

Summary of Sustainable Forestry Research

FY 2009

Michigan Department of Natural Resources and Environment

Purpose and Use of this Report

The State of Michigan, under the Michigan Department of Natural Resources and Environment (DNRE) and Michigan Department of Agriculture (MDA), supports research projects to ensure sustainable management of Michigan's forest lands. This document summarizes those projects in place during the fiscal year 2009 (October 1, 2008 - September 30, 2009). 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 DNRE and MDA.

Research Summaries

Research is administered and supported differently in each Department and DNRE Division. The Wildlife Division and Fisheries Division 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 Management Division (FMD) 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 DNRE's 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;
- Human Dimensions;
- Chemical Use;
- Forest Management
- Wildlife Management;
- Fisheries Management;
- Environmental Protection;
- Biological Diversity;
- and Social Economic.

Integration and Use of Research in the DNRE

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

Michigan DNRE 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 DNRE 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 DNRE personnel. For more information about specific research projects listed in the tables above, interested parties should contact the research coordinator for that Division. Table 7 lists the research coordinator for each Division.

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT RESEARCH PROJECTS – 2009

Table 1

Forest Management Division

(Forest, Mineral, and Fire Management Division (FMFM) was renamed Forest Management Division (FMD) in Jan. 2010)

FY 2009 Research Funded by DNR-FMD

Primary Contact for all projects: Ronald Murray, Research Coordinator, Forest Management Division, 517-335-3353, murrayr@michigan.gov

Forest Management

- Conduct the re-measurement of the FIA plots for Michigan

USDA-FS-Forest Inventory Analysis –Cost \$16,247.68

Contact: Scott A Pugh, USDA-FS, FIA, spugh@fs.fed.us

- Design, develop, and build prototype and operational equipment units for mechanized forest fire fighting

Forest Fire Experiment Station—Cost: \$693,291.17

Contact: Joshua Cohen, WLD Natural Features Inventory, DNR-WLD-MNFI, CohenJ@michigan.gov

- Design and develop specialized equipment for forest fire fighting
Roscommon Equipment Center—Cost: \$192,576.63
Contact: Kirk Bradley Assistant Unit Leader, DNR-FMD,
BRADLEYK@michigan.gov

- Funding for center to do Tree Improvement Studies and implement nursery practices to improve quality of tree seedlings produced in Michigan State Forest Nurseries
Michigan Tree Improvement Center—Cost: \$ 173,009.45
Contact: Richard Mergener, MergenerR@michigan.gov

- Improvements of production of nursery stock and seedlings
Wyman Nursery Improvement—Cost: \$700,228.42
Contact: Richard Mergener, MergenerR@michigan.gov

- Development of a GIS-based inventory system for the Michigan State Forests - Integrated Forest Monitoring Assessment and Prescription (IFMAP)
Michigan Department of Information Technology—Cost: \$1,279,552.57
Contact: Jason Stephens StephensJ@Michigan.gov

- Support of projects conducted by the PERM Research Forester and forest-based projects that relate to wildlife habitat - improvements
 MSU PERM Forester -PERM Project Support –Cost: \$40,000.00
 Contact: Michael Walters, PERM Research Forester, Mwalters@MSU.edu

- Support for research on Seedling, Nursery, & Tree Improvement Projects
 MICHCOTIP—Cost: \$6,000.00
 Contact David Neumann, Silviculturalist, Michigan DNR,
 NewmannD@Michigan.gov

- Development of a statewide Beech Bark Disease Monitoring and Impact Analysis Plot Network
University of Michigan, School of Natural Resources & Environment—
Cost: \$19,009.03
Contact Dr.Andrew Storer, Professor, Michigan Technological University,
Storer@MTU.edu

- Oak Wilt Sample Analysis for delimitation of infected areas
Michigan Technological University—Cost: \$2,500.00
Contact: Dr. Dana Richter, Professor of Forest Pathology, Michigan
Technological University, dlrichte@mtu.edu

- To develop and implement a computerized timber sale treatment tracking system
Michigan Department of Information Technology--\$211,023.71
Contact: Douglas Heym, Timber Sale Specialist DNR-FMD,
heymd@michigan.gov

-Sirex Trapping - Bark Beetle Survey

Michigan State University—Cost: \$25,000.00

*Contact Dr.Andrew Storer, Professor, Michigan Technological University,
Storer@MTU.edu*

Ecological Processes

- Natural Features Inventory of the Michigan State Forests & Other Studies of Natural Features

*Michigan State University - Michigan Natural Features Inventory--
\$78,335.00*

FY 2009 Research Permitted on FMD-Administered Lands But Not Directly Sponsored

Biological Diversity

- A project to collect and bank seeds for the Millennium Seed Bank Project in an effort to establish a high quality, accurately identified, and well documented native species seed collection at the population level. .

-Chicago Botanical Gardens et. al. national partnership

Forest Management

- 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 Project-a project to detect Sirex using herbicided trap trees

-Michigan Technological University

*Contact Dr.Andrew Storer, Professor, Michigan Technological University,
Storer@MTU.edu*

- A study entitled "Interactions Among Prescribed Fire, Mechanical Treatments, Insect Pests and Pathogens in Red Pine" seeks to 1) Determine the effects of fire and mechanical treatments, alone and in combination, on incidence and impact of forest insect pests and pathogens in mature red pine stands in the Lake States. 2) Document the effects of these treatments on forest vegetation and litter parameters, and relate these effects to the biology of forest pests.

-Michigan Technological University and USDA-FS, S&PF

*Contact Dr.Andrew Storer, Professor, Michigan Technological University,
Storer@MTU.edu*

- “Impact of the Sleeper Lake Wildfire on Forest Health in Upland Pine Forests.”
This study is related to the Muskrat Lakes Fire and Fire Surrogate study and is taking place in and around the Sleeper Lake Wildfire site in Luce County. Permanent plots have been established to monitor tree response to fire. Understory vegetative response is also being measured. Forest health data was collected including fire severity and insect activity.

Michigan Technological University

Contact Dr. Andrew Storer, Professor, Michigan Technological University, Storer@MTU.edu

- Causes of Ash Decline in Michigan are being studied to determine their role in the mortality of ash and their relationship to the Emerald Ash Borer mortality now being experienced across the state.

- Michigan State University

Contact: Dr. Gerry Adams, Associate Professor Botany and Plant Pathology, gadams@pilot.msu.edu

- 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

Ecological Processes

- The Michigan Gradient study conducts research on Nitrogen gradients to understand the mechanisms controlling carbon © and N cycling in the face of chronic N deposition and the long-term consequences of N saturation

-Michigan Technological University with support from the National Science Foundation

Contact Dr. Andrew Storer, Professor, Michigan Technological University, Storer@MTU.edu

Wildlife Management

- A study of small mammal biology is being done by trapping small mammals on state lands

University of Michigan Museum of Zoology

Table 2
Recreation Division
(Parks and Recreation Division was renamed
Recreation Division (RD) in Jan. 2010)

Primary Contact for all projects: Glenn Palmgren, Research Coordinator,
Recreation Division, 517-373-7844, PalmgrenG@michigan.gov

-Study/Job title/description

Research Agency (Contact person for completed projects)

FY 2009 Ongoing Research Funded by DNR-RD

Ecological Processes

- Natural community surveys of known element occurrences on State Park and
Recreation Area lands

Michigan Natural Features Inventory—Cost: \$30,000

**FY 2009 Ongoing Research Permitted on RD-Administered Lands
But Not Directly Sponsored**

Biological Diversity

- A study of the population genetics of rose pink in Michigan and nearby states
Albion College

- Embryological basis of tail length variation in *Peromyscus maniculatus*
Harvard University

- Genetic diversity and population structure of switchgrass along the coast of
Lake Michigan

University of Chicago Dept. of Ecology & Evolution

- Impact of reservoirs on food webs downstream from dams on the Kalamazoo
River

Michigan State University

- Integrating long-term demographic data & repeated genetic sampling for
viability analysis of natural and
restored populations of Pitcher's thistle

East Carolina University

- Invertebrate collection and study for zoology class
Saginaw Valley State University

- Northern saw-whet owl banding at Muskegon State Park
Mr. Brian Johnson

- Phylogenetic analysis of the ant genus *Aphaenogaster* in North America using
both morphology and DNA

Michigan State University

- Rock cress (*Arabidopsis lyrata*) genetic research
Integrative Biology, ETH Zurich, Switzerland
- Study of genetic basis of variation in the fruit fly (*Drosophila americana*)
University of Michigan
- Study of natural selection on floral traits in butterflyweed
Michigan State University
- Study of western fox snakes
Queens University, Dept. of Biology
- The distribution and ecological association of lianas & herbaceous vines in the Eastern Deciduous Forest/Prairie Transition Zones
US Geological Survey
- Vascular plant survey of Ludington State Park
Mr. David Dister

Ecological Processes

- Characterization of forest functional types and their role in mediating ecosystem response to environmental change
University of Wisconsin - Madison
- Collaborative study with USACE and NRCS to improve the use of hydric soil field indicators
DEQ
- Community composition and coevolution: a generalist plant and its specialist pollinator
MSU - Kellogg Biological Station
- Ecological impacts of EAB on Michigan state lands
Ohio State University
- Establishment of a diverse assemblage of native grasses & forbs on a degraded, knapweed infested site in Bass River RA, Ottawa Co, MI
Grand Valley State University
- Impacts of EAB ash mortality on amphibian community diversity in Southeast Michigan
Wayne State University
- Micro-meteorological monitoring of lake effect temperature inversion
University of Cincinnati
- Paleo-storminess recorded by eolian sand downwind of dunes
University of Toledo
- Photogrammetric measurement of sand dune erosion at P.J. Hoffmaster and Saugatuck Dunes State Parks

Hope College

- Sand erosion measurement at Hoffmaster State Park

Grand Valley State University

- Soil sampling in successive dune ridges to determine composition and structure of microbial communities in

Mississippi State University

- Study of beach-coastal dune processes

Calvin College

Environmental Protection

- Assessment and control of sea lamprey

US Fish & Wildlife Service

- Collection of lingering ash from permanent research plots

US Forest Service

- Cooperative weed control within Michigan State Parks (Baby's breath survey and eradication)

The Nature Conservancy of Michigan

- Detection of pathogenic fungus that causes beech bark disease

Michigan State University

- EAB research on State Parks and Wildlife Areas

Michigan State University

- EAB survey and detection on state lands

Michigan Technical University

- Early detection and rapid response bark beetle surveys

Michigan State University

- Early detection of exotic forest pests

Michigan Department of Agriculture

- Emerald ash borer slow ash mortality project and trap testing

Michigan Technological University

- MSU beech bark disease monitoring plot study

Michigan State University

Human Dimensions

- Tick invasion and Lyme disease research in Michigan's Lower Peninsula

Michigan State University

Wildlife Management

- Assessing an expert-based landscape approach to predict king rail (*Rallus elegans*) distribution

University of Arkansas

- Population density of mink

Lake Superior State University

Research Projects Completed in FY 2009

Reports for all projects listed below are on file in Recreation Division,
Stewardship Unit and are available from Glenn Palmgren
(PalmgrenG@michigan.gov)

DNR-RD Funded Projects

Ecological Processes

- Natural community surveys of known element occurrences on State Park and
Recreation Area lands

Michigan Natural Features Inventory

Joshua G. Cohen, CohenJ@michigan.gov

Completed 12/31/2009. Final report # 2009-22.

Research Permitted on RD-Administered Lands But Not Directly Sponsored

Biological Diversity

- A taxonomic investigation of a re-vegetated mining site in Grand Mere State
Park, Part II

Hillsdale College

*Manning Serafin, mserafin@hillsdale.edu / Dr. Ranessa Cooper, advisor,
rcooper@hillsdale.edu)*

Thesis received in May 2009

Ecological Processes

- Collaborative study with USACE and NRCS to improve the use of hydric soil
field indicators

DNRE

James Sallee, SalleeJ@michigan.gov

Final report received 11/9/09

Environmental Protection

- Distribution and population dynamics of beech scale (*Cryptococcus fagisuga*) in
Michigan

Michigan State University

*Daniel Wieferich, wieferi9@msu.edu / Dr. Deborah McCullough, advisor,
mccullo6@msu.edu Thesis received 1/13/10*

Table 3
Wildlife Division
RESEARCH PROJECTS – 2009

Primary Contact for all projects: Patrick Lederle, Research Coordinator, Wildlife Division, 517-373-9338, LEDERLEP@michigan.gov

-Study/Job title/description

Ecological Process

- Winter use by White-tailed Deer of Remnant Hemlock Stands in the Western Upper Peninsula
Michigan Technological University--Project completed, no additional costs in FY 09

- Role of Predators, Winter Weather, and Habitat on White-tailed Deer Fawn Survival in Michigan
Mississippi State University—Cost: \$ 145,000

- Systematic Evaluation of Oak Regeneration in Lower Michigan
Michigan State University--Project completed, no additional costs in FY 09—Cost \$ 0.00 additional in 09

- Importance of Coarse Woody Debris to Forest Songbirds
Michigan State University—Cost: \$ 45,000

Human Dimensions

- Reducing Partial Controllability: An Assessment of Bovine TB Management Interventions
Michigan State University—Cost: \$ 15,300

- Partners in Ecosystem Research and Management: Evaluation of Stakeholder Attitudes Towards Deer and Deer Management in Michigan
Michigan State University--\$ 131,200

Biological Diversity

- Developing a Sharp-tailed Grouse Monitoring Program in the Eastern Upper Peninsula
Michigan Technological University—Cost: \$ 5,000

- Effectiveness of Residual Structure Retention in Clearcut Harvest Units for Conserving Biodiversity and Wildlife Habitat
Michigan State University—Cost: \$ 131,000

-Statewide Analysis and Surveys to Develop an Approach for Identifying Priority Conservation Areas in Michigan

Michigan State University—Cost: \$ 100,000

-Southern Michigan DNR Lands Integrated Inventory Project

Michigan State University—Cost: \$ 190,000

Social and Economic

- Partners in Ecosystem Research and Management: Modeling the Demand and Values for Michigan's Hunted Wildlife Resources

Michigan State University—Cost: \$ 37,400

- Partners in Ecosystem Research and Management: Evaluating the Role of Social Networks and Capital in the Stewardship Activities Impacting Wildlife Resources

Michigan State University—Cost: \$ 51,400

Table 4
Fisheries Division
Fisheries Division Research Projects funded in FY2009

Primary Contact for all projects: Tammy Newcomb, Research Coordinator,
Fisheries Division, 517-373-3960 NEWCOMBT@michigan.gov

-Study/Job title/description (Fisheries Division Assessment Theme**) *Principal Investigator (Agency)--Cost*

**Fisheries Division Assessment Themes

- Inland lakes and depressional wetlands (ILDW)
- Rivers, streams, and floodplain wetlands (RSFW)
- Great Lakes nearshore zones, including coastal wetlands (GLNSZ)
- Great Lakes deepwater zones (GLDWZ)
- Great Lakes pelagic zones (GLPZ)
- Fish culture and fish health (FCFH)
- Human dimensions of aquatic systems and their fisheries (HD)

Ecological Processes

- Quantifying the effects of anthropogenic development on lake food webs (ILDW)
Bremigan--Michigan State University—Cost: \$19,727
- Northern Lake Huron, Coolwater Fish Community Assessment (GLNSZ)
Fielder --MDNR, Fisheries Division—Cost: \$32,125
- Fish community status in Saginaw Bay, Lake Huron (GLNSZ)
Fielder --MDNR, Fisheries Division—Cost: \$148,143
- Lakewide assessment of the contribution of natural recruitment to the Chinook salmon population of Lake Huron (GLPZ)
Johnson--MDNR, Fisheries Division—Cost: \$3,191
- Colonization of a brook trout stream by introduced brown trout (RSFW)
Nuhfer--MDNR, Fisheries Division—Cost: \$28,019
- Evaluation of brown trout and steelhead competitive interactions in Hunt Creek, Michigan (RSFW)
Nuhfer--MDNR, Fisheries Division—Cost: \$23,509
- Evaluation of lake sturgeon populations in the St Clair River and Lake St Clair, Michigan (GLNSZ)
Thomas--MDNR, Fisheries Division—Cost: \$59,735
- Effects of sediment traps on Michigan river channels (RSFW)
Wills--MDNR, Fisheries Division—Cost: \$20,437
- Influence of lotic and nearshore habitats on fish populations in Great Lakes and inland lake ecosystems, with emphasis on walleye (Multiple)
Zorn--MDNR, Fisheries Division—Cost: \$109,904

Human Dimensions

- Michigan Statewide Angler Survey Program (Multiple)
Clapp/Su--MDNR, Fisheries Division—Cost: \$2,304,891

- A statewide survey of Michigan's licensed anglers (HD)
Lupi--Michigan State University—Cost: \$50,190
- Comprehensive analysis and improvement of Michigan statewide angler survey data
Su--MDNR, Fisheries Division—Cost: \$63,841

Fisheries Management

- Improving fishery stock assessments in the Great Lakes (Multiple)
Bence--Michigan State University—Cost: \$159,453
- Energetics approach to predicting growth, maturation, and fecundity of largemouth bass, bluegill, and walleye (ILDW)
Breck--MDNR, Fisheries Division—Cost: \$58,720
- Decision-support tools for managing fisheries of inland lakes (ILDW)
Breck--MDNR, Fisheries Division—Cost: \$18,441
- Statewide coded-wire tagging and tag recovery program (Multiple)
Clapp--MDNR, Fisheries Division—Cost: \$153,534
- Population dynamics of yellow perch stocks in Michigan waters of Lake Michigan (GLNSZ)
Clapp-MDNR, Fisheries Division—Cost: \$70,042
- Assessment of Chinook salmon and coho salmon populations and their prey in Eastern Lake Michigan (GLPZ)
Claramunt--MDNR, Fisheries Division—Cost: \$142,102
- Evaluation of returns of salmonids to weirs in Michigan's waters of the Great Lakes (GLPZ)
Claramunt/Jonas--MDNR, Fisheries Division—Cost: \$25,380
- Vital statistics of walleye in Saginaw Bay (GLNSZ)
Fielder--MDNR, Fisheries Division—Cost: \$45,967
- Dynamics of the Lake Erie walleye and yellow perch populations and fisheries (GLNSZ)
Haas--MDNR, Fisheries Division—Cost: \$134,368
- Fisheries assessments in large, inland lakes of Michigan (ILDW)
Hanchin--MDNR, Fisheries Division—Cost: \$175,294
- Design, analysis, and implementation of aquatic resource inventory in Michigan (Multiple)
Hayes--Michigan State University—Cost: \$89,443
- Evaluation of lake trout stocks in Lake Huron (GLDWZ)
He--MDNR, Fisheries Division—Cost: \$145,330
- Assessment of predator-prey balance for Lake Huron fishery management (Multiple)
He--MDNR, Fisheries Division—Cost: \$53,517
- Assessment of lake trout populations in Michigan's waters of Lake Michigan (GLDWZ)
Jonas--MDNR, Fisheries Division—Cost: \$117,974
- Influence of total length and condition at stocking on Chinook salmon survival and time at large (GLPZ)
Jonas--MDNR, Fisheries Division—Cost: \$19,95

- Evaluation of the relative growth and survival of Assinica, Nipigon, and Iron River-strain brook trout stocked into small inland lakes (ILDW)
Nuhfer--MDNR, Fisheries Division—Cost: \$33,440
- Effects of restrictive minimum size limits and gear restrictions on brook trout populations in the Black River, Michigan (RSFW)
Nuhfer--MDNR, Fisheries Division—Cost: \$24,217
- Evaluation of Eagle Lake and steelhead-strain rainbow trout stocked into inland lakes in Michigan (ILDW)
Nuhfer--MDNR, Fisheries Division—Cost: \$22,811
- Assessment of lake trout populations in Michigan waters of Lake Superior (GLDWZ)
Sitar--MDNR, Fisheries Division—Cost: \$299,829
- Status of Lake St Clair fish community and sport fishery (GLNSZ)
Thomas--MDNR, Fisheries Division—Cost: \$118,857
- Charter boat catch and effort from the Michigan waters of the Great Lakes (Multiple)
Wesander--MDNR, Fisheries Division—Cost: \$53,519
- Assessment of nearshore fish communities in northern Lake Michigan (GLNSZ)
Zorn--MDNR, Fisheries Division—Cost: \$2,633
- Assessing the effects of spring fishing regulations on reproductive dynamics and population demographics of black bass in Michigan lakes (ILDW)
Bremigan--Michigan State University—Cost: \$34,468
- Hooking mortality of lake trout in the upper Great Lakes (GLDWZ)
Sitar--MDNR, Fisheries Division—Cost: \$79,357
- Development of databases, classification systems, and fisheries management tools for inland lakes of Michigan (ILDW)
Wang--MDNR, Fisheries Division—Cost: \$81,631
- Compare and improve lake trout abundance indices and evaluate optimal allocation of creel survey resource for Lake Huron (Multiple)
Su--MDNR, Fisheries Division—Cost: \$37,342

Biological Diversity

- Improve and validate river segment identification and classification models for assessing fishery potential and environmental impairment in Michigan (RSFW)
Wang--MDNR, Fisheries Division—Cost: \$1,671
- Status and trends of inland lakes: methods development, program oversight, and ecological assessment (ILDW)
Wehrly--MDNR, Fisheries Division—Cost: \$64,642
- Status and trends of fish populations and community structure in Michigan streams (RSFW)
Wills/Nuhfer--MDNR, Fisheries Division—Cost: \$67,822
- Lake sturgeon population status in the Cheboygan River watershed lakes, Michigan (ILDW)
Baker--MDNR, Fisheries Division—Cost: \$108,832