection probability being relatively high in both years, 2022 ($p = 0.75$) than 2021 ($p = 0.66$). Through manual analysis of 140 cameras, which represents 70 hours of footage collected, and over 17 hours of viewed footage, we observed 16 species of fish including Yellowcheek Darter and additional representatives of the families *Percidae*, *Centrarchidae*, *Leuciscidae*, and *Catostomidae*. Redundancy analyses (RDA) were used to evaluate relationships between species and microhabitat for both snorkel and cameras. Yellowcheek Darters were associated with Rainbow Darter and Banded Darter as well as high velocity for snorkel surveys. Cameras associated Yellowcheek Darter with Rainbow Darter, high velocity, and high percent cover. Principal component analysis (PCA) was used to evaluate darter microhabitat-use vs. availability from the snorkel data, which showed each of the five darter species used habitats based on availability (i.e. no habitat selection).
4. Our study provides information that can be used for the Yellowcheek Darter Recovery Plan and shows the effectiveness of non-invasive sampling methods in riverine environments. This should benefit endangered Yellowcheek Darter populations as well as other small bodied cryptic species.



Quantifying the role of flow regime in mediating global change impacts on stream fish communities

Funding Source: U.S. Geological Survey
Project Duration: May 2025 – December 2029
Principal Investigator: Dan Magoulick
Graduate Student: Josh Tivin (Ph.D.)

Research Objectives:

- Quantify the role of flow regimes in mediating the impacts of climate, land use, and hydrologic alteration on functional traits, guilds, and diversity indices
- Model changes in functional and taxonomic diversity in response to future global change scenarios.

Management Implications:

- Identifying flow regimes and functional traits most vulnerable to global change will inform conservation planning under future climate change and land use scenarios.
- Results will inform the development of adaptive management strategies for species sensitive to climate, land use, and hydrologic pressures.
- Outputs will depict areas of high functionality and taxonomic diversity, promoting areas for conservation opportunities.

Project Summary:

1. Freshwater systems are experiencing heightened global climate, land use, and hydrologic pressures that pose a threat towards community reorganization and the homogenization of stream fish communities. However, aquatic systems are not impacted uniformly, as the flow regime and underlying hydrologic template are primary drivers of community

composition and functional structure. Therefore, understanding the role flow regimes play in mediating community response is crucial for effective management planning.

2. This research aims to examine how the flow regime acts as an underlying mechanism that dictates the response of functional diversity and fish traits to environmental disturbance. This was done through local and largescale studies to examine the impacts of seasonality, climate, land use, and hydrology on functional diversity metrics and specific functional traits using a variety of trait-based approaches.
3. We found that Runoff (RO) and Intermittent (INT) streams demonstrated greater variability in habitat and functional diversity than Groundwater (GW) streams, attributed to the harsh precipitation and drying patterns in RO/INT systems. GW streams also depicted greater stability within the functional structure of the community, supporting greater evenness of traits and more specialized trait combinations.
4. Global change – trait relationships were highly context dependent, with the flow regime mitigating or enhancing select pressures. While climate change exhibited the greatest importance on trait - global change relationships across all flow regimes, the number and strength of relationships varied, with RO streams harbouring the most relationships, followed by INT and GW.
5. By understanding how flow regime mediates functional diversity and trait relationships, we can better target conservation strategies to safeguard functionally sensitive fish communities and stream types. Ultimately, this research will guide management efforts under increasing global change uncertainty in freshwater ecosystems.



Habitat influences, movements, and non-native crayfish threats of *Faxonius eupunctus* complex Crayfish in the Eleven Point, Spring, and Strawberry Rivers of Arkansas and Missouri

Funding Source: State Wildlife Grant, Arkansas Game and Fish Commission
Funding Duration: 2021-2026
Principal Investigator: Dan Magoulick
Graduate Student: Casey Davis (Ph.D.)

Research Objectives:

1. Understand how local- and landscape-scale habitat factors affect the abundance and distribution of Faxonius eupunctus, F. wagneri, and F. roberti.
2. Examine movement behaviors of Faxonius eupunctus in a 5th order stream.
3. Deduce current spatial extent of non-native Faxonius neglectus in the Strawberry River drainage.

Management Implications:

1. Relationships between the abundance and distribution and the habitat factors may differ among the three crayfishes, and understanding those differences could be critical for conservation efforts.
2. Movement behaviors of crayfish are poorly understood, especially for native crayfishes in large streams, and knowledge could be useful for planning locations and scales of conservation actions.

3. *Faxonius neglectus* has already caused damage to *Faxonius roberti* populations in the Spring River drainage. Understanding *Faxonius neglectus* extent is necessary for future conservation actions for *Faxonius roberti* and other native crayfishes in the Strawberry River drainage and informs management of *Faxonius roberti* overall.

Project Summary:

1. Crayfish are important to the structure and function of freshwater ecosystems, but many are imperiled due to human activities. The Coldwater Crayfish *Faxonius eupunctus* was recently split into three species: *F. eupunctus*, *F. wagneri*, and *F. roberti*. Existing studies lack this context, which could be important to the conservation of the *eupunctus* species complex.
2. Thirty-two locations were sampled during 2023, 2024, and 2025. Crayfish were collected using kick seining and habitat covariates were collected on-site or online. Relationships between habitat factors and crayfish occurrence are being examined using occupancy modeling. 150 *F. eupunctus* were implanted with PIT tags at one 5th-order site in 2024. Tags were relocated twice weekly for two months using a handheld antenna and locations recorded using GPS. Home ranges were calculated in ArcGIS, and linear models were used to compare sizes and sexes. Seven locations were searched for *F. neglectus* in 2025.
3. Occupancy sampling found *F. eupunctus* and *F. roberti* each at 53% of locations. *Faxonius wagneri* was not detected at any of the 11 sampled locations in its presumed range. Analysis of data is ongoing.
4. 57% of tagged *F. eupunctus* were relocated at least once, and 40% more than once. Home ranges averaged 15.2 m^2 using kernel density and 22.1 m^2 using minimum convex polygons. Move frequency averaged 2.3 times and distance 18.4 meters over the course of the study. Larger crayfish appeared to move less frequently, but other relationships were insignificant.
5. *Faxonius neglectus* was found throughout Piney Fork and Mill Creek, and in the Strawberry River just downstream of the mouth of Piney Fork. Additional sampling is underway.
6. Knowledge of *eupunctus* complex occupancy, movement, and non-native threats will assist scientists and managers in future conservation actions, such as locating and prioritizing habitats for protection, restoration, or mitigation efforts.



Investigating the Response of *Nocomis* and *Lepomis* species and their Nest Associates to Anthropogenic and Hydrological Stressors in the Interior Highlands of Arkansas

Funding source: US Geological Survey
Funding duration: June 2025 to December 2028
Principal Investigator: Dr. Dan Magoulick
Graduate Student: Alexandra King (Ph.D.)

Research Objectives:

- Examine the effect of local and landscape variables on *Nocomis* and *Lepomis* species nesting distribution, density, and occupancy
- Investigate the relationship between nest association and predation in solitary and colonial nest building fishes
- Assess the influence of hydrologic and thermal stressors on nesting abundance and density, and the effect of spawning timing on guarding male size, nest size and dimensions, nest abundance, and nesting mode (solitary vs. colonial).

Management Implications:

- Identify optimal micro- and mesohabitats of *Nocomis* and *Lepomis* species and their nest associates.
- Quantify environmental, hydrological, and thermal thresholds of *Lepomis* and *Nocomis* and their nest associates and identify stressors posing the greatest risk to nest builders in Ozark streams.
- Forecast stressors and designate critical habitat areas and target habitats for remediation to improve recruitment strength and abundance of ecosystem engineers.

Project Summary:

1. Redspot chub (*Nocomis asper*) and hornyhead chub (*Nocomis biguttatus*) modify habitats by constructing spawning mounds, providing spawning habitat and refugia for nest associates.
2. In Arkansas, redspot chub are listed as species of greatest conservation need (SGCN).
3. Therefore, it is vital to monitor *Nocomis* species and their nest associates in the Interior Highlands of Arkansas, as they are sensitive to anthropogenic stressors, habitat alterations, and sedimentation, particularly alterations in land use (i.e., gravel mining, dewatering, dam releases, and siltation).
4. Currently, there is limited research regarding optimal spawning habitats and nesting characteristics of redspot chub and the undescribed hornyhead chub in the White River drainage.
5. Data collection is ongoing. Currently, I have sampled 40 unique sites in Arkansas from late April to the end of August.
6. I mounted underwater cameras <1m downstream of *Nocomis* and *Lepomis* species nests to monitor spawning timing, nest density, predator presence and predation events, and nest associate richness and relative abundance.
7. Redspot chub nests were detected in 4/19 sites in the Illinois drainage (21%) and spawning activity ceased by late May. Comparatively, hornyhead chub nests were detected in 7/19 (37%) sites in the White River drainage and spawning ceased by late July. Longear sunfish nests were detected in 13/19 (68%) sites in the White River drainage and only 5/19 (26%) sites in the Illinois River drainage had *Lepomis* nests present. Protected areas had some of the highest nest densities observed.
8. This research will improve our understanding of optimal fish spawning habitats in stream ecosystems and the response of ecosystem engineers to habitat exploitation and climate change.
9. Population declines in *Nocomis* and *Lepomis* species and their nest associates could result in declines of keystone predators such as black bass, particularly the endemic Neosho bass *(Micropterus dolomieu velox*). Understanding the influence of mutualistic nest associations on food webs and population dynamics is crucial for future conservation efforts.



Environmental thresholds for darter species and assemblages in the Interior Highlands

Funding Source: U.S. Geological Survey and U.S. Fish and Wildlife Service
Project Duration: August 2020 – August 2026
Principal Investigator: Daniel D. Magoulick
Postdoctoral Researcher: Dr. Sarah F. Sorensen

Research Objectives:

- Identify ecological drivers of darter species in the Ozark-Ouachita Interior Highlands across different flow classes.
- Determine which alteration metrics are associated with ecological thresholds for darter communities and individual species.

Management Implications:

- Provide threshold information to stakeholders to better identify and prioritize conservation needs for darter species and assemblages.
- Provide guidance for future conservation of darter assemblages in streams facing changing temperatures, flow patterns, and land use.

Project Summary:

1. We examined darter (genera *Nothonotus, Percina, Etheostoma, Ammocrypta, and Crystallaria*) occurrence data at 809 sites throughout the Ozark-Ouachita Interior Highlands within groundwater, runoff, and intermittent streams. Using Gradient Forest, we modeled the occurrence data against 64 predictor variables representing climate change, stream temperature, hydrologic, and land use alteration metrics. We further

analyzed 14 individual species, including state and federally threatened/endangered species and species found commonly throughout the study area.

2. Across all flow classes, the land use alteration metrics had the greatest number of ecological thresholds and hydrologic alteration had the fewest. However, climate change metrics had a greater R^2-weighted importance for groundwater intermittent streams, followed by stream temperature. For runoff streams, climate change and stream temperature metrics were not significantly different, but had a significantly greater R^2-weighted importance than hydrologic and land use alteration.
3. Community level thresholds exist in groundwater streams for summer air temperatures, winter air temperatures, and spring water temperatures. Runoff and intermittent streams do not have any strong thresholds at the community level.
4. Among state and federally threatened and endangered species, the Niangua Darter, Leopard Darter, and Blackside Darter have significant predictor variables associated with ecological thresholds. The federally threatened Niangua Darter, modeled in runoff streams, experiences a decrease in likelihood of occurrence for streams that have a greater increase in winter temperatures. The federally threatened Leopard Darter, modeled in runoff streams, is less likely to occur in streams with more rapidly warming fall temperatures. The Oklahoma threatened Blackside Darter, modeled in groundwater and runoff streams, is less likely to occur in streams with more rapidly warming winter air temperatures in runoff streams but does not have a threshold in groundwater streams.
5. For species modeled in all three flow classes, more thresholds were present in runoff and intermittent flow classes than groundwater. Common thresholds were for overall increase in spring and winter air temperatures and higher rates of changing air temperatures in the spring.
6. Results from this project highlight the risk darter species face as a result of climate change, especially in runoff and intermittent streams. By identifying what alteration metrics have the greatest impact on darter communities and individual species, conservation practitioners and managers can target at risk streams and species.



Quantifying invasive carp range extents and impacts of invasive carp on native fish communities using environmental DNA metabarcoding

Funding Source: Arkansas Game and Fish Commission
Project Duration: July 2025 – December 2026
Principal Investigator: Dr. Caleb Roberts
Graduate Student: Lindsey LaBrie (PhD Student)

Research Objectives:

- Document and update the current known extent of invasive carp (bighead, black, and silver carp) ranges in Arkansas.
- Quantify the effects of invasive carp presence on native fish communities in Arkansas along the invasion gradient.

Management Implications:

- Provide georeferenced data on fish community composition, including native and invasive species, derived from eDNA samples.
- Create maps of current invasive carp (bighead carp, silver carp, black carp) ranges in Arkansas.
- Determine the relative impacts of invasive carp on native fish communities and provide management targets for AIS biologists

Project Summary:

1. Aquatic invasive species (AIS) pose a major threat to freshwater ecosystems across the world. AIS regularly outcompete native fishes for space and food resources, which can lead to biodiversity declines in invaded systems. Bighead, silver, and black carp (*Hypophthalmichthys nobilis, H. molitrix, Mylopharyngodon piceus;* hereafter: invasive carp)

were originally introduced into aquiculture ponds in Arkansas in the 1970s for the purpose of controlling algae, phytoplankton, and parasite-vectoring mollusks and have since expanded their range across Arkansas and the United States.

2. Arkansas is home to over 60 species of conservation concern, including many species endemic to Arkansas, and 6 threatened and endangered (T&E) species. However, the interactions between invasive carp and native species, and the resulting effects on overall biodiversity in Arkansas waterways, are not well documented. It becomes imperative, then, to understand where invasive carp are, how they affect the native fish community, where they might spread next, and how the aquatic community is changing over time in response to invasive carp presence.
3. Following an environmental DNA (eDNA) metabarcoding approach, we collected and filtered water samples at 75 sampling locations across ten of Arkansas's major rivers monthly from May through August 2025 and 2026 (a total of 600 samples). We sent the filters to a commercial laboratory for DNA analysis and sequencing.
4. We finished sample collection in August 2026, and statistical analysis is forthcoming. We will determine the current distribution of invasive carp in Arkansas by mapping the detections derived from our georeferenced eDNA samples. We will consider the farthest upstream detection of each invasive carp species to be the current "edge" of their range in each river.
5. We will also quantify the effects of invasive carp on native fish communities using a statistical modeling approach, such as Bayesian occupancy modeling. We will create Bayesian single-species occupancy models for each focal invasive carp species. To determine which predictor variables best explain native fish community occupancy and species richness, we will develop a set of candidate multi-species occupancy models from combinations of predictor covariates (i.e., invasive carp occupancy, years-since-invasion, environmental covariates).
6. Outputs from statistical analyses will show predicted relative impacts of invasive carp on native fish communities, which can provide targets for resource managers to assign priorities to contain the spread of invasive carp and mitigate further impacts on native fish communities.



Environmental Thresholds Differentiating Native and Non-native Fish Occurrence in Great Plains Streams.

Funding Source: U.S.G.S.
Project Duration: January 2026 – May 2027
Principal Investigator: Dr. Daniel Magoulick
Graduate Student: Gavin Saenz (M.S. Student)

Research Objectives:

- Identify and classify species as native or non-native at the HUC8 scale using the USGS Non-indigenous Aquatic Species Database SEINeD tool, supplemented taxonomic corrections using relative published literature.
- Compile and integrate a multi-state fish occurrence dataset spanning fourteen Great Plains states to characterize native and non-native fish assemblage composition across twenty thousand sampling events.

- Identify key ecological and hydrological environmental predictors, including climate, hydrology, land cover, and impoundment variables, that may differentiate native from non-native fish occurrence across Great Plains streams.
- Apply Gradient Forest modeling to identify environmental thresholds along which native and non-native fish assemblage composition shifts most rapidly across the Great Plains.
- Analyze thresholds from Gradient Forest Analysis and pinpoint areas of abrupt non-linear change.
- Apply threshold analysis to Gradient Forest outputs to identify specific environmental values at which abrupt, non-linear shifts in native and non-native fish assemblage composition occur across the Great Plains stream study area.

Management Implications:

- Identifying environmental thresholds that differentiate native from non-native fish occurrence will provide resource managers with quantitative benchmarks for prioritizing conservation and restoration efforts in these Great Plains streams.
- Findings will help identify watersheds and stream reaches where land use change, groundwater extraction, or impoundment has pushed conditions beyond thresholds favorable to native fish assemblages.
- This work will provide a regional framework for anticipating how ongoing climate change and hydrological alteration may shift the balance between native and non-native fish communities across the Great Plains.

Project Summary:

1. Native fish assemblages in Great Plains streams are increasingly threatened by the establishment and spread of non-native species, driven by a combination of altered hydrology, land use change, and impoundment. Understanding the environmental conditions that facilitate non-native fish occurrence is critical for effective conservation and management of these systems.
2. This study compiles a multi-state fish occurrence dataset, spanning 14 Great Plains states and uses Gradient Forest modeling to identify ecological and hydrological thresholds differentiating native from non-native fish occurrence. Environmental predictors include climate variables derived from PRISM 30-year normals, dam density from the National Inventory of Dams, land cover from NLCD 2019, hydrological variables from NHDPlus HR,soil and lithological variables from StreamCat, as well as the Hydrologic Alteration Index (HAI) from McManamay et al. (2022).
3. We expect that environmental variables related to hydrology, impoundment, and land cover will emerge as important predictors of native and non-native fish assemblage composition across the Great Plains, though the specific nature and direction of these relationships will be determined empirically through modeling.
4. By characterizing the environmental conditions that facilitate non-native fish establishment, this research will support proactive management of Great Plains stream

ecosystems under increasing hydrological and climatic uncertainty and provide a regional baseline for monitoring future shifts in native and non-native fish communities.

5.2. Wildlife



Exploring Nest Success and Movement Patterns of King Rail in Southeastern Arkansas

Funding Source: Arkansas Game and Fish Commission
Project Duration: January 2025 – May 2027
Principal Investigator: Caleb Roberts
Graduate Student: Anne Puchalsky (M.S. Student)

Research Objectives:

- Estimate King rail apparent nest success rate and daily nest survival probability at Freddie Black Choctaw Wildlife Management Area: West Unit, located in Desha County, Arkansas.
- Explore nest site characteristics and movement patterns of King rail within the wetland units of Choctaw.

Management Implications:

- Provide information on what factors most influence nest success such as vegetation, habitat composition and water levels to inform management that promotes King rail nesting habitat.
- Utilize movement data of an inland population of King rail to inform space requirements needed for future restoration planning.

Project Summary:

1. The King rail (*Rallus elegans*) is a critically imperiled breeding species in the state of Arkansas that have faced population declines due to a variety of threats. A successful breeding population of King rail is located in the restored wetlands of Freddie Black Choctaw Island: West, Wildlife Management Area (WMA) in southeastern Arkansas. By

understanding nesting metrics and movement patterns, we can inform conservation planning that will bolster and potentially expand populations.

2. Through nest location and monitoring, we will determine apparent nest success of the species at Choctaw West. We will also sample nest site characteristics such as water levels and habitat composition to understand what factors may influence nest success by completing daily survival rate analyses. To understand movement, we will capture birds and outfit them with GPS/GSM transmitters to track their movements around Choctaw West.
3. Over the 2025 and 2026 field seasons, 31 nests were located and used to calculate apparent nest success and included in daily survival rate analysis. Eleven birds were banded, and seven transmitters were deployed. Three transmitters are still providing reliable fixes for movement analyses.
4. King rail nests have a higher probability of survival in areas with higher emergent vegetation, and denser vegetation. A higher percentage of scrub shrub, rush and habitat such as grass and levee roads within 5 meters of the nest led to a decrease in daily nest survival rates.
5. Preliminary analysis of movement data indicates support for King rail at Choctaw being residents and a willingness to make movements between wetland impoundments.
6. By considering factors that both positively and negatively influence nest success, we can provide suggestions to tailor management for King rail reproduction. In conjunction with movement data, we can begin to understand how individuals utilize the area within Choctaw to have continued success.



Solar Powered Conservation: The effects of Solar Energy Infrastructure and Habitat Management on Avian Communities

Funding Source: U.S. Department of Energy
Project Duration: July 2023 – December 2027
Principal Investigator: J.D. Wilson, Caleb Roberts
Graduate Student: Michael Ferrara (M**.S.**)

Research Objectives:

- Compare avian occupancy and species richness in solar arrays with varying vegetation characteristics to reference sites representative of pre-installation conditions.
- Determine site, management, and landscape attributes that are most closely associated with increased avian species richness within solar arrays.
- Determine how avian abundance varies spatially in relationship to the location in and around solar arrays.

Management Implications:

- We found solar arrays did not reduce richness or occupancy of avian communities.
- We found landscape context is the most important driver of avian community composition in and around solar energy infrastructure.

- Native plantings under solar arrays did not measurably increase avian community occupancy or richness.

Project Summary:

1. Solar energy facilities will play a considerable part of building towards net-zero CO2 emission future. Newer solar facilities incorporate diverse vegetation communities into their management plans, yet their impact on wildlife is poorly understood.
2. We deployed Autonomous Recording Units at 38 solar sites and 30 paired reference sites with variable vegetation management during three one-week breeding season surveys. Audio recordings were processed through BirdNET and manually vetted detections. Avian community occupancy was modeled using a Bayesian Multi-Species Occupancy Model.
3. We assessed avian abundance by conducting point counts inside, at the edge, and up to 600 meters outside of 21 solar facilities. We modeled avian abundance using a Bayesian N-Mixture Model.
4. Our results show that landscape features have a stronger association with avian community occupancy than local vegetation attributes. Of the local covariates, vegetation diversity had the strongest relationship with avian community occupancy, but this relationship is altered in the presence of solar infrastructure. When assessing this relationship, credible interval overlaps at moderate vegetation diversity levels resulted in high levels of uncertainty, but at low vegetation diversity avian species richness was greater in solar arrays but the opposite was true at high vegetation diversity levels.
5. Landscape context and location relative to a solar array are important factors for modeling avian abundance around solar arrays. Our model predicts habitat outside of solar arrays on average can support about 5 more birds per 3.14-hectare circle than inside a solar array.
6. Considering landscape context and incorporating landscape features is important for rich and abundant avian communities in and around solar arrays. Maintaining diverse local vegetation communities remain valuable for ecological and site-management benefits and in modeling avian community occupancy. This research highlights the relationship between human development on avian communities.



Developing an Integrated Species Distribution Models Framework to Estimate Abundance of Cogongrass (*Imperata cylindrica*) in the Southeast US

Funding Source: USDA NIFA AFRI
Project Duration: January 2024 – January 2028
Principal Investigator: Caleb Roberts
Graduate Student: Paul Akpejeluh (Ph.D. Student)

Research Objectives:

- Improve invasive plant early detection by integrating structured presence-absence data and opportunistically collected presence-only data using a spatiotemporal model framework.
- Estimate Cogongrass abundance annually from 2000 to 2020 in the Southeast US.
- Identify environmental and climate conditions closely associated with Cogongrass abundance.

Management Implications:

- Provide annual spatially explicit maps of Cogongrass abundance across the Southeastern US to help prioritize management and control measures
- Identify environmental and climatic conditions closely associated with Cogongrass abundance to help target monitoring and allocate resources toward high invasion areas

- Provide a data integration framework that can be applied for other invasives species facing similar data limitations

Project Summary:

1. Cogongrass, an invasive alien, perennial warm season grass, is considered one of the top 10 worst weeds in the world and it is rapidly spreading across southeastern United States.
2. Existing occurrence and abundance data are collected from a variety of sources with different strengths and limitations. For example, structured and systematically collected data from sources such as Forest Inventory and Analysis dataset (FIA) and USDA Forest Service Geodatabase are often unbiased but very sparse. On the other hand, opportunistically collected data from sources such Early Detection and Distribution Mapping System, and iNaturalist are abundant but limited due to sampling bias. Relying on a single source risks over- or under-estimating true invasion cover.
3. To address this challenge, we developed an integrated species distribution model (ISDM) framework that combines multiple data types and sources into a single, unified framework for more reliable estimate of Cogongrass abundance. We estimated annual cover of Cogongrass per 5km grid cells across the entire Southeast from 2000 to 2020.
4. Preliminary results show that estimated invaded area expanded substantially between 2000 and 2020 with most occurring in the first decade. We also found strong year-to-year persistence in invasion with cover in one year correlating to approximately 95% cover in the following year.
5. Spatially, predicted abundance maps show persistent high Cogongrass cover in AL and GA to the FL panhandle and peninsula across the 20 years study period. We also found predicted Cogongrass cover increases with warmer temperatures and higher site productivity and negatively associated with distance to roads.
6. Estimating abundance using this framework provides a more realistic representation of invasion processes as it captures how populations evolve across both space and time while accounting for uncertainty in the estimates. This will support the prioritization of resources in managing existing infestations as well as lay the groundwork for developing a more robust early detection framework for modeling invasive species spread.



Evaluating Eastern Wild Turkey response to pine savanna restoration in Arkansas

Funding Source: Arkansas Game & Fish Commission; Arkansas Chapter of National Wild Turkey Federation
Project Duration: January 2026 – December 2027
Principal Investigator: Caleb Roberts
Graduate Student: Gracie Whatley (M.S. Student)

Research Objectives:

- Assess the effects of open pine restoration on Eastern Wild Turkey populations in relation to Northern Bobwhite response on private lands enrolled in the Open Pine Regional Conservation Partnership Program (RCPP) in southern Arkansas.
- Explore the relationship between mesopredator activity and Eastern Wild Turkey productivity using game cameras on RCPP-managed private lands.

Management Implications:

- This project will provide information on the response of Eastern Wild Turkey to pine savanna restoration on private lands.
- Direct comparisons of Bobwhite and Turkey presence across a range of habitat stages will provide more accurate expectations throughout a restoration project that can inform biologists' decisions.
- Understanding the relative influence of habitat versus mesopredator presence on turkey abundance can be used to better communicate the relative importance of habitat restoration versus predator control.

Project Summary:

1. Open canopy forests and grasslands have been among the most imperiled ecosystems in the United States for decades, and many native species to these areas are at a great conservation risk. With a majority of forests in the eastern U.S. being privately owned, incentivized land management programs like the Open Pine RCPP are paramount to combat this decline. Flagship species like Bobwhite quail and Eastern Wild Turkeys provide both aesthetic and recreational motivation for landowners to enroll their properties in this program.
2. With a growing interest in this program, now is a crucial time to further our understanding of how these species occupy the landscape. This study seeks to capture the variation in turkey presence across habitat gradients in comparison to quail by using autonomous recording units (ARUs) on private land enrolled in the Open Pine RCPP in southern Arkansas over the course of two spring breeding seasons.
3. Game cameras are deployed at the same locations to observe turkey abundance and poult-to-hen ratios as a measure of productivity. The image data will also be used to determine relative abundance of predators such as coyotes, bobcats, racoons, etc., to explore how the relationships between turkeys and their natural predators shifts across open pine restoration progress.
4. Vegetation data is being collected at all locations to render a quantitative assessment of the habitat and will be used to categorize restoration progress. It will also be weighed against the results of the predator response to investigate the notion of habitat management as a form of predator control.
5. The images from game cameras will also be used in tandem with timelapse camera videos placed at these different properties over the course of this project to provide biologists with qualitative evidence that can be shown to private landowners. This will help to bridge the informational gap between landowners and biologists in Arkansas.



Strategizing pine savanna restoration on private lands.

Funding Source: TBD
Project Duration: August 2025 – May 2029
Principal Investigator: Caleb Roberts
Graduate Student: Michael Ferrara (Ph.D. Student)

Research Objectives:

- Quantify bird responses to pine savanna restoration using a before-after-control-impact design.
- Determine how the distance to established Northern Bobwhite populations influences colonization and occupancy of restored habitat patches.

Management Implications:

- Develop a decision support tool to prioritize lands for pine savanna restoration.
- Demonstrate how metapopulation dynamics and colonization affect northern bobwhite site occupancy to better determine priority restoration sites.

Project Summary:

1. The way humans interact with our environment is constantly changing. Historic fire suppression and human-mediated landscape change has led to the densification and

expansion of forests, which has not only impacted the vegetation communities but the wildlife that live there. Programs like the Open Pines Regional Conservation Partnership Program (RCPP) have facilitated large scale habitat restoration across private and public lands across the United States, but the scale of these programs often makes it difficult to establish priorities and assess outcomes.

2. Therefore, it is important for us to 1) quantify outcomes of restoration on priority ecosystem services and 2) adapt management strategies using the outcomes assessment.
3. We will use a before-after-control-impact study design on lands enrolled in the Open Pines RCPP to quantify key bird species' responses to pine savanna restoration.
4. We will develop a custom Bayesian occupancy model using point count and Breeding Bird Survey data to quantify how dispersal distance influences occupancy of restored pine savanna by Northern Bobwhite populations.
5. The findings from this study will provide tools for land managers and regional biologists to better coordinate site level and regional management to optimize habitat management tools and facilitate management for species of greatest conservation need.



Effects of repeated fire and fire recency on shortleaf pine woodland understory and seed bank composition and diversity

Funding Source: National Science Foundation Graduate Research Fellowship Program
Project Duration: August 2025 – May 2029
Principal Investigator: Caleb Roberts
Graduate Student: Andrew Ruegsegger (Ph.D.)

Research Objectives:

- Determine if and how plant community species and trait composition following repeat fire is different from communities that have only been burned once.
- Determine if and how woodland understory and seed bank density, richness, and trait and species composition compares between sites with different fire histories.
- Assess if understory and seed bank species and trait compositions are more similar to one another in burned sites than in burned sites, and if fire frequency and fire recency affects this.
- Compare standing vegetation patterns across different fire histories to present-day seed bank diversity and composition.

Management Implications:

- A better understanding of how different prescribed burn intervals affect understory and seed bank community trajectories in shortleaf pine woodlands.

- Understand how long-term fire or lack thereof affects seed bank diversity and composition.
- Details on optimal woodland overstory and midstory basal area for maintaining understory diversity and communities.
- An enhanced ability to make predictions on seed bank diversity and composition based on fire history and aboveground vegetation.

Project Summary:

1. Open woodlands and savannas were once the most abundant ecosystems in eastern North America but are now among the most imperiled ecosystems on the planet due to land conversion, changes in landscape-scale herbivory, and policies of fire suppression allowing the growth of fire-intolerant species and increasing light-limiting fuel-loads and mid- and overstory canopy growth.
2. Throughout the 1990s and early 2000s, the Ouachita National Forest (ONF) implemented several forest plan amendments to initiate large-scale restoration of shortleaf pine woodlands, the Forest's dominant ecosystem, through several management strategies including the re-establishment of prescribed fire.
3. Between 2010-2013, 200 long-term vegetation monitoring plots were established between two major management areas in the ONF. These plots are monitored on a three-year basis and were placed in stands subject to various prescribed fire intervals and thinning strategies.
4. In collaboration with the U.S. National Forest Service and The Nature Conservancy, this project will use this long-term data in addition to seed bank data that I will collect and grow through greenhouse emergence trials beginning in the early spring of 2027 to answer questions on how fire history affects aboveground and belowground community assembly and diversity. This research will both inform forest managers on how the understory community and seed bank respond to fire while also answering ecological questions about plant community assembly following repeat disturbance.



Advancing wild turkey conservation in Arkansas through innovative decision support tools for habitat mapping, estimating population trends and prioritizing management.

Funding Sources: Arkansas Game and Fish Commission (AGFC)
Project Duration: January 2024 – January 2028
Principle Investigator: Caleb Roberts
Postdoc: Dr. Evan Wilson

Research Objectives:

- Estimate and map the population distribution pattern of Wild Turkey in Arkansas.
- Estimate population growth rates of turkeys across Arkansas using Bayesian population models
- Identify areas with the greatest potential to positively impact turkey populations through habitat management efforts.
- Assess the impact of weather on gobbling activity and timing of wild turkeys across Arkansas

Management Implications:

- Provide technical assistance for development of public-facing data products, such as interactive maps of habitat suitability and population growth rates. The models, data products, and technical assistance we provide will put Arkansas Game & Fish Commission in an ideal position to prevent, halt, or potentially reverse turkey declines in Arkansas.

Project Summary:

1. The eastern wild turkey (*Maleagris gallopavo silvestris*) once faced rapid population decline throughout the states and were successfully restored in several states. However, the

apparent decline in population has led to a growing concern in multiple states including Arkansas. The estimated annual population seems to be declining by ~3%, where the greatest being reported from Arkansas (≥23%, between 2014 and 2019) (Chamberlain et al. 2022).

2. Therefore, there is a critical need to develop a decision support tool for Arkansas that 1) incorporates spatial non-stationarity into turkey habitat suitability analyses, 2) provides information on turkey population growth rates, and 3) synthesizes turkey habitat suitability, turkey population growth rates, and relevant external socio-ecological information to identify areas where management actions will be most impactful and cost-efficient.
3. To date, we have completed a preliminary habitat suitability analysis, using a Bayesian spatially varying coefficient occupancy model that accounts for spatial autocorrelation. Preliminary results from this analysis were presented at the 2026 Society for Rangeland Management's annual conference. We have constructed an integrated population model to estimate population abundance indices, productivity, and population growth rates at the ecoregion scale. This model integrates data on turkey populations collected by AGFC with other existing data sources and allows users to project future impacts of changing weather and hunting regulations on population parameters. The development of this model is detailed in a manuscript currently in preparation, that is ultimately the product of collaboration between AGFC, NWTF, USGS, University of Arkansas and the Coop Unit.
4. Our preliminary habitat suitability analysis indicates that turkey occupancy varied between ecoregions with occupancy probability greatest in the Ozarks and lowest in the Delta. Forest and riparian cover types were positively associated with turkey occupancy, whereas developed cover was negatively associated with turkey occupancy. We determined that accounting for spatial autocorrelation in these models is important and improves model fit over non-spatial occupancy models, however at Arkansas' spatial extent, spatially-varying coefficients for forest cover do not increase explanatory power of the models.
5. Our integrated population models showed three (Gulf Coastal Plain, Ouachitas, Ozarks) of the four ecoregions in Arkansas showed evidence of population decline between 2007 and 2024. We observed variable annual productivity rates that were influenced by variability in weather conditions and hunting regulations, specifically with warmer (higher minimum temperature) and drier (lower total precipitation) weather conditions in spring (March-May) and later spring hunting season start dates, positively affecting productivity. Our model indicated that female survival likely varies between ecoregions and provided ecoregion specific estimates of survival rates despite our model relying on a single survival study, highlighting the utility of integrated population models as a decision support tool.



Quantifying and communicating successes in savanna restoration on Arkansas private lands

Funding Source: Arkansas Game and Fish Commission
Project Duration: May 2025 – May 2027
Principal Investigator: Caleb Roberts
Graduate Student: Lauren Luther (M.S. Student)

Research Objectives:

- Quantify the response of savanna bird community abundance, including priority species, to various aspects of management history.
- Determine whether landscape context, site history, or local features most strongly influence savanna bird occupancy.

Management Implications:

- Understand how different management strategies and vegetation conditions affect various priority savanna bird species.
- Create abundance models to assess management outcomes. Provide evidence for effectiveness of various management strategies and timelines.
- Create occupancy models to assess the implications of landscape context and site history on savanna bird occupancy probability within a restored site, and determine whether local features resultant of management more strongly influence occupancy.

Project Summary:

1. The Open Pines Regional Conservation Partnership Program has begun to incentivize management of pine timber land for grassland and savanna bird species. Grassland birds are currently experiencing sharper declines than any other guild of birds (NABCI, 2025).

2. To quantify avian restoration efforts, we will use point counts, autonomous recording unit surveys, and vegetation surveys along with occupancy and abundance modeling.
3. ARU's were placed and point counts were conducted at 2 private sites and 4 public sites in restored pine savanna habitats across Arkansas. Vegetation surveys have been conducted at each point, and management history will be obtained for each site.
4. Multispecies abundance models will be developed using the "spAbundance" package in R (Doser et al. 2024) to estimate savanna bird community abundance responses to management strategies and vegetation metrics. Preliminary results point to lower canopy cover increasing several priority species' abundances.
5. Multispecies occupancy models will be developed using the "spOccupancy" package in R (Doser et al. 2022a) to estimate savanna bird community occupancy responses to landscape context, legacy effects, and local features.
6. The results of this study will help to inform management practices of open pine savannas across Arkansas by demonstrating the effectiveness of various practices and by assisting in the prioritization of sites for future restoration efforts.

6. RECENT and ACCEPTED PUBLICATIONS

** Listed alphabetically by year*
***Date range: July 1, 2025 – October 1, 2026*

2025

Bayer, L. M., & **Magoulick, D. D.** (2025). Native crayfish shows high desiccation tolerance and potential to outcompete invader. *Biological Invasions, 27*, Article 216. https://doi.org/10.1007/s10530-025-03675-5

Donovan, V. M., Ludwig, A. K., Fogarty, D. T., **Roberts, C. P.**, & Twidwell, D. (2025). High-intensity fire supports restoration of grassland species richness and community composition following woody encroachment. *Journal of Environmental Management, 391*, 126469.

Magoulick, D. D., & Graham, C. L. (2025). Relationship between larval fish drift, time of day and discharge in an Ozark stream. *Journal of Freshwater Ecology, 40*, 1-13. https://doi.org/10.1080/02705060.2025.2503366

Sorensen, S. F., & **Magoulick, D. D.** (2025). Disturbance is primary determinant of food chain length when top predator is constant. *Journal of Freshwater Ecology, 40*, 1-13. https://doi.org/10.1080/02705060.2025.2552789

2026

Berry, L. L., DeGregorio, B. A., Uden, D. R., & **Roberts, C. P.** (2026). Comparing spatial covariance to common field vegetation metrics. *Rangeland Ecology & Management*. (In press).

Berry, L. L., DeGregorio, B. A., Uden, D. R., & **Roberts, C. P.** (2026). Finding the (small) cores: Spatial covariance tracks grassland bird community occupancy in fragmented grasslands. *Ecosphere, 17*(3), e70515.

Brewer, D. E., Webb, E. B., McCallie, J., Novobilsky, J., Fournier, A. M., **Roberts, C. P.**, et al. (2026). Locations and management strategies for prioritizing King Rail conservation efforts in the Mississippi Alluvial Valley. *Ecological Solutions and Evidence, 7*(2), e70233.

Flinders, J. A., Clement, A., & **Magoulick, D. D.** (2026). Effects of prey and tissue type on $\delta^{13}C$ and $\delta^{15}N$ discrimination and turnover rates of rainbow trout. *Hydrobiologia, 853*, 2609-2623. https://doi.org/10.1007/s10750-025-06097-5

Flinders, J. A., & **Magoulick, D. D.** (2026). Assimilation efficiency of rainbow trout fed natural diets. *Environmental Biology of Fishes, 109*, 40. https://doi.org/10.1007/s10641-026-01804-0

Ivory, A. A., II, Wonkka, C. L., McGranahan, D. A., Kincy, S., Weidig, N. C., **Roberts, C. P.**, Brock, K. M., Silva, C. A., & Donovan, V. M. (2026). Fueling the fire: Predicting cogongrass (*Imperata cylindrica*) impacts on fire behavior across environmental and seasonal gradients. *Fire Ecology*. (Accepted for publication).

Novobilsky, J. M., **Roberts, C. P.**, Rowe, K., McCallie, J., & Fournier, A. M. V. (2026). King Rails in southeastern Arkansas are majority resident. *Avian Conservation and Ecology, 21*(2), Article 9. https://www.ace-eco.org/vol21/iss2/art9

Roberts, C. P., Donovan, V. M., Cady, S. M., Edwards, B. P. M., Morford, S., Naugle, D., Scholtz, R., Twidwell, D., Uden, D. R., & Fogarty, D. (2026). Biome-scale spatial patterns of avian abundance reveal proactive conservation opportunities in North American grasslands. *Biological Conservation, 322*, 112055. https://doi.org/10.1016/j.biocon.2026.112055

Roberts, C. P., Novobilsky, J., Akpejeluh, P., Berry, L. L., Budd, M. J., Ferrara, M. C., LaBrie, L. A. P., Luther, L., Karki, V., Krementz, D., Rowe, K., Shaw, M., Wilson, K., & Fournier, A. M. V. (2026). *Rallus elegans* (King Rail) occupancy is stable, but habitat is in short supply in the Arkansas Delta. *Ornithological Applications, 128*(1).

Sorensen, S., Fox, J. T., & **Magoulick, D. D.** (2026). Hydrologic variability drives environmental and geospatial relationships in Smallmouth Bass (*Micropterus dolomieu*) distribution. *Science of the Total Environment, 1025*, 1-9. https://doi.org/10.1016/j.scitotenv.2026.181562

Tivin, J. D., & **Magoulick, D. D.** (2026). Seasonal and hydrologic variation influences habitat and functional structure of stream fish assemblages. *Frontiers in Environmental Science, 14*, 1764275.

Wilson, K. C., Chiavacci, S. J., **Roberts, C. P.**, & DeGregorio, B. A. (2026). Seasonal variation in wild pig (*Sus scrofa*) diet revealed by DNA metabarcoding. *Wildlife Society Bulletin*, e70019.

7. COURSES TAUGHT

Roberts CP – Ecological Modeling. Fall 2026.
Magoulick D – Biometry. Spring 2026.
Roberts CP – Invasion Ecology. Fall 2025.
Magoulick D – Conservation Biology. Spring 2025.