

PERM

Summer 2016



Partnership for Ecosystem Research and Management



MICHIGAN STATE
UNIVERSITY



MESSAGE FROM THE DIRECTORS

For more than 20 years, the Partnership for Ecosystem Research and Management (PERM) has successfully united Michigan State University (MSU) scientists with the Michigan Department of Natural Resources (MDNR) to help keep Michigan's natural resources healthy and sustainable.

The partnership is the brainchild of MSU AgBioResearch scientist and former Fisheries and Wildlife Department Chair William Taylor, and then Michigan Department of Natural Resources (DNR) Fisheries Division Chief John Robertson. Bill and John were looking for a better way to link scientific expertise on campus with the most pressing natural resource management issues facing MDNR.

It was the early 1990s and natural resources issues were steadily becoming more complex and difficult to solve. Economically important issues such as recreational fishing in the Great Lakes and diseases of wildlife such as deer needed to be looked at from a systems approach rather than at a species level. The experts knew they needed an integrated, collaborative approach to tackle these challenges, and to secure funding for critical research.

The duo successfully convinced MSU administrators to support the addition of new faculty positions focused on the partnership, and state government to fund the positions as well as provide substantial research support for the new hires. The arrangement was formalized on Earth Day, April 22, 1993 and has since flourished.

Originally a partnership between MSU and the Fisheries and Wildlife divisions of the DNR, PERM subsequently expanded



Douglas Buhler
MSU AgBioResearch Director



William Moritz
MDNR Director

to include the DNR Forest Resources Division, and the Great Lakes Fishery Commission. Today, we are extremely pleased with the progress PERM has enabled from advancing conservation to meeting public needs.

We are working to better understand how people interact with fisheries and wildlife, how they value fisheries and wildlife and how that affects fisheries and wildlife population objectives. Efforts have focused on deer, fish, wolf and feral swine among others. This is truly a novel program from the opportunities students have to work side-by-side with researchers and governmental agencies, to the ways it has bridged new, highly productive working relationships.

Included in this brochure are some highlights from recent research projects. We hope you enjoy!

PERM Faculty

These MSU faculty members bring a common ecosystem perspective and emphasis on state-of-the-art qualitative and quantitative approaches to meet the needs of partner agencies.

JIM BENCE

MARY BREMIGAN

JORDAN BURROUGHS

DAN HAYES

DANA INFANTE

DAN KRAMER

FRANK LUPI

SHAWN RILEY

KIM SCRIBNER

2015 BY THE NUMBERS

- PERM faculty produced more than 100 peer-reviewed journal articles.
- More than 120 presentations were given by PERM faculty or their students.
- DNR funded more than \$2.3 million in PERM activities through 58 projects.
- PERM faculty received more than \$8 million in external grant funding for an additional 48 projects that added to the body of science for natural resource management in Michigan.
- PERM projects cover five important topics:
 - Addressing Fish and Wildlife Health.
 - Advanced Quantitative and Genetic Analyses and Support.
 - Habitat and Population Dynamics.
 - Integrating Social, Economic and Human Dimension Aspects of Fish and Wildlife Management.
 - Landscape and Habitat.

Project Snapshots

Below are brief summaries of a few PERM-supported projects that illustrate the valuable contribution the partnership is making to a sustainable future for Michigan's natural resources. For a comprehensive list of all PERM-funded projects, visit agbioresearch.msu.edu/PERM.

Supporting sustainable Great Lakes commercial fisheries

JIM BENCE

Fishery management agencies around the world rely on stock assessments to estimate the size of the fish populations under their jurisdiction. Stock assessments serve a critical function as the foundation for fishery management plans to provide guidance for the amount of fish that can be harvested for commercial and recreational purposes. The Great Lakes fisheries are managed in ways that are economically and biologically sustainable.

Stock assessments are particularly important in Michigan's 1836 Treaty-ceded waters, which encompass large portions of Lake Michigan, Lake Huron and Lake Superior. Management of these waters is shared between the state, the federal government and six tribal nations. The management agreement stipulates that the economically significant whitefish and lake trout stocks be managed on the basis of assessments using state-of-the-art methods. Researchers with the Quantitative Fisheries Center at MSU are using simulation modeling to test numerous alternative stock assessment methodologies in three important ways. First, they examine how well an assessment model fits the fishery data using a set of standard diagnostics. Second, they use data from a hypothetical fishery and input that into several models to determine the best model to use. Third, they use forecasting models to evaluate the effect on the fishery of strategies to manage harvest amounts. These approaches are recognized globally for their importance in successfully facilitating collaborative fishery management.

Healthy fish equals healthy fisheries

MOHAMED FAISAL

Containing roughly 20 percent of the world's fresh surface water, the Great Lakes provide the United States and Canada with an abundance of resources. Nurturing a healthy fish population in the Great Lakes presents significant challenges with diseases potentially introduced from ballast water or unhealthy fish introductions. The Aquatic Animal Health Laboratory (AAHL) at Michigan State University (MSU) partners with the Michigan Department of Natural Resources (MDNR) to offer diagnostic services for fish kills, health certifications for commercial aquaculture, pathogen assessment for the risk of new diseases, disease prevention plans for Michigan's six large fish hatcheries, and more. Additional services provided by the AAHL include conducting laboratory and field research, teaching classes to undergraduate and graduate students as well as fisheries and wildlife professionals, and providing recommendations to combat disease in wild fish populations both inland and in the Great Lakes. The AAHL team has more than 30 members. Alongside Faisal are a laboratory manager, postdoctoral scholars, graduate and undergraduate students, support staff members and other university researchers. Projects range from surveillance of fish populations to managing diseases such as viral hemorrhagic septicemia, a pathogen that affects dozens of fish species and has spread throughout the Great Lakes over the past decade. Funding for the AAHL is provided by the MDNR, the U.S. Department of Agriculture, the Great Lakes Fishery Commission, the U.S. Geological Survey, the Environmental Protection Agency and others.

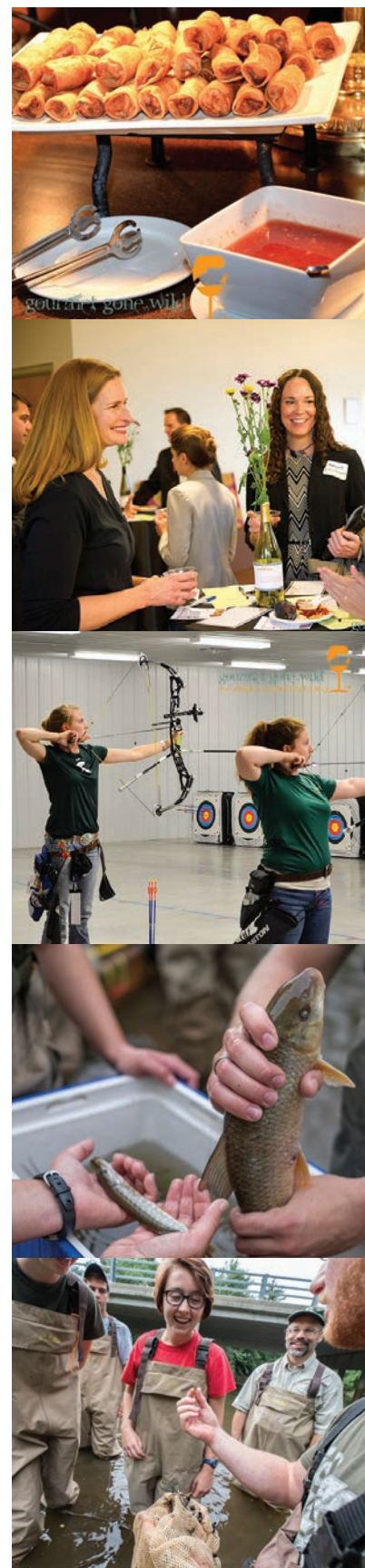
Gourmet Gone Wild shows ways to prep, serve game meat

JORDAN BURROUGHS

Abundant beauty and natural resources make Michigan an ideal hunting destination. The state's hunter participation rate — the percentage of residents who purchase a hunting license — ranked third in the nation in 2014. Despite Michigan's good standing nationally, recent decades have seen an overall downward trend in participation. This research project focuses on working to dispel some of the stereotypes that surround hunting and those who participate in the activity. As families place a higher priority on the origin and sustainability of food sources, Burroughs wants to show how hunting can supplement trips to the grocery store.

A program called Gourmet Gone Wild (GGW) shows groups how to prepare wild fish and game while emphasizing the healthy aspects of game meat and hunting's role in environmental stewardship and conservation. The dishes are often paired with local beer and wine. Pre- and post-program surveys have shown a positive response to GGW, with many participants asking about harvesting their own meat.

This has led to the development of a hunter education program, Learn to Hunt. A team of experts teach non-hunters about game animals, ecology, ethics, the hunting process and, ultimately, food. Students also participate in a mentored hunt, where they have the opportunity to harvest an animal. Funding for Burroughs' position comes from the Boone and Crockett Club, the DNR and MSU Extension.





Is Michigan's turkey hunting harvest quota appropriate?

WILLIAM PORTER

The wild turkey is the second most popular animal for hunting in Michigan behind deer. Populations of the large bird have risen steadily in the Great Lakes State over the past several decades. Roughly 100,000 hunters take to the woods each year and bag about 30,000 turkeys, making Michigan No. 7 in the United States in harvest size. Although the population continues to rise, the past 10 years or so have seen the rate of increase slowing because of turkeys filling the available habitat and reaching carrying capacity. Researchers at Michigan State University want to know if the current harvest quota is still appropriate for the turkey population.

A project that began in 2013 is examining the turkey harvest with a focus on sustainability of the population into the future. Porter indicated that there are three essential components to any conservation project: protecting the resource, providing opportunities for people — both hunters and non-hunters — to enjoy the resource, and evaluating the economic value of those activities. Using data and computer models, Porter and his team are developing assessment models to forecast the future of the wild turkey population with different harvest scenarios. The project wraps up in summer 2016, at which point the group will present its findings and recommendations. Funding has been provided by the Michigan Department of Natural Resources (MDNR) Wildlife Division. Several individuals from the MDNR have contributed to the project.



DEPARTMENT OF FORESTRY

In 2015 the PERM agreement was amended to add MSU's Forestry Department to the partnership. Broadening the partnership will facilitate engagement between MDNR's Forest Resources Division (FRD) and scientists at MSU to ensure ecological and economic sustainability of Michigan's Forests. For example, FRD and MSU will be collaborating on a long-term research project that will analyze silvicultural techniques for regenerating diverse northern hardwood forests and restoration options in the wake of beech bark disease and emerald ash borer. The amendment will also advance the ability to quantify the impact of forest products on Michigan's economy.

Tracking feral swine in Michigan

GARY ROLOFF and ROBERT MONTGOMERY

Feral swine have spread throughout many parts of the U.S. and caused enormous damage to agricultural operations where they have become established. They are now posing a similar threat in Michigan. Tracking feral swine to determine their whereabouts and behaviors in an effort to eventually eradicate the invasive species from Michigan is the ultimate goal of this five-year project.

Started in 2013, the study aims to quantify feral swine's hourly, daily and seasonal movement and habitat use patterns in Michigan with respect to land ownership, land cover type, proximity to domestic swine facilities and proximity to urban areas; identify the spatial extent of feral swine rooting activities; quantify feral swine dispersal capabilities and routes; develop a predictive model that portrays the likelihood of feral swine habitat use; evaluate the efficacy of techniques for controlling feral swine populations; evaluate changes in activity and habitat use patterns as population control activities increase; and identify the presence of diseases and parasites in feral swine. Similar studies have been done in other states on feral domestic swine, but this project focuses on the Russian boar breed. It is believed that the Russian boar was brought to Michigan as a primary source of high-fence hunting opportunities.

Feral swine have now been reported in 79 of Michigan's 83 counties, and state and federal governments are actively pursuing eradication. Results from the research will support those eradication efforts while also determining the extent and severity of damage to agricultural crops and the likelihood of disease transmission to domestic livestock.



Can sharing venison help support Michigan's hunting legacy?

SHAWN RILEY

In 2013, Michigan hunters brought home about 30 million pounds of venison — enough to feed everyone in the state 10 USDA 1/4-pound servings, or roughly 3 pounds per person. Along with research assistant Amber Goguen, Shawn Riley is seeking to determine whether a study he worked on in Sweden — which showed that the frequency of sharing, receiving and consuming wild harvested meat is a strong predictor of people's support of traditional uses of the environment such as hunting — might also hold true in the United States.

The project objectives are to look at ways that game meat is shared from harvest to consumption, including opportunities and barriers to game meat movement; assess the influences of game meat consumption and sharing on non-hunter attitudes toward hunters, hunting and conservation; determine sociocultural values produced through game meat consumption and sharing, and how these values enhance the quality of life of hunters and non-hunters; identify motivations for game meat sharing and typologies of providers and receivers; and develop recommendations for how to increase sharing of game meat and associated benefits. Findings and recommendations from this work will be shared with the DNR and conservation groups through workshops and presentations. With the number of deer rising and the number of hunters declining in Michigan, wild game could help fill a local food niche market while providing a value-added perspective to manage the state's bountiful wildlife populations.



A Swedish hunter working with Shawn Riley kneels in the field with a freshly harvested white-tailed deer. The meat was shared among several families.



Rehabilitating an ancient fish species

KIM SCRIBNER

Lake sturgeon, a historically abundant and ecologically crucial member of the Great Lakes ecosystem, have been decimated by overexploitation and the damming of spawning streams since the 19th century. Pollution from a variety of sources compounded the difficulties facing the species by reducing water quality throughout the Great Lakes basin. Current numbers of sturgeon are estimated to be only 1 percent of their historic peak abundance.

Since 2000, PERM evolutionary ecologist Kim Scribner has been working with a team of Michigan State University and DNR scientists to help restore the struggling species. Though the Clean Water Act improved water quality and focused fishery agency management has brought the mortality of adult sturgeon under control, the species' population remains low. Working with the relatively large sturgeon population on the Black River near Cheboygan, Michigan — approximately 1,100 individuals, the second largest population in the state — Scribner's team has been studying the underlying causes of mortality among young sturgeon.

Scribner and his colleagues have been able to quantify the rates and risks of mortality at every stage of lake sturgeon development from egg to adulthood, which can take 15 years to reach. Researchers now know that fluctuations in predation, river discharge and flow rates, and even water temperature affect juvenile sturgeon survival.

The result is a clearer picture of the risks that sturgeon face, which natural resources management agencies can use in their restoration work. Stocking a river with sturgeon requires a substantial outlay of resources in the form of the food, staff and facilities required to raise them from the egg. The data produced by Scribner's research enables natural resource managers to release the fish in locations and at times of the year when they have the greatest chance at survival.

Fishing information helps guide fishery management and promotes local economies

FRANK LUPI

Michigan's angling population contains a wide spectrum of anglers with different fishing interests, fishing behaviors and demographic characteristics. Information from anglers provides fisheries managers with the information necessary to offer a variety of experiences and implement rules and regulations with predictive knowledge of which types of angling groups will be affected. Additionally, local communities use this information to market the types of natural resource experiences that are available for tourism opportunities.

The Michigan Recreational Angler Survey (MRAS) was designed to collect information on the status and distribution of angling effort across all of Michigan's fisheries (e.g. inland, Great Lakes, trout, bass, etc.). The survey strategy is designed to minimize the effects of survey biases, collect both long-term and short-term angling behavior for all of Michigan's fisheries, measure angling seasonality, cover a large geographic area, and incur low costs per respondent. Anglers are identified by a random sample of the MDNR license database. Individual anglers have been surveyed each month beginning in July 2008.

Lupi and his team designed a survey containing 21 multi-part questions addressing general fishing activities during the last 12 months, fishing activities during the most recent month, details of the most recent fishing trips, usual fishing activities, and background and demographic information. Using information collected through the MRAS, Lupi's team are able to develop profile descriptions of particular angler groups. Information related to anglers' demographic characteristics, their general fishing behaviors and their most recent trips were used to develop profiles of bass anglers, trout anglers and the spatial distribution and relative prominence of other specialized fishing techniques to inform management decisions for these fisheries.

Information on the location of fishing trips, their duration and the species targeted by anglers has also provided important information for resource use. This information has been particularly important for estimating the effects of fisheries closures, damage assessments for natural resource mitigation purposes, license and regulation changes, and anglers' response to bait restrictions. Trip behavior analysis from the MRAS showed anglers significantly altered their behavior in response to new disease regulations and the abundance of particular species. This information informs natural resource policy makers in developing and maintaining regulations.

