

A photograph of a sunset over a field. The sun is low on the horizon, casting a golden glow across the sky and illuminating the clouds. The foreground shows a dark, silhouetted field.

FISHERIES RESEARCH



Highlights from the Research Section

Learn more at: <http://www.iowadnr.gov/About-DNR/DNR-Staff-Offices/Fisheries-Research>

MESSAGE FROM THE SUPERVISOR



Iowa DNR'S mission: To conserve and enhance our natural resources in cooperation with individuals and organizations to improve the quality of life in Iowa and ensure a legacy for future generations.

Often the Fisheries Bureau's role in the DNR's mission is captured in the unofficial motto, to "shorten the time between bites." Fishing is one of Iowa's oldest traditions. It is an essential part of our heritage; it brings families together, and connects us to the land. Most importantly, good fishing is best achieved by managing for a healthy ecosystem so it serves as a good indicator of success for most of our programs. The Research Section's role to provide Iowa anglers with the best fishing possible is to put the right tools in the hands of fisheries managers. The result is improved fishing and water quality in our lakes, ponds, and rivers. This supports tourism jobs, attracts industry and businesses, and creates a better quality of life for Iowans, thereby contributing to the economic resiliency of our communities.

-George Scholten

RESEARCH SERVICES

PROCESS IMPROVEMENT PROJECTS

Many studies focus on developing better products, services, and methods of fisheries management that cost the Department less money. For example, efficient stocking methods lessen the growing demand for hatchery products, and culture disease research increases survival rate during fish production.

POWERFUL, LONG-TERM STUDIES

Dedicated research with standardized data collection is often the only way to answer important questions about the effectiveness of management strategies. For example, a new fishing regulation may not reveal its effectiveness for five or ten years, or even longer.

CONSULTATION AND HELP TO FELLOW STAFF

The Research Section provides help when other Department staff request it, mainly with study design, appropriate methods and sample sizes, analytical tools, and peer review of professional publications.



Fisheries research is the foundation of smarter, more efficient and effective fisheries management. The DNR's Fisheries Research Program evaluates current fisheries management practices, innovates new techniques, and advances the science and technology used to improve fishing in Iowa's waters. This focus helps the Fisheries Bureau ensure that fishing license dollars are spent wisely and as efficiently as possible.

DNR's Fisheries Research Program achieves all this with a small group of highly skilled fisheries scientists. Seven research stations are located across the state. Each has a particular field of investigation. Five teams focus on fisheries in a specific Iowa water resource: natural lakes, reservoirs, small impoundments, interior streams, and the Mississippi River. The other two teams improve fish culture practices used in DNR fish hatcheries and investigate new ways to use technology to get information and data from fisheries managers to Iowa anglers.

CURRENT PROJECTS

22

active studies

14

field staff

75%

Federal match

NATURAL LAKES TEAM

Walleye population dynamics
in natural lakes

Muskellunge population dynamics
and management strategies

Muskellunge movement and
emigration

Managing Common Carp in shallow
natural lakes

Impact and population dynamics of
Yellow Bass in shallow lakes

SMALL IMPOUNDMENTS TEAM

High-accuracy mapping of all significant
Iowa lakes and reservoirs

Hydroacoustic and sedimentation
measurement methods

Development of best management
practices for aquatic vegetation

EVALUATION OF

Overtime, backwater habitats in the Mississippi River have degraded and no longer meet key requirements for fish to survive over winter. This is a concern for Mississippi River anglers and fisheries biologists because reduced habitat quality can result in a decline of fish species. The Iowa DNR is partnering with other agencies to implement Habitat Restoration and Enhancement Projects (HREP) to restore backwater habitats that will improve fish health and survival.

4 CRITICAL ELEMENTS

35 °F

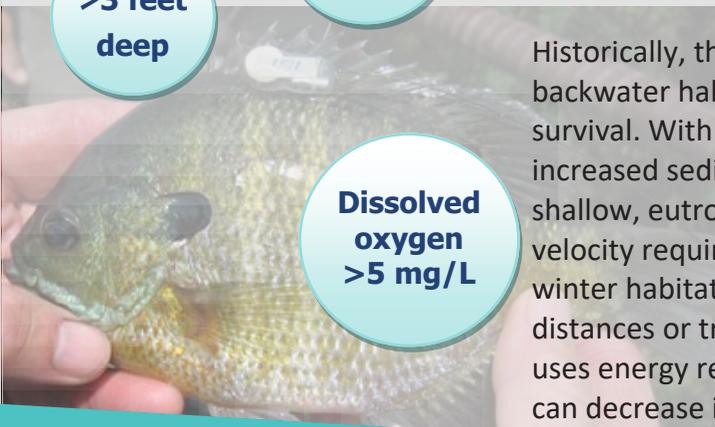
**<0.3
ft/sec
flow**

**>3 feet
deep**

**Dissolved
oxygen
>5 mg/L**

Because of previous telemetry research, biologists know fish have different habitat requirements throughout the year. When multiple fish were tracked throughout the winter, four key elements were identified as critical to survive over winter. In order for a fish to survive over the winter, it must seek out habitats with warm water, low current, adequate dissolved oxygen and depth. For Mississippi River panfish, this habitat is found in backwaters.

Historically, the Mississippi River had many quality backwater habitats that were adequate for overwinter survival. With construction of the navigation channel and increased sedimentation, many backwaters are now too shallow, eutrophic, and do not meet the temperature and velocity requirements for fish to survive. When suitable winter habitat is limited, panfish must travel longer distances or try to overwinter in less suitable habitat. This uses energy reserves which compromise a fish's health and can decrease its chance of survival.



MISSISSIPPI RIVER HABITAT PROJECTS

3.5

**miles to find
suitable habitat
before restoration**

24K

**backwater acres
restored**

11

**restoration projects
completed**

In the Mississippi River, habitat restoration projects are designed to be near summer foraging habitats, so fish do not need to travel so far to find suitable overwinter habitat. Eleven habitat restoration projects have been implemented in Iowa's waters, impacting over 23,950 acres. These projects are successful because critical elements for survival, determined by Iowa DNR fisheries research, are included in project design. Fisheries biologists work with partners to monitor the fish community, sedimentation rates, water quality, and water velocity at each restoration site. Post-restoration monitoring ensures the projects have the intended impact.

Restoration projects improve fishing and recreational opportunities for Iowans, allowing people to enjoy the Mississippi River in a more healthy and resilient state. Each project supports local jobs and recreation. Eight more restoration projects are in the planning stage in Iowa and anglers are sure to reap the benefits of an improved fishery once the project is completed.



MEET THE BIOLOGIST

Kirk Hansen is the Large Rivers Research Fisheries Biologist based in Bellevue, Iowa. He has a M.S. degree in Biology from Tennessee Tech University and has been with the Iowa DNR since 2005. During that time, Kirk has been actively involved with planning and implementing over 14 major backwater habitat restoration projects on the Mississippi River.

In Iowa, 734 public waterbodies are stocked with fish raised from our state fish hatcheries. Many anglers across Iowa depend on these stocked fish for quality fishing opportunities. An important component of providing enough fish for stockings is to maintain healthy fish in the hatchery. A research team at Rathbun Fish Hatchery works to improve fish health and implement more efficient culture practices in our hatcheries.

Eradicate parasites

Increase survival

Optimize growth

Cost savings



46%

of Iowa's waterbodies
are stocked with fish

Projects include finding the best method to get rid of fish parasites, identifying diets that will optimize fish growth, and improving culture techniques to reduce predation. The result of all research studies is improved fish health, increased hatchery efficiencies and cost savings. Fish hatchery research is the foundation to provide the healthiest fish to stock in Iowa's waters.

INCREASING HATCHERY SURVIVAL

TREATMENT OF *ICH*, A COMMON WALLEYE PARASITE

The number one issue affecting fish health in Iowa DNR's fish hatcheries is disease.

Parasites found naturally in the environment will compromise fish health if they are not controlled in the hatchery.

Research trials conducted at Rathbun Fish Hatchery help decide the best treatment for fish infected with parasites. Trials are designed to compare treatments while monitoring fish health over time. Multiple trials are conducted and include a control, so the effect of the treatment is accurately measured. Once the most effective treatment has been found, staff can implement the treatment to improve fish health in the hatchery.

\$15,120
saved on *Ich* treatment

For example, research trials were conducted to determine the best method for to get rid of *Ichthyophthirius multifiliis* (*Ich*), a common disease of Walleye at Rathbun Fish Hatchery. Results from these trials helped reduce how long Walleye were infected with *Ich* and reduced the amount of chemical used in the treatment. This resulted in annual cost savings of \$15,120!

Research trials are required to get certain therapeutants approved for use in the hatchery. For example, research trials conducted at Rathbun have resulted in approval of Hydrogen Peroxide and Chloromine-T to treat fish parasites in Walleye. As new parasites and diseases are introduced in Iowa, there will be a need for research to evaluate potential treatments and develop treatment procedures that keep fish healthy in our state fish hatcheries.

Fish Death Due to Ich

Treatment Cost

Old
Treatment



\$33,250

=

New
Treatment



\$18,130



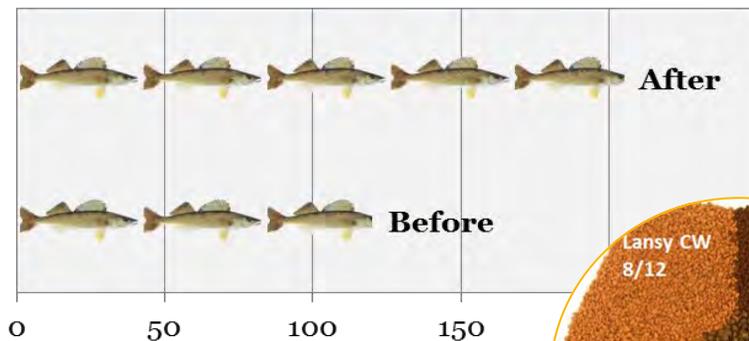
MEET THE BIOLOGIST

Alan Johnson uses applied science and the scientific method to improve fish health and production efficiency in Iowa DNR's fish hatcheries. Some major accomplishments include 90% survival of pond reared Walleye fingerlings when transitioning to commercial diets, increased Brown Trout egg production, and developing new technology for sport fish production. Alan has been a research biologist for 18 years.

DETERMINING THE BEST FOOD

There are many commercial diets available on the market to grow fish in a hatchery, but not all diets provide optimum health. Some diets lack essential ingredients needed for growth. Other diets are not palatable, so fish go hungry. The Rathbun Fish Culture team conducts feeding trials to determine which diets on the market will produce healthy fish. Research trials identified an optimum diet for Walleye that resulted in decreased mortality as fish transitioned to the food.

Number of Advanced Fingerlings Produced



INCREASING HATCHERY SURVIVAL



For example, when Walleye were fed a suboptimum diet, it took 600,000 fry from six ponds to produce 120,000 advanced fingerlings. When Walleye were fed the optimum diet, identified in the research trials, nearly half of the fish and pond space was needed to produce 120,000 advanced fingerlings. The free pond space can now be used to produce more Walleye or additional species, like Hybrid Striped Bass, for Iowa anglers.

GRADING TO REDUCE WALLEYE MORTALITY



Fish predation is a problem in hatcheries and can occur when large fish are kept in the same tank to grow with smaller fish. Research trials helped implement grading, a practice used to separate fish into different sizes, to reduce fish predation. Research results showed fish in graded tanks were in better health, were larger, and had higher overall survival than fish in ungraded tanks. Grading is now used in the hatchery to decrease predation and ensure more fish are available at harvest time.

6

ponds

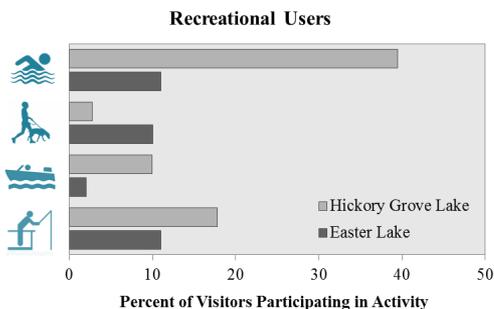
5

diets

2x

fish produced on
optimum diet

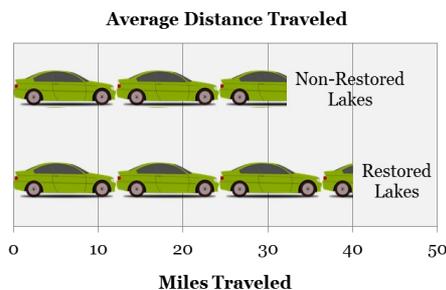
Lake restoration is a massive undertaking which often includes renovating a fishery, removing in-lake sediment and installing habitat, and adding numerous amenities in the area surrounding the lake. Through partnership with private landowners and municipal entities, installation of Best Management Practices in the watershed and long-term protection of the restoration are essential parts of the process. Research on the changes that occur after restoration is ongoing to evaluate success and guide future restoration strategies.



The creel survey is an important method to evaluate changes in the recreational fishery. Creel surveys occur on-site before and after restoration, establishing a baseline for improvements in fishery species composition, fish size distribution, and fishing pressure. Creel surveys have been conducted recently at Easter Lake, Thomas Mitchell Pond, Hickory Grove Lake, Three Mile Lake, Twelve Mile Lake, Green Valley

Lake, Black Hawk Lake, Summit Lake, and the Spirit Lake Complex. Surveys usually cover angler effort, catch, satisfaction, trip expenses, visitation behavior, and satisfaction.

Results thus far reveal a broad range of fishing trip expenses, visitation, and annual fishing-related spending which may be related to the restoration stage of each lake. Pre-restoration lakes generally have lower spending, lower visitation, poor fisheries, and less variety in recreational opportunities. Post-renovation lakes attract a wider variety of recreation, higher visitation, greater spending per group, and high-quality fishing for bass, panfish, channel catfish, and walleye.



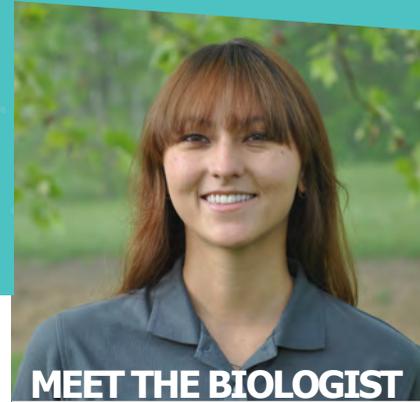
EVALUATING CHANGES

9 21+ 1

major creel surveys

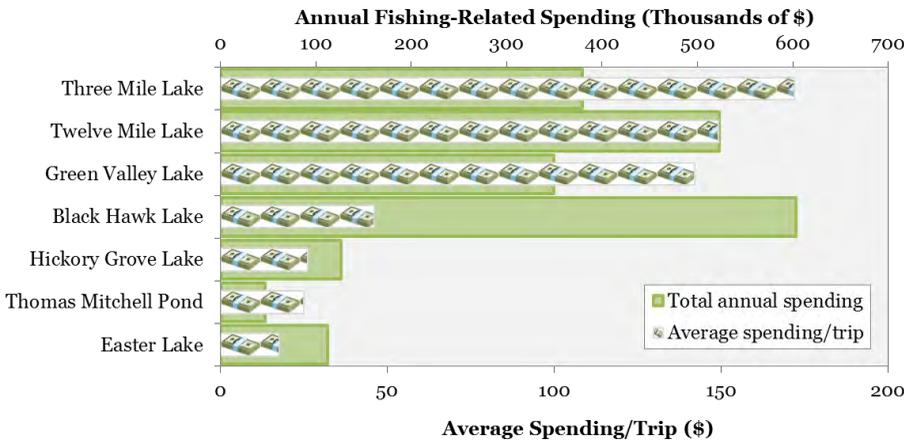
ongoing restorations

statewide analysis



MEET THE BIOLOGIST

Rebecca Krogman has been the Large Impoundments Research Biologist since 2013. She was recently awarded the Young Professional Travel Award and was the first participant in the Young Professional Exchange Program between the American Fisheries Society and the U.K.'s Institute of Fisheries Management. Her recent publications include the standardization of fish names and measurement of fish habitat in large U.S. reservoirs.



Up to
16%
of anglers fishing at creel
restoration locations are
from out-of-state

UNITED STATES

FOLLOWING LAKE RESTORATION



EVALUATION OF WALLEYE STOCKING STRATEGIES IN RESERVOIRS AND INTERIOR RIVERS

Tracking fingerling and fry stocking success is important to identify optimal stocking timing, fish size, and location. Improved knowledge of stocking success will boost cost-effectiveness while maintaining quality Walleye fishing in interior lakes and rivers. These studies will provide information on the best stocking conditions and locations.

HYBRID STRIPED BASS MANAGEMENT RECOMMENDATIONS

This study evaluates factors that affect the stocking success of Hybrid Striped Bass in Iowa lakes and reservoirs. Results will provide managers with information on genetic cross differences, stocking recommendations, and sampling methods.

SHALLOW LAKE RENOVATION BASED ON ALTERNATIVE STABLE TROPHIC STATES

This study focuses on the effects of water level management and biomanipulation on shallow lake fisheries. Methods include the elimination of benthic and planktivorous fish (e.g., carp), followed by stocking highly predatory fish.

ASSESSMENT OF IOWA'S SHOVELNOSE STURGEON SPORT FISHERIES

The population dynamics of Shovelnose Sturgeon in Iowa are poorly understood. This study focuses on sturgeon abundance, growth, fecundity, and movement in Mississippi River tributaries using mark-and-recapture tagging. Information will inform harvest regulations and improve sturgeon management in Iowa.

BEST MANAGEMENT PRACTICES FOR HYBRID STRIPED BASS CULTURE

This study focuses on determining feeding methods to maximize survival and growth of Hybrid Striped Bass at Rathbun and Mount Ayr fish hatcheries.

RECIRCULATING AQUACULTURE OF WALLEYE

Recirculating aquaculture systems offer an innovative and water-efficient way to produce fish. Their use offers the benefits of reduced exposure to pathogens and invasive species, while reducing water requirements. This study focuses on establishing best culture practices for

POPULATION DYNAMICS OF ADULT WALLEYES IN IOWA'S LARGE NATURAL LAKES

Research focuses on the use of harvest regulations to manage Walleye, and recent findings support an adaptive approach guided by annual assessments.

OTHER EXCITING RESEARCH



HYDROACOUSTIC MAPPING OF IOWA LAKES

Mapping all significant lakes and reservoirs in Iowa provides stakeholders with accurate depth maps, highlighting underwater structure, boat ramps, and nearby facilities. Publically-accessible maps can now be downloaded or accessed through the popular online Fishing Atlas, one of the Iowa DNR's most popular webpages. This study also relates physical and watershed characteristics to sportfish populations, with results guiding future management of Iowa's public lakes and watersheds.

ENHANCING THE POPULAR WALLEYE AND SAUGER RIVER FISHERY

Walleye and sauger provide one of the most popular fisheries on the Mississippi River. An ongoing study seeks to better document factors affecting survival at early and adult stages; walleye and sauger populations fluctuate often due to variable recruitment. Management techniques that may lead to an improvement in survival, such as habitat protection and harvest regulations, will be recommended to enhance the quality of the fishery.

MUSKELLUNGE TRACKING

Over the past several years, research staff have tagged a subset of muskellunge into Spirit Lake with radio transmitters to estimate post-stocking survival. Recent observations suggest a positive relationship between survival and muskellunge size. Tracking has also revealed escapement as a significant factor affecting the population of muskellunge in the Iowa Great Lakes. Research on this topic will continue into the 2018 field season.



ADDITIONAL STUDIES BY THE RESEARCH SECTION

- Best Management Practices for aquatic vegetation in Iowa lakes
- Contribution, survival, and population dynamics of Muskellunge in Spirit, East Okoboji, West Okoboji, and Clear Lakes
- Intensive culture of Walleye fry and fingerlings fed formulated diets
- Evaluation of Iowa's standard fisheries sampling program
- Data analysis and survey projects
- Evaluation of hydroacoustic survey methods and sediment rates in Iowa lakes
- Response of fish and habitat to stream rehabilitation practices in Iowa's interior rivers and streams

MEET THE RESEARCH TEAM



The Natural Lakes Research team provides high quality and relevant research information to fisheries management and hatchery programs to enhance fisheries resources in Iowa's natural lakes.

Technology and Data Management provides computer-oriented technical help to field staff by developing, modifying, installing and maintaining a statewide database and other software and hardware for fisheries applications, software and hardware training, and updating and maintaining systems. Technology and Data Management strives to make information about fish, fishing, and fisheries more available and easily accessible to the public.



The Large Reservoir Research Team works with fisheries managers to identify and resolve issues affecting the fishery resources of large reservoirs. Large reservoirs provide many recreational opportunities throughout Iowa and include some of the state's most popular fishing and boating destinations, like Lake Red Rock, Rathbun Lake, the Creston area lake chain, and many others. Ongoing research projects ensure that Iowa's reservoirs are managed with the best available science.



The Fish Culture team uses applied science and the scientific method to improve fish health and production efficiency in Iowa DNR's fish hatcheries. Past achievements include 90% survival of pond-reared Walleye fingerlings and increased Brown Trout egg production, and they continue to study new technology for sport fish production. Alan and Randy have been researching together for 8 years.

The Interior Rivers and Streams team gather and share information needed to better manage Iowa's stream and river fishery resources and maintain and improve fishing opportunities for Iowa anglers.



The Mississippi River team conducts research to answer critical questions to help our Fish Management Teams and partners manage the fisheries and habitat of the Mississippi River in Iowa.

Man-made lakes research provides fishery managers the tools they need to manage small public lakes for anglers. This team produces guidelines that are applicable not only to many state-owned lakes and reservoirs, but also to shallow lakes and small ponds.





Kim Bogenchutz and Darcy Cashatt teach fish identification at Outdoor Journey for Girls



Mike Steuck talks about habitat restoration projects on the Mississippi River



Kirk Hansen leads a fishing clinic on the Maquoketa River



Andy Fowler teaches about fish sampling

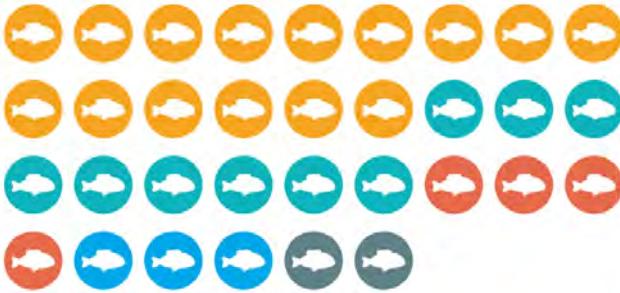


Mark Richardson teaches fish identification at a fishing clinic



Stream team teaches about electrofishing

Fishing-related Outreach Events



- Fishing Clinics (15)
- Talks to Clubs (9)
- Talks to School Classes (4)
- School Field Trips (3)
- Talks to College Classes (2)

17

radio programs

70

social media posts

6

newspaper articles and press releases

OUTREACH AND ANGLER EDUCATION



Rebecca Krogman helps with Walleye and Muskellunge PIT tagging at Big Creek Lake



Statewide collaboration to collect broodstock Walleye every spring



Randy Schultz helps with a rotenone application for fishery renovation



Megan Thul (right) holds a snapping turtle for measurement



Jeff Kopaska helps with trout stocking efforts



Lewis Bruce organizes a continuing education course on electrofishing



Rebecca Krogman serves on the 2017 Governing Board of the American Fisheries Society



Randy Schultz (former biologist) presents an award as President of the Fisheries Management Section of the American Fisheries Society



Alan Johnson presents at the Iowa Chapter of the American Fisheries Society



Jeff Kopaska presents at the annual meeting of the Iowa Chapter of the American Fisheries Society



Erin Haws, fisheries intern, hosts a discussion at the statewide fisheries staff meeting



Rebecca Krogman presents in the U.K. at the Institute of Fisheries Management annual meeting

14

technical presentations at meetings

5

professional society and committee meetings attended

10

peer reviews provided to colleagues

RECENT PEER-REVIEWED PUBLICATIONS

Meerbeek, JR, and DP Crane. 2017. **A comparison of Muskellunge weight estimation equations to a modified length-girth technique.** Muskellunge Management Fifty Years of Cooperation among Anglers, Scientist, and Fisheries Biologists, American Fisheries Society Symposium 85:539-554.

Meerbeek, JR. 2017. **Retention of visible implant alphanumeric tags in adult Walleye.** Journal of Freshwater Ecology 32:721-725.

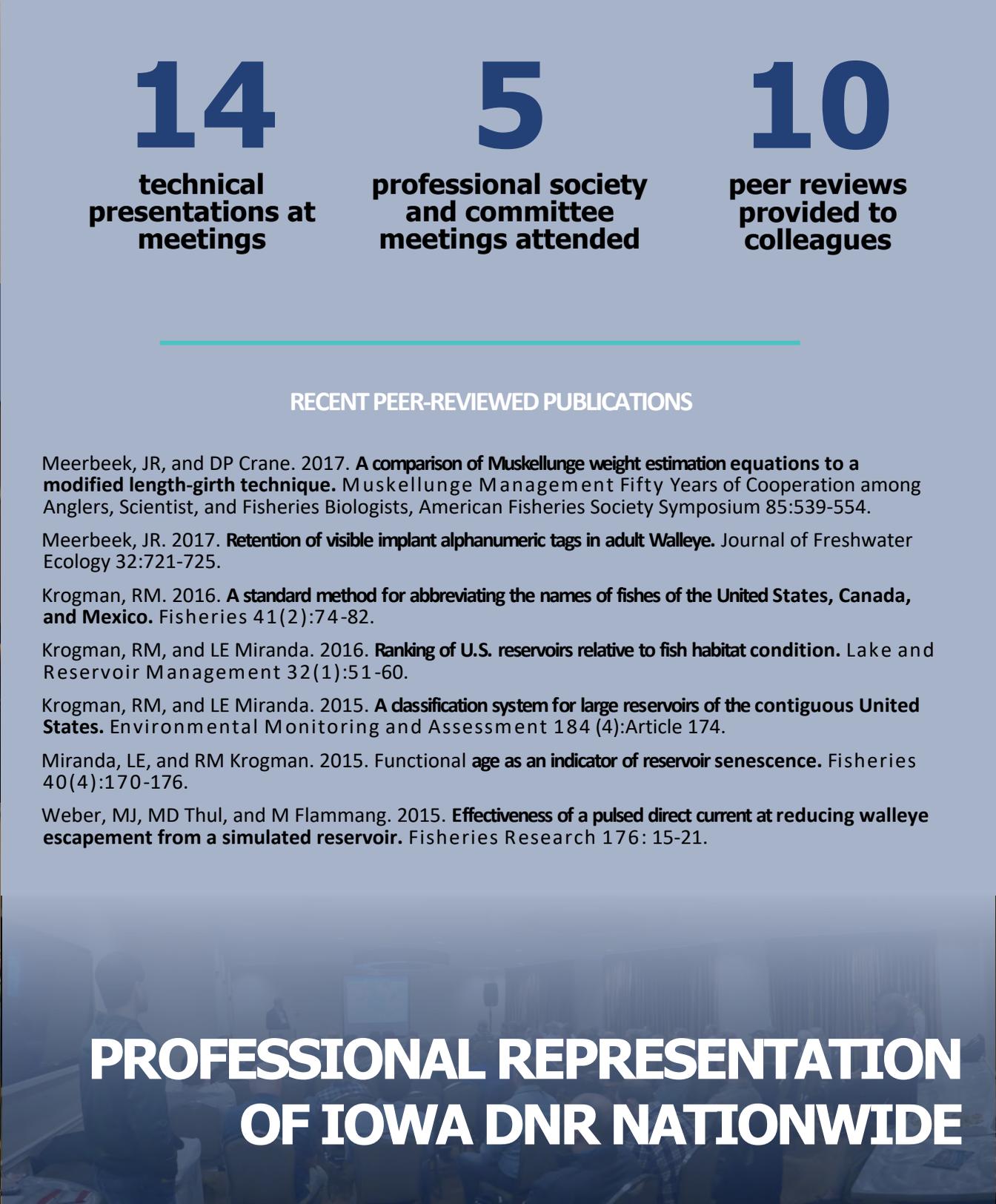
Krogman, RM. 2016. **A standard method for abbreviating the names of fishes of the United States, Canada, and Mexico.** Fisheries 41(2):74-82.

Krogman, RM, and LE Miranda. 2016. **Ranking of U.S. reservoirs relative to fish habitat condition.** Lake and Reservoir Management 32(1):51-60.

Krogman, RM, and LE Miranda. 2015. **A classification system for large reservoirs of the contiguous United States.** Environmental Monitoring and Assessment 184 (4):Article 174.

Miranda, LE, and RM Krogman. 2015. **Functional age as an indicator of reservoir senescence.** Fisheries 40(4):170-176.

Weber, MJ, MD Thul, and M Flammang. 2015. **Effectiveness of a pulsed direct current at reducing walleye escapement from a simulated reservoir.** Fisheries Research 176: 15-21.



PROFESSIONAL REPRESENTATION OF IOWA DNR NATIONWIDE

**WANT MORE
INFORMATION?**



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NATURAL RESOURCES**

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