



# **SUMMARY OF SUSTAINABLE FORESTRY RESEARCH FY 2011**

## **MICHIGAN DEPARTMENT OF NATURAL RESOURCES MISSION STATEMENT**

*"The Michigan Department of Natural Resources is committed to the conservation, protection, management, use and enjoyment of the state's natural and cultural resources for current and future generations."*

## **NATURAL RESOURCES COMMISSION STATEMENT**

The Natural Resources Commission, as the governing body for the Michigan Department of Natural Resources, provides a strategic framework for the DNR to effectively manage your resources. The NRC holds monthly, public meetings throughout Michigan, working closely with its constituencies in establishing and improving Natural Resources and Environment management policy.

The Michigan Department of Natural Resources (DNR) provides equal opportunities for employment and access to Michigan's Natural Resources. Both state and federal laws prohibit discrimination on the basis of race, color, national origin, religion, disability, age, sex, height, weight or marital status under the U.S. Civil Rights Acts of 1964 as amended, 1976 MI PA 453, 1976 MI PA 220, Title V of the Rehabilitation Act of 1973 as amended, and the 1990 Americans with Disabilities Act, as amended.

If you believe that you have been discriminated against in any program, activity, or facility, or if you desire additional information, please write: Human Resources, Michigan Department of Natural Resources, PO Box 30028, Lansing MI 48909-7528, or Michigan Department of Civil Rights, Cadillac Place, 3054 West Grand Blvd, Suite 3-600, Detroit, MI 48202, or Division of Federal Assistance, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, Mail Stop MBSP-4020, Arlington, VA 22203.

For information or assistance on this publication, contact Forest Planning & Operations Section, Forest Resources Division, Michigan Department of Natural Resources, PO Box 30452, Lansing MI 48909-7952. This publication is available in alternative formats upon request.

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## Purpose and Use of this Report

The State of Michigan, under the Michigan Department of Natural Resources (DNR) supports research projects to ensure sustainable management of Michigan's forest lands. This document summarizes those projects in place during fiscal year 2011 (October 1, 2010 - September 30, 2011). This document also fulfills the requirement of Forest Certification Work Instruction 5.1 "Coordinated Natural Resource Management Research" for an annual summary of research activities within forested landscapes. This report should be used to document Michigan's commitment to sustainable forestry research and to inform discussion on research needs and collaboration opportunities in the DNR.

## Research Summaries

Research is administered and supported differently in each department and DNR division. The Wildlife Division (WL) and Fisheries Division (FI) administer all research activities through their respective research sections. These divisions also have a significant portion of their research efforts funded by a variety of federal grants that have annual reporting requirements. Forest Resources Division (FRD) does not have a dedicated research section; administration and support of research occurs through each program area.

The summary of research projects are organized into tables by department and applicable DNR divisions. Each table is then organized by group based upon the objectives of the study. The group names provide a logical link to the themes of sustainable forestry and allow the reader to assess the breadth and depth of the DNR research programs. One study could potentially fit into multiple groups. For purposes of simplicity, studies are listed in only one group. The group names are:

Ecological Processes	Fisheries Management	Environmental Protection
Human Dimensions	Forest Management	Biological Diversity
Chemical Use	Wildlife Management	Social and Economic

## Integration and Use of Research in the DNR

Research that supports sustainable forestry in the DNR occurs through a variety of mechanisms. The DNR supports a large number of research projects contracted through multiple universities within the state. The DNR supports university faculty positions through their Partnership for Ecosystem Research and Management (PERM) program. The DNR also employs its own research and monitoring staff in FRD, WL, and FI.

Michigan DNR research programs cover the entire breadth and depth of sustainable forestry. While each division uses a different array of means to communicate research findings, the research programs are well integrated with the operations of the DNR and are providing useful information to support improvements in business practices. Division in-service trainings, specialist meetings, and ongoing field and program communications are examples of the means used to convey research information to DNR personnel. For more information about specific research projects listed in the tables, interested parties should contact the research coordinator for that division. The research coordinator for each division is listed as the contact at the beginning of each division's section.

**MICHIGAN DEPARTMENT OF NATURAL RESOURCES  
RESEARCH PROJECTS – 2011**

**Table 1 - Forest Resources Division  
FY 2011 Research Funded by DNR-FRD**

Primary Contact for all projects:  
Ronald Murray, Research Coordinator  
DNR, FRD  
517-335-3353, [murrayr@michigan.gov](mailto:murrayr@michigan.gov)

**Forest Management**

- Conduct the Re-Measurement of the FIA Plots for Michigan  
*Contact: Scott A Pugh, USDA-Forest Service, FIA, [spugh@fs.fed.us](mailto:spugh@fs.fed.us)*  
USDA Forest Service, Forest Inventory Analysis - \$ 97,679.04
- Design, Develop, and Build Prototype and Operational Equipment Units for Mechanized Forest Fire Fighting  
*Contact: Kirk Bradley, Assistant Unit Leader, DNR, FRD, [bradleyk@michigan.gov](mailto:bradleyk@michigan.gov)*  
Forest Fire Experiment Station - \$586,710.00
- Design and Develop Specialized Equipment for Forest Fire Fighting  
*Contact: Kirk Bradley, Assistant Unit Leader, DNR, FRD, [bradleyk@michigan.gov](mailto:bradleyk@michigan.gov)*  
Roscommon Equipment Center - \$123,911.00
- Tree Improvement Studies and Implementation of Nursery Practices to Improve Quality of Tree Seedlings Produced in Michigan State Forest Nurseries  
*Contact: Richard Mergener, DNR, FRD, [mergenerr@michigan.gov](mailto:mergenerr@michigan.gov)*  
Michigan Tree Improvement Center - \$79,388.00
- Improvement of Production of Nursery Stock and Seedlings  
*Contact: Richard Mergener, DNR, FRD, [mergenerr@michigan.gov](mailto:mergenerr@michigan.gov)*  
Wyman Nursery Improvement - \$376,589.00
- Development of a GIS-based Inventory System for the Michigan State Forests –Integrated Forest Monitoring Assessment and Prescription (IFMAP)  
*Contact: Jason Stephens, DNR, FRD, [stephensj@michigan.gov](mailto:stephensj@michigan.gov)*  
Michigan Department of Information Technology - \$1,067,915.00
- Support of Projects Conducted by the PERM Research Forester and Forest-based Projects that Relate to Wildlife Habitat Improvements - \$60,000.00  
*Contact: Michael Walters, PERM Research Forester, [mwalters@msu.edu](mailto:mwalters@msu.edu)*
- Support for Research on Seedling, Nursery, & Tree Improvement Projects  
*Contact: David Neumann, Silviculturist, DNR, FRD, [neumannd@michigan.gov](mailto:neumannd@michigan.gov)*  
MICHCOTIP - \$6,460.00

- Develop and Implement a Computerized Timber Sale Treatment Tracking System  
Contact: Douglas Heym, Timber Sales Specialist, DNR, FRD, [heymd@michigan.gov](mailto:heymd@michigan.gov)  
Michigan Department of Information Technology - \$379,065.24
- Sirex Trapping - Bark Beetle Survey  
Contact: Dr. Anthony Cognato, Professor, Michigan State University, [acognato@msu.edu](mailto:acognato@msu.edu)  
Michigan State University - \$25,000.00

### **FY 2011 Research Permitted on FRD-Administered Lands But Not Directly Sponsored**

#### **Forest Management**

- Development of a Statewide Beech Bark Disease Monitoring and Impact Analysis Plot Network  
Contact: Dr. Andrew Storer, Professor, Michigan Technological University, [storer@mtu.edu](mailto:storer@mtu.edu)  
Michigan Technological University, direct grant to MTU from USDA-FS
- Oak Wilt Sample Analysis for Delimitation of Infected Areas  
Contact: Dr. Gerry Adams, Associate Professor of Botany and Plant Pathology, Michigan State University, [gadams@msu.edu](mailto:gadams@msu.edu); cooperator: Dr. Dana Richter, Professor of Forest Pathology, Michigan Technological University, [dlrichte@mtu.edu](mailto:dlrichte@mtu.edu) Michigan Technological University, direct grant to MSU from USDA-FS
- MTU Maple Decline Study - The geographic extent and rate of spread of the current sugar maple dieback is being examined along with potential contributing factors associated with historical dieback. Relationships between management activities, climatic events, insect or pathogen activity, soil chemistry or other factors associated with the current dieback should be clarified. These relationships will help with recommendations for management to prevent, anticipate, reduce, or salvage stands with dieback in the future.  
Contact: Dr. Andrew Storer, Professor, Michigan Technological University, [storer@mtu.edu](mailto:storer@mtu.edu), direct grant to MTU from USDA-FS
- MSU Knapweed Weevil Research – Releases and Studies of Population Dynamics and Impacts  
Contact: Doug Landis, Professor, Michigan State University
- USDA-FS NRS Growth & Yield Research – Sampling of three (3) stands in an UP FMU that are: Northern Hardwood Cover-type, were harvested in the past 3-4 years, and are over 20 acres in size  
Contact: Lauren Lemannin, Researcher, Michigan Technological University, [lemannin@mtu.edu](mailto:lemannin@mtu.edu)

#### **Ecological Processes**

- Natural Features Inventory of Michigan State Forests & Other Studies of Natural Features  
Contact: Joshua Cohen, DNR, WI, [cohenj@michigan.gov](mailto:cohenj@michigan.gov)
- A Project to Study the Biology and Methods of Reducing the Rate of Spread of the Emerald Ash Borer in Newly Established or Low Density Sites on Forested Sites  
Michigan State University funded by APHIS PPQ CPHST

- Sirex Woodwasp Monitoring to Detect Sirex Using Herbicide Treated Trap Trees  
*Contact: Dr. Andrew Storer, Professor, Michigan Technological University, [storer@mtu.edu](mailto:storer@mtu.edu)*  
 Michigan Technological University
- Development of a Statewide Beech Bark Disease Monitoring and Impact Analysis Plot Network  
*Contact: Dr. Deb McCullough, Professor of Entomology and Forestry, Michigan State University, [mccullo6@msu.edu](mailto:mccullo6@msu.edu)*
- Michigan Gradient Study on Nitrogen Gradients to Understand the Mechanisms Controlling Carbon and Nitrogen (N) Cycling in the Face of Chronic N Deposition and the Long-term Consequences of N Saturation  
*Contact: Dr. Andrew Storer, Professor, Michigan Technological University, [storer@mtu.edu](mailto:storer@mtu.edu)*  
 Michigan Technological University with support from the National Science Foundation
- Emerald Ash Borer Parasite Releases on State Forest Lands  
*Contact: Dr. Leah Bauer, Research Entomologist, USDA-FS Northern Research Station, [lbauer@fs.fed.us](mailto:lbauer@fs.fed.us)*
- National Wetlands Condition Assessment  
*Contact: Michelle Moore, Research Scientist, Great Lakes Environmental Center [mmoore@glec.com](mailto:mmoore@glec.com)*
- Gray Jay Caching Behavior Study  
*Contact: Sayako Iwanaga, Graduate Student, Northern Michigan University, [siwanaga@nmu.edu](mailto:siwanaga@nmu.edu)*
- Siting & Permission for the Oregon State University Earthscope Magnetotelluric Transportable ArrayMid Continent Rift  
*Contact: Louise Pellerin, Manager Geophysical Services, Green Engineering, Inc., 8471 Foxlair Circle, Anchorage, AK 99507-3668, [pellerin@ak.net](mailto:pellerin@ak.net) - subcontractor for Oregon State University*
- Emerald Ash Borer Parasitoid Rearing  
*Contact: Derek Lamarand, USDA-APHIS, [Derek.Lamarand@aphis.usda.gov](mailto:Derek.Lamarand@aphis.usda.gov)*

**Table 2 - PRD  
FY 2011 Ongoing Research Funded by DNR-PRD**

Primary Contact for all projects: Alicia Selden, Research Coordinator,  
PRD, 517-335-0883, [seldena@michigan.gov](mailto:seldena@michigan.gov)

**Ecological Processes**

- Natural community surveys of known element occurrences on State Park and Recreation Area lands  
*Michigan Natural Features Inventory - \$60,000.00*

**FY 2011 Ongoing Research Permitted on PRD-Administered Lands  
But Not Directly Sponsored**

**Biological Diversity**

- Adaptation of plants to steep environmental gradients  
Contact: *Dr. Joan West, University of Georgia, [joanwest@uga.edu](mailto:joanwest@uga.edu)*
- Arabidopsis lyrata genetic research  
Contact: *Dr. Barbara Mable, University of Glasgow*
- Arabidopsis lyrata: Investigating Adaptiveness of Short Stamens in Tetradynamy  
Contact: *Anne Royer, Michigan State University Kellogg Biological Station, [royerann@msu.edu](mailto:royerann@msu.edu)*
- Bacterial Content in Muck Along Bay City Recreation Area Shoreline  
Contact: *Donna Kashian, Wayne State University, [dkashian@wayne.edu](mailto:dkashian@wayne.edu)*
- Biological Diversity of Michigan Caddisflies  
Contact: *David Houghton, G.H. Gordon Biological Station*
- Biological Survey of Beach Grass Populations throughout the Great Lakes Region  
Contact: *Dr. Sarah Emery, University of Louisville, [sarah.emery@louisville.edu](mailto:sarah.emery@louisville.edu)*
- Carrion Fly Research  
Contact: *Dr. Eric Benbow, University of Dayton*
- Characterize Microbial Contents and Genetic Diversity within Pitcher Plants  
Contact: *Dr. Margaret Koopman, Eastern Michigan University, [mkoopma2@emich.edu](mailto:mkoopma2@emich.edu)*
- Entomology Course: Survey and Collection of Insect Diversity  
Contact: *Dr. Brian Scholtens, University of Michigan Biological Station*
- Peters Sand Mine Assessment/Monitoring Study  
Contact: *Ranessa Cooper, Hillsdale College, 517-607-2224*
- Phylogeny of North American Plums (Prunus spp.)  
Contact: *Dr. Dario Chavez, University of Florida*
- Population Biology of Pitcher's Thistle  
Contact: *Dr. Claudia Jolls, East Carolina University*

- Seed Preservation and Genetic Research on Pitcher's Thistle, Houghton's Goldenrod & Dwarf Lake Iris  
Contact: *Dr. Ann Rzepka Budziak, Holden Arboretum, [arzepka@holdenarb.org](mailto:arzepka@holdenarb.org)*
- Switch Grass Seed Collection, Genotype Study  
Contact: *Mark Hammond, Michigan State University, [mhammond@kbs.msu.edu](mailto:mhammond@kbs.msu.edu)*
- Using Restoration and Management to Recover Pitcher's Thistle and Improve Habitat Conditions for the Great Lakes Population of Piping Plover  
Contact: *Timothy Bell, The Morton Arboretum, [tbell22@scsu.edu](mailto:tbell22@scsu.edu)*
- Vascular Plant Survey of Ludington State Park  
Contact: *David Dister, [david.dister@gmail.com](mailto:david.dister@gmail.com)*

### **Chemical Use**

- Japanese Knotweed Life Cycle Vulnerability to Management Techniques Including Herbicide  
Contact: *Joseph Dauer, Michigan State University, [jdauer@msu.edu](mailto:jdauer@msu.edu)*

### **Ecological Processes**

- Beach Grass Research  
Contact: *Lukas Bell-Dereske, Rice University, [ldereske@rice.edu](mailto:ldereske@rice.edu)*
- Can Microbial Symbiots Mediate Effects of Climate Changes or the Functioning of an Ecosystem Engineer?  
Contact: *Dr. Sarah Emery, University of Louisville, [sarah.emery@louisville.edu](mailto:sarah.emery@louisville.edu)*
- Ecological Impacts of Emerald Ash Borer on Michigan State Lands  
Contact: *Dr. Daniel Herms, Ohio State University, [herms.2@osu.edu](mailto:herms.2@osu.edu)*
- Establishment of a Diverse Assemblage of Native Grasses & Forbs on a Degraded, Knapweed Infested Site in Bass River Recreation Area  
Contact: *Dr. Neil MacDonald, Grand Valley State University, [macdonan@gvsu.edu](mailto:macdonan@gvsu.edu)*
- Interactive Effects of Invasive Species and Climate Change on Pitcher's Thistle Survival and Growth  
Contact: *Dr. Sarah Emery, University of Louisville, [sarah.emery@louisville.edu](mailto:sarah.emery@louisville.edu)*
- Micro-Meteorological Monitoring of Lake Effect Temperature Inversion  
Contact: *Dr. Kenneth Hinkel, University of Cincinnati, [Kenneth.hinkel@uc.edu](mailto:Kenneth.hinkel@uc.edu)*
- Photographic Measurement of Sand Dune Erosion at P.J. Hoffmaster and Saugatuck Dunes State Parks  
Contact: *Dr. Brian Bodenbender, Geology Department, Hope College*
- Study of Beach-Coastal Dune Processes from January – December 2011 in Hoffmaster State Park  
Contact: *Dr. Deanna Van Dijk, Calvin College, [dvandijk@calvin.edu](mailto:dvandijk@calvin.edu)*
- Use of Warren Woods Old Growth Forest as a Control/Base for Restoration and Preservation of University of Notre Dame Woodlots  
Contact: *Dr. Dominic Chaloner, University of Notre Dame, [dchalone@nd.edu](mailto:dchalone@nd.edu)*

## **Environmental Protection**

- Birds as Indicators of Contaminant Exposure on Great Lakes  
Contact: *Christine Custer, USGS, Upper Midwest Environmental Sciences Center, [ccuster@usgs.gov](mailto:ccuster@usgs.gov)*
- Cooperative Weed Control within Michigan State Parks (baby's breath survey and eradication)  
Contact: *Shawn Howard, Nature Conservancy in MI, [showard@tnc.org](mailto:showard@tnc.org)*
- Munitions Survey and Soil Sampling  
Contact: *Joni Jorgensen-Risk, Parsons, [joni.jorgensen-risk@parsons.com](mailto:joni.jorgensen-risk@parsons.com)*
- Survey for Oak Wilt  
Contact: *Phillip Kurzeja, Michigan State University, [korzejap@msu.edu](mailto:korzejap@msu.edu)*

## **Forest Management**

- Assessment of Beach Bark Disease in Michigan: Rate of Spread and Impacts on Stand Composition and Down Woody Material  
Contact: *James Wieferich, Michigan State University, [wiefer10@msu.edu](mailto:wiefer10@msu.edu)*
- Emerald Ash Borer Research on DNR Lands  
Contact: *Dr. Deb McCullough, Michigan State University, [mccullo6@msu.edu](mailto:mccullo6@msu.edu)*
- Predicting Impacts of Climate Change on Gypsy Moths using a Mechanistic Model of Species Interactions  
Contact: *Colin Kyle, University of Chicago, [ckyle@uchicago.edu](mailto:ckyle@uchicago.edu)*
- Remeasurement of Permanent Vegetation Plots for Study of Long-term Forest Change  
Contact: *Craig Lorimer, University of Wisconsin-Madison, [clorimer@wisc.edu](mailto:clorimer@wisc.edu)*
- Restoration of Native Pine Species in Great Lakes Coastal Environments  
Contact: *Dr. Robert Fahey, Morton Arboretum, [rfahey@mortonarb.org](mailto:rfahey@mortonarb.org)*

## **Human Dimensions**

- Tick Invasion and Lyme Disease Research in Michigan's Lower Peninsula  
Contact: *Jean Tsao, Michigan State University, [tsao@msu.edu](mailto:tsao@msu.edu)*

## **Wildlife Management**

- Cerulean Warbler Survey and Banding  
Contact: *John Brenneman, Kalamazoo Nature Center, [jbrenneman@naturecenter.org](mailto:jbrenneman@naturecenter.org)*
- Determination of Bird and Bat Migration Corridors and Stopover Sites along Shores of the Great Lakes  
Contact: *Anna Peterson, University of Minnesota, [pete1112@d.umn.edu](mailto:pete1112@d.umn.edu)*
- Investigation of the Information Conveyed by Alarm Calls in Yellow Warblers  
Contact: *Dr. Sharon Gill, Western Michigan University, [Sharon.gill@wmich.edu](mailto:Sharon.gill@wmich.edu)*
- Northern Saw-Whet Owl Banding at Muskegon State Park  
Contact: *Brian Johnson, [baidaj@yahoo.com](mailto:baidaj@yahoo.com)*

- Owl Banding at Cheboygan State Park  
Contact: *Dr. Kathleen Colby, North Central Michigan College, [kcolby@ncmich.edu](mailto:kcolby@ncmich.edu)*
- Seasonal Deer Migration Affects the Distribution of Nutrients in Forest Ecosystem  
Contact: *Bryan Murray, Michigan Technological University, [bdmurray@mtu.edu](mailto:bdmurray@mtu.edu)*

**Table 3 - Wildlife Division  
FY 2011 Research Funded by DNR-WL**

Primary Contact for all projects:  
Steve Beyer, Research Coordinator  
DNR, WL  
517-373-9338, [beyers@michigan.gov](mailto:beyers@michigan.gov)

**Ecological Process**

- Role of Predators, Winter Weather, and Habitat on White-tailed Deer Fawn Survival in Michigan  
*Mississippi State University - \$337,270.00*
- Estimating Coyote and Wolf Abundance and Consumption Rates of White-tailed Deer.  
*Mississippi State University - \$40,600.00*
- Importance of Coarse Woody Debris to Forest Songbirds  
*Michigan State University - \$0 additional cost in FY 2011*

**Human Dimensions**

- Reducing Partial Controllability: An Assessment of Bovine TB Management Interventions  
*Michigan State University - \$5,296.00*
- Partners in Ecosystem Research and Management: Human Dimensions of Wildlife Health; Human-Wildlife Interactions; Developing Capacity for Living With Wildlife  
*Michigan State University - \$115,679.00*
- Assessing Effects of Social Capital Among Michigan Deer Management Cooperatives.  
*Michigan State University - \$82,890.00*

**Biological Diversity**

- Effectiveness of Residual Structure Retention in Clear-cut Harvest Units for Conserving Biodiversity and Wildlife Habitat  
*Michigan State University - \$216,358.00*
- Statewide Analysis and Surveys to Develop an Approach for Identifying Priority Conservation Areas in Michigan  
*Michigan State University - \$0 Project completed; no additional costs in FY 2011*
- Comprehensive Biodiversity Survey of Southern Michigan State Game Areas  
*Michigan State University - \$0 Project not funded nor conducted in FY 2011*
- Expansion of Black Bear Range in the Agro-forested Region of Central Michigan.  
*University of Wisconsin - \$0 Because of contracting issues, no research was supported on this project in FY 11*
- Landscape Genetic Analysis of Harvest Intensity, Land-cover and Land-use Features Affecting Black Bear Movements, Abundance, and Source-sink Dynamics in Michigan's Lower Peninsula.  
*Michigan State University - \$179,994.00*

## **Social and Economic**

- Partners in Ecosystem Research and Management: Modeling the Demand and Values for Michigan's Hunted Wildlife Resources  
*Michigan State University - \$38,333.00*
- Partners in Ecosystem Research and Management: Evaluating the Role of Social Networks and Capital in the Stewardship Activities Impacting Wildlife Resources  
*Michigan State University - \$55,695.00*
- Disease Surveillance in Free-ranging Cervids in Michigan  
*Michigan State University - \$55,569.00*
- Partners in Ecosystem Research and Management: Improving the Quality and Sustainability of Human Environments and Natural Resources in Michigan with a Specific Emphasis on Wildlife Resources  
*Michigan State University - \$39,899.00*

**Table 4 – Fisheries Division  
FY 2011 Research Funded by DNR-FI**

Primary Contact for all projects:  
Tammy Newcomb, Research Coordinator  
FI  
517-373-3960  
[newcombt@michigan.gov](mailto:newcombt@michigan.gov)

**Ecological Processes**

- Colonization of a Brook Trout Stream by Introduced Brown Trout  
*Contact: Wills*  
Fisheries Division - \$5,293.00
- Influence of Lotic and Nearshore Habitats on Fish Populations in Great Lakes and Inland Lake Ecosystems, with Emphasis on Walleye  
*Contact: Zorn*  
Fisheries Division - \$106,077.00
- Effects of Sediment Traps on Michigan River Channels  
*Contact: Wills*  
Fisheries Division - \$39,428.00
- Evaluation of the Relative Growth and Survival of Wild Rose and Sturgeon River Brown Trout Stocked into Michigan Lakes and Reservoir Tailwaters  
*Contact: Wills*  
Fisheries Division - \$39,971.00
- Development of Management Scenarios for Lake and Stream Habitat and Fisheries Under Current and Future Land-use and Climate Conditions  
*Contact: Wehrly*  
Fisheries Division - \$116,988.00
- Walleye Dynamics in Michigan's Inland Waterway: the Burt-Mullett-Pickerel-Crooked Lake System  
*Contact: Hayes*  
Michigan State University - \$98,728.00
- Fish Community Status in Saginaw Bay, Lake Huron  
*Contact: Fielder*  
Fisheries Division - \$175,196
- Northern Lake Huron, Coolwater Fish Community Assessment  
*Contact: Fielder*  
Fisheries Division - \$42,855
- Evaluation of Lake Sturgeon Populations in the St Clair River and Lake St Clair, Michigan  
*Contact: Thomas*  
Fisheries Division - \$72,129

- Investigation of Watershed Influences, Riparian Condition, and Instream Habitat Dynamics on Stream Fish Communities: Prioritizing Watershed Rehabilitation Opportunities and Tradeoffs by Evaluating Functional Relationships  
*Contact: Infante*  
Michigan State University - \$50,875.00
- Effects of Temperature on Functional Relationships Among Michigan's Fluvial Fish Assemblages: Identifying Management Opportunities in the Face of Environmental Changes  
*Contact: Infante*  
Michigan State University - \$94,128.00
- Strengthening Habitat Elements of Michigan's Statewide River Segment GIS in Support of Aquatic Ecosystem Management  
*Contact: Zorn*  
Fisheries Division - \$191,637.00
- Development of a GIS for Inventory, Classification, and Management of Non-game Wildlife in Great Lakes Waters  
*Contact: Rutherford*  
University of Michigan - \$168,461.00
- Development of Lake Spatial Information and Tools for Aquatic Life Conservation  
*Contact: Breck*  
Fisheries Division - \$195,279.00

### **Human Dimensions**

- Comprehensive Analysis and Improvement of Michigan Statewide Angler Survey Data  
*Contact: Su*  
Fisheries Division - \$53,373.00
- Michigan Statewide Angler Survey Program  
*Contact: Clapp, Su*  
Fisheries Division - \$1,988,051.00
- A Statewide Survey of Michigan's Licensed Anglers  
*Contact: Lupi*  
Michigan State University - \$48,228.00

### **Fisheries Management**

- Assessment of Predator - Prey Balance for Lake Huron Fishery Management  
*Contact: He*  
Fisheries Division - \$46,199.00
- Energetics Approach to Predicting Growth, Maturation, and Fecundity of Largemouth Bass, Bluegill, and Walleye  
*Contact Breck*  
Fisheries Division - \$50,326.00

- Effects of Restrictive Minimum Size Limits and Gear Restrictions on Brook Trout Populations in the Black River, Michigan  
*Contact: Wills*  
Fisheries Division - \$50,904.00
- Assessing the Effects of Spring Fishing Regulations on Reproductive Dynamics and Population Demographics of Black Bass in Michigan Lakes  
*Contact: Bremigan*  
Michigan State University - \$77,227.00
- Hooking Mortality of Lake Trout in the Upper Great Lakes  
*Contact: Sitar*  
Fisheries Division - \$63,170.00
- Development of Databases, Classification Systems, and Fisheries Management Tools for Inland Lakes of Michigan  
*Contact: Wehrly*  
Fisheries Division - \$21,270.00
- Compare and Improve Lake Trout Abundance Indices and Evaluate Optimal Allocation of Creel Survey Resource for Lake Huron  
*Contact: Su*  
Fisheries Division - \$12,198.00
- Influence of Total Length and Condition at Stocking on Chinook Salmon Survival and Time at Large  
*Contact: Jonas*  
Fisheries Division - \$19,651.00
- Decision-support Tools for Managing Fisheries of Inland Lakes  
*Contact: Breck*  
Fisheries Division - \$5,004.00
- Improving Fishery Stock Assessments in the Great Lakes  
*Contact: Bence*  
Michigan State University - \$157,365.00
- Evaluation of Eagle Lake and Steelhead-strain Rainbow Trout Stocked into Inland Lakes in Michigan  
*Contact: Wills*  
Fisheries Division - \$1,486.00
- Investigation of Stocking Methods for Expanding the Steelhead Fishery in Lake Huron  
*Contact: Johnson*  
Fisheries Division – \$22,291.00
- Vital Statistics of Walleye in Saginaw Bay  
*Contact: Fielder*  
Fisheries Division - \$49,671.00

- Evaluation of Lake Trout Stocks in Lake Huron  
*Contact: He*  
Fisheries Division - \$157,941.00
- Dynamics of the Lake Erie Walleye and Yellow Perch Populations and Fisheries  
*Contact: Thomas*  
Fisheries Division - \$146,813.00
- Charter Boat Catch and Effort From the Michigan Waters of the Great Lakes  
*Contact: Wesander*  
Fisheries Division - \$58,470.00
- Statewide Coded-wire Tagging and Tag Recovery Program  
*Contact: Clapp*  
Fisheries Division - \$168,765.00
- Population Dynamics of Yellow Perch Stocks in Michigan Waters of Lake Michigan  
*Contact: Clapp*  
Fisheries Division - \$78,610.00
- Assessment of Chinook Salmon and Coho Salmon Populations and their Prey in Eastern Lake Michigan  
*Contact: Claramunt*  
Fisheries Division - \$121,642.00
- Assessment of Lake Trout Populations in Michigan's Waters of Lake Michigan  
*Contact: Jonas*  
Fisheries Division - \$120,698.00
- Status of Lake St. Clair Fish Community and Sport Fishery  
*Contact: Thomas*  
Fisheries Division - \$93,436.00
- Assessment of Lake Trout Populations in Michigan Waters of Lake Superior  
*Contact: Sitar*  
Fisheries Division - \$200,596.00
- Evaluation of Returns of Salmonids to Weirs in Michigan's Waters of the Great Lakes  
*Contact: Claramunt, Jonas*  
Fisheries Division - \$25,364.00
- Design, Analysis, and Implementation of Aquatic Resource Inventory in Michigan  
*Contact: Hayes*  
Michigan State University - \$35,368.00
- Fisheries Assessments in Large Inland Lakes of Michigan  
*Contact: Hanchin*  
Fisheries Division - \$35,368.00

- Assessment of Nearshore Fish Communities in Northern Lake Michigan  
*Contact: Zorn*  
Fisheries Division - \$58,783.00
- Refinement of the Aquatic Portion of Michigan's Wildlife Action Plan and Development of Tools to Support the Plan  
*Contact: Wehrly*  
Fisheries Division - \$155,527.00

### **Biological Diversity**

- Lake Sturgeon Population Status in the Cheboygan River Watershed Lakes, Michigan  
*Contact: Baker*  
Fisheries Division - \$150,051.00
- Status and Trends of Inland Lakes: Methods Development, Program Oversight, and Ecological Assessment  
*Contact: Wehrly*  
Fisheries Division - \$76,988.00
- Genetic Diversity of Fish Populations in Michigan: Effects of Environmental and Anthropogenic Factors on Recruitment and Apportionment of Phenotypic and Genetic Diversity of Fish Populations in Inland and Great Lakes Habitats  
*Contact: Scribner*  
Michigan State University - \$67,845.00
- Status and Trends of Fish Populations and Community Structure in Michigan Streams  
*Contact: Wills*  
Fisheries Division - \$62,461.00
- Assessment of Nearshore Fish Communities in Northern Lake Michigan  
*Contact: Zorn*  
Fisheries Division - \$58,783.00
- Review of Inland Fisheries Cooperative Grants Funded Projects for Efficacy and Biological Benefit  
*Contact: Grischke*  
Fisheries Division - \$36,064.00