BRIEFING STATEMENT

DATE: 5/10/2017 (draft)

SUBJECT: New Indiana University Grand Challenge initiative to tackle major environmental threats to Hoosier health, economy: $55 million research initiative to launch collaborative Environmental Resilience Institute and create a Hoosier Resiliency Index

SYNOPSIS: "*Prepared for Environmental Change: Resilient Ecosystems, Livable Communities, and Healthy Hoosiers*" will develop research for pilot applications, specifically developing tools for strategic management of wildlife, water quality and agricultural productivity in the Lower Wabash River Floodplains / Patoka River NWR Landscape Conservation Design.

MEDIA PACKAGE: The Indiana University media package is accessible here:

Press release: https://news.iu.edu/stories/2017/05/iu/releases/10-grand-challenges.html

Press kit: https://news.iu.edu/media-kits/IUGrandChallengesPressKit.pdf

TARGET SECTOR: Row crop agriculture, particularly in large river floodplains

PARTNERS:

IN NRCS	TNC Indiana Chapter	Sycamore Land Trust
IL NRCS	Ducks Unlimited	Landowner Ray McCormick
IN DNR	Pheasants Forever	
IL DNR	Illinois Natural History Survey	

National Wild Turkey Federation
IN Dept Environmental Management
National Fish & Wildlife Foundation
Posey & Knox County Soil & Water Conservation Districts (SWCDs)
FWS Patoka River National Wildlife Refuge - Bill McCoy
FWS Partners for Fish & Wildlife - Scott Pruitt or Jeff Keifer
FWS Ohio River Fish Habitat Partnership - Donovan Henry

LCC PROJECT MANAGER: Kelley Myers, ETPBR LCC Coordinator; Gwen White, ETPBR Science Coordinator

BACKGROUND: FWS Refuge policy requires a Landscape Conservation Design (LCD) for refuge planning. In the spring of 2015, Bill McCoy, refuge manager at Patoka River National Wildlife Refuge, contacted staff of the Tallgrass Prairie Landscape Conservation Cooperative (ETPBR LCC) to request assistance in convening a stakeholder work group to explore downscaling the *Gulf Hypoxia Initiative – Precision Conservation Blueprint v1.5* to guide conservation action in the region around the Lower Wabash and Patoka Rivers.

Facilitated by LCC and FWS staff, the Lower Wabash Floodplains LCD stakeholder team met several times over the past 18 months to establish a partnership around a shared strategic

framework for conservation in floodplains and associated tributaries in two states bordering the Lower Wabash River from Terre Haute, IN, to the confluence with the Ohio River.

The partnership has attracted the attention of Indiana University researchers as a result of SPEA graduate student interns assisting with facilitation of the group and graduate student capstone products focusing on conservation problems identified by the stakeholders.

An interdisciplinary IU faculty team was awarded the second project funded through IU's $300 million Grand Challenges Program, which launched in 2015. The budget for Prepared for Environmental Change is $55 million over five years including hiring of 16 new faculty and the work of dozens of students each year on Indiana University's Bloomington and Indianapolis campuses.

In addition to research on social and physical sciences, the Collaborative Pilot Projects at community and watershed scales will meet immediate community needs and enable testing and refining of theory, models and tools in diverse contexts, helping to ensure their robust applicability to other communities in Indiana and around the world.

Faculty have selected the Lower Wabash LCD as one of three statewide "living community laboratories" to test policies and provide management tools in order to reduce the negative impact of agricultural runoff while also improving habitat for wildlife and reducing agricultural risk. Among the tools are a decision-support matrix for landowners to forecast soil and water conditions as well as economic return on crops and timber; and maps to identify which habitat conservation targets yield the best long-term returns. This research will also contribute to the objectives of the larger multi-LCC Gulf Hypoxia Initiative.

Over the next 5 years, IU faculty research will integrate natural and social science methods to address three key needs of the Lower Wabash River / Patoka NWR Landscape Design in this region, including:

- Inventory baseline social and environmental factors for the Lower Wabash. Key deliverables.
- Develop feasible approaches to reducing non-point source pollution while improving wildlife habitats that could be implemented in short- to medium-term time frames.
- Build adaptive management tools for long-term, effective nutrient reduction, habitat improvements, and public engagement.

A press release and a more detailed initial outline of how research conducted through this initiative will support these efforts in the Lower Wabash are attached. We will be calling a meeting over the summer to discuss next steps for the stakeholder group and integration with research faculty leading the IU Grand Challenge initiative.

 Prepared for Environmental Change:
Resilient Ecosystems, Livable Communities, and Healthy Hoosiers
Grand Challenges Summary

Principal Investigator: Ellen Ketterson, Ph.D.
Distinguished Professor, Department of Biology, College of Arts and Sciences, IU Bloomington
Email: ketterso@indiana.edu

Grand Challenge: This Grand Challenge initiative will prepare Indiana for resilience and prosperity in the face of environmental change.

Summary: Our planet is changing rapidly, and Indiana is changing with it. Climate disruption, urbanization, and other global transformations are spurring movements of animals and people into new places. Seasonal climatic variation is increasingly out of sync with biological processes, such as leaf emergence and animal migrations. Hoosiers already bear daily witness to the consequences of global change. Medical professionals are confronting new diseases; farmers are hit in turn by ice storms, flooded fields, and drought; public utilities face new challenges to respond to shifting demands for power and safe water for human, agricultural, and industrial use; residents are experiencing dramatic changes in the timing and intensity of seasons.

Communities in Indiana and around the world must *proactively plan for change* rather than simply react to problems after they become severe. Successfully preparing for change will require better understanding of human connections to natural systems and the strategic balancing of natural, social, and built capital to maintain thriving, resilient human and natural communities.

Prepared for Environmental Change will partner with government, industry, and non-profit groups to develop, test, and deploy innovative solutions in three broad areas:

1. **Natural Sciences Research** will generate predictive modeling of changes in climate (temperature and precipitation), fluvial dynamics (groundwater processes, river and stream flow, erosion and sediment transport), and vegetation and wildlife, including pest species, disease vectors, and beneficial species (e.g. crop pollinators). Working together, the natural science projects will provide:
   - Accurate state-level projections of climatic, hydrographic, habitat, and species change to allow governments and businesses to plan for investments in agriculture, industry, infrastructure, and public safety.
   - An early warning system ("Project Vector Shield") to minimize health threats from mosquitos, ticks and other disease-spreading vectors.

2. **Social Science Research** will discover how public opinions, individual and institutional behaviors and strategies, and the political landscape interact to generate societal response to long-term change. This research will lead to:
   - Better ways to collaboratively conserve wildlife and other natural resources.
   - Practical and economically viable strategies to promote greener, more prosperous communities that are also more resilient to storms, heat waves, and other extreme weather events.

- Powerful strategies for informing and motivating a culturally and politically diverse citizenry on issues of science, policy and risk, including a Hoosier Resiliency Index that will track readiness of Indiana communities and regions to respond to immediate challenges and long-term challenges.

3. **Collaborative Pilot Projects** at community and watershed scales will meet immediate community needs and enable testing and refining of theory, models and tools in diverse contexts, helping to ensure their robust applicability to other communities in Indiana and around the world. These pilot projects will include:
   - Providing and measuring multifunctional urban green infrastructure. The Pleasant Run Partnership with the Indianapolis Office of Sustainability, Keep Indianapolis Beautiful, and Citizens' Energy Group will apply environmental and social research to pioneer a new model for water re-use in Pleasant Run Creek, providing resiliency in fresh water supply and quality, reduced flooding risk, enhanced carbon sequestration, an improved wildlife corridor, and economic and neighborhood revitalization.
   - Optimizing animal habitat, nutrient pollution reduction, and agricultural prosperity. We will work with the **Lower Wabash Landscape Conservation Design** team to test policies and provide management tools in order to reduce the negative impact of agricultural runoff while also improving habitat for animals. Among the tools we will pilot are a decision-support matrix for landowners to forecast soil and water conditions as well as economic return on crops and timber; and maps to identify which habitat conservation targets yield the best long-term returns.
   - Balancing conservation, development, and sustainability. In Bloomington, our research will help to shape the design and facilitate the successful implementation of the city's upcoming sustainability plan, protect a safe drinking water supply from Lake Monroe, and optimize the environmental and social value of the city's public green space investments. In New Albany, our forecasts, infrastructure analyses and environmental messaging tools will enhance local officials' goal of restoring their riverfront, and our social survey data will critically inform their new comprehensive plan.

Partners in this ambitious Grand Challenge include the Cities of Bloomington, Indianapolis, and New Albany, Citizens Energy Group, Cummins, Inc., Indiana's Department of Natural Resources, the Nature Conservancy, and the **Eastern Tallgrass Prairie & Big Rivers Landscape Conservation Cooperative**, among others.

The budget for Prepared for Environmental Change is $55 million over five years, and will fund the hiring of 16 new faculty and the work of dozens of students each year on Indiana University's Bloomington and Indianapolis campuses.

How could the Indiana University Grand Challenge Grant to the Prepared for Change Group Assist the Lower Wabash Landscape Conservation Design? *Draft: Sept. 30, 2016*

The proposed research would integrate natural and social science methods to address three key needs of the Lower Wabash River Floodplains / Patoka River NWR Landscape Conservation Design (LCD):

1. Inventory baseline social and environmental factors for the Lower Wabash. Key deliverables:
   a. Complete a comprehensive baseline description of the Lower Wabash River Watershed, including an inventory of existing, available data about the environmental and social systems in the Lower Wabash River Watershed. This would include coordination of a volunteer-based field campaign to collect baseline information on habitat, land-use, land management, etc. (leveraging the extension agent supported by the Grand Challenge).
   b. White paper discussing the evolution of the environmental, economic, and social systems that affect management in the Lower Wabash River Watershed, including opportunities to enable effective short- and medium-term improvement in water and habitat quality. This study will include interviews with and survey of stakeholders to discuss what leads to support or resistance to pollution-reduction and habitat-enhancement incentives.
   c. Assemble existing habitat-based species models for birds and mammals in a spatial context. Focus on models that the LCD could use to track progress and revise strategies as needed. Validate some of the models and use the work to focus financial assistance for conservation practices through the Natural Resources Conservation Service RCPP (Regional Conservation Partnership Program).

2. Develop feasible approaches to reducing non-point source pollution while improving wildlife habitats that could be implemented in short- to medium-term time frames. Key deliverables:
   a. Construct a calibrated, validated model of water, nutrient, and energy balances as a function of land management decisions in the Lower Wabash River for 1948-2007. (i.e., establish a baseline understanding of the relationships between land management, climate, habitat, and water quality outcomes in the Lower Wabash River)
   b. Map the spatial distribution of BMP effectiveness as a function of BMP type and benefit (e.g., flood reduction vs. nutrient loads). Improve understanding of BMP co-benefits of habitat conservation. Maps can be targeted for individual benefits (e.g., water quality improvement) or weighted co-benefits (e.g., water quality improvement and habitat conservation). The objective is to inform "Which BMPs are most effective for which goals if placed in which locations?"
   c. Collaborate with LCD to host a series of participatory modeling workshops to build a working relationship with stakeholders. These workshops will be used to explore trade-offs in land management for agriculture and stimulate conversation about how to best address non-point source pollution and habitat conservation in the Lower Wabash River Watershed.

d. Prototype of a decision support tool that could be made accessible via the web to make short-term forecasts of water quality and quantity available to landowners as a function of different management decisions. This tool could include a preliminary return-on-investment calculator for land managers to assess the on-farm economic impacts of their decisions, developed in collaboration with extension agents and land managers.

3. Build adaptive management tools for long-term, effective nutrient reduction, habitat improvements, and public engagement. Key deliverables:
   a. Monitoring plans at the scales of (1) individual management actions or installed BMPs, (2) watershed-scale nutrient loads and exports
   b. Incorporate research on what shapes perceptions of water quality and habitat conservation in the Lower Wabash River Watershed.