NOTICE OF PRIORITIES FOR FISHERY RESEARCH
MICHIGAN DEPARTMENT OF NATURAL RESOURCES,
FISHERIES DIVISION
–Fiscal year 2009 (beginning October 1, 2008)

PURPOSE OF PROGRAM; ADMINISTRATION, TYPE OF RESEARCH; AND RESEARCH THEME AREAS

The Michigan Department of Natural Resources (DNR), Fisheries Division's (Division's), research program manager annually develops this Priorities Notice, highlighting the top three priority research areas within each of eight research themes. This Priorities Notice is disseminated to the Division's State of Michigan university partners via both email and posting on the Research Section's web site http://www.michigan.gov/dnr/0,1607,7-153-10364_10951---,00.html by the end of November each year

Consistent with the Division's Strategic Plan, the Division formulates and undertakes a research program to provide a scientific basis for its various strategic programs, to address questions posed by management, to develop new technology and management tools, and to conduct complex assessments, such as those of the Great Lakes. The Division's Research Section is administered by the research program manager, in coordination with leadership of the Division's other sections, basin teams, and management team. Research work supports both the Division's internal management programs and inter-state and inter-national management programs for the Great Lakes. The DNR's fisheries research work force is composed of Division research biologists, university faculty who are direct partners through our Partnership for Ecosystem Research and Management (PERM) agreements, and other university faculty.

Describing our priority research areas by theme will help communicate our research agenda to both internal staff and external partners. Our strong commitments to shared management on the Great Lakes (through the Council of Lake Committees) and ecosystem management within Michigan (through Department Ecoteams) require that we develop our research priorities in accordance with the goals of partner state, regional, federal, and tribal resource management agencies.

The Division's research themes are primarily aligned with aquatic ecosystems (rivers, inland lakes and wetlands, Great lakes pelagic, etc.) although some are defined programmatically (Fish Culture, for example). The intent is to emphasize the understanding and management of ecosystems, their linkages to each other, and their fundamental processes that support the aquatic life and human uses we value. Four research meetings have been held in an ongoing series designed to define or update priorities for each theme. Each Theme Area is under the direction of a theme captain. In 2006, the research theme groups were asked to identify research needs and three highest-priority research areas within each theme. The latest meeting, held in October of 2007, provided an opportunity for most Michigan fishery research scientists to participate in review of research needs in Michigan with special reference to the implications of invasive species. The full text for the Theme Area documents can be found at the web addresses shown below. Our themes, theme captains, and the resulting priority areas are:

Inland lakes and depressional wetlands: Kevin Wehrly
http://www.michigan.gov/documents/Inland_Lakes__Depressional_wetlands_146800_7.pdf.

- Impacts of human activities on lake ecosystems.

    - Impacts of lakeshore development on lake habitat
    - Impacts of vegetation management
    - Methods to assess vegetation
    - Impacts of invasive species
- Evaluation of lake management practices
    - Evaluation of regulations
    - Evaluation of stocking
- Classification of lakes and wetlands

Rivers, streams, and floodplain wetlands: Troy Zorn
http://www.michigan.gov/documents/Rivers_Streams__Floodplain_wetlands_146793_7.pdf.

- Stream channel management: diagnosis tools, management techniques, and evaluation of existing protection and management schemes. Topic areas include:
    - Sediment/bedload movement, treatment options/recommendations, expected results,
    - describe geomorphic processes and their influence on stream beds and banks,
    - quantifying rates of change in channels for different types of Michigan streams,
    - determining when and where human intervention in geomorphic processes (e.g., sand traps, bank stabilization, etc.) is needed,
    - influence of riparian, floodplain, and watershed conditions, and stream hydrology on channels,
    - BMP (buffer strips, etc) evaluation and recommendations,
    - habitat improvement recommendations,
    - evaluation of habitat improvement activities such as bank stabilization, whole tree addition, fish structure addition,
    - Integration of study findings with GIS river reach classifications
- The interface and interrelationships between lotic and lentic systems, both Great Lakes and inland. Topic areas may include:
    - Movement between and use of lake, river, estuary, and floodplain habitats by all life stages of fish
    - Influence of spatial arrangement, connectivity, size, and other attributes of rivers and lakes on physical and ecological processes (e.g., sediment and LWD transport; temperature, water quality, and nutrient conditions; fish recruitment and population dynamics)
    - Biological interactions between lake and river fishes (e.g., Great Lakes fish, ANS in the Great Lakes, and resident river fishes)
    - Influence of dams on all of the above
    - Use of passage activities to mitigate physical and ecological effects of fragmentation, including potential effects of ANS introduction
- Development of decision support tools based upon Status and Trends Program data and other statewide databases. Useful tools may include:
    - Species-based habitat suitability models
    - Valley-segment based, data analysis tools for use with data from individual fish and habitat surveys (e.g., Status and Trends Program random surveys)
    - Models for guiding appropriate placement of sediment traps
    - GIS-based delivery of population trend data from Status and Trends Program fixed (index) sites
    - Relationships between land use (and land use changes) and biotic integrity metrics for stream fish communities

- Risk assessment models that predict the likely path of ANS colonization of inland waters and potential for establishment of significant ANS populations based on key river habitat parameters (e.g., temperature, gradient, size, etc.)

Great Lakes nearshore zones, including coastal wetlands: Dave Fielder
http://www.michigan.gov/documents/Great_Lakes_Nearshore_Zones__coastal_wetlands_146797_7.pdf.

- Evaluation of dynamics of depressed or recovering species and populations such as yellow perch, smallmouth bass, lake herring, lake sturgeon.
- Linkages between zones – For example:
  - open water fish community effects on nearshore zone fish and visa versa,
  - Effects of changing benthic community on midwater zone.
- Evaluation of management practices such as stocking and cormorant management.

Great Lakes deepwater zones: Shawn Sitar
http://www.michigan.gov/documents/Great_Lakes_Deepwater_Zones_146795_7.pdf.

- Population dynamics of deepwater fish species in the context of essential habitat, community and ecosystem processes.
- Improved field assessment of exploited deepwater species.
- Better data syntheses and model predictions for achieving management goals.

• **Great Lakes pelagic zones:** Dave Clapp and Randy Claramunt
http://www.michigan.gov/documents/Great_Lakes_Pelagic_Zones_146798_7.pdf.

- Evaluation of Chinook salmon natural reproduction and ecosystem response;
  - identify biotic and abiotic factors determining Chinook reproduction success,
  - recruitment (wild and hatchery) index for Chinook salmon,
  - contributions of naturalized fish to lakewide predator abundances, production, and forage demand.
- Understanding predator/prey dynamics, for example:
  - pelagic interactions of perch and alewives,
  - salmonid responses to low alewife abundance,
  - updating bioenergetic models to reflect new energy pathways,
  - alewife recruitment dynamics,
  - abiotic effects on recruitment of alewives and other species.
- Evaluation of linkages (emphasis on nutrient/resource cycling) between:
  - the pelagic zone and benthic community,
  - pelagic and nearshore zone,
  - pelagic and deepwater zone,
  - effects of newly invasive species on these linkages.

Fish culture: Jim Johnson
http://www.michigan.gov/documents/Fish_Culture__Fish_Health_146801_7.pdf.

- Definition of a "Quality" hatchery product and achieving quality standards in fish production output.
- Post-stocking evaluations:
  - efficacy of stocking in largely self-regulating systems.
  - Evaluate stocking practices and conduct experimental stockings of ecosystems altered by ANS.

    - Identify new opportunities to biomanipulate ANS-altered systems using stocked fish.
- Improve cost effectiveness of fish culture, including culture of nontraditional species. For example:
    - Less costly feed formulation for starting diet and rearing of age-0 lake sturgeon,
    - Cost-effective means of lake sturgeon gamete collections
    - Evaluate stocking prescriptions in systems recently altered by ANS to avoid wasteful stockings where stocking opportunities have been diminished.

Human dimensions of aquatic systems and their fisheries: Zhenming Su
http://www.michigan.gov/documents/Human_Dimensions_of_Aquatics__Fisheries_Management_146799_7.pdf.

- Improve our understanding of anglers and angler activities
    - Develop, identify and apply high quality methods for assessing the composition, behavior, attitudes, and preferences of Michigan anglers,
    - Describe and explain relationships between management actions, angler behavior, and environmental changes,
    - Continue and improve surveys of angler effort and catch and their uses,
    - Understand how anglers are recruited and retained.
- Improve our understanding of decision-making processes, metrics and tools for using human dimensions data
    - Research that evaluates processes for stakeholder involvement in decision-making,
    - Economic valuation and trade-offs of aquatic resource uses,
    - Develop management information system to incorporate HD information into management decisions.
- Improve our understanding of the general public's understanding, values and behavior toward aquatic resources**.**
    - Identify knowledge, attitudes and preferences of general public in regard ecosystems,
    - Understand how the general public responds to management actions,
    - Understand how communication influences knowledge and responses of the general public.

Fish Health: Jim Johnson and Gary Whelan

- Studies of distribution, virulence, and susceptibility of Michigan aquatic species of viral hemorrhagic septicemia (VHS), including:
    - Analyses of key species for their susceptibility to this virus, to include lake trout, brook trout, lake whitefish, lake herring, Pacific salmon, brown trout, rainbow/steelhead trout, and alewives;
    - Analysis of surveillance fish samples to determine trends in virulence to, susceptibility to, and rate of distributional changes of, VHS in Michigan fish populations.
    - Epidemiological analyses of the likely risks and affects of VHS on fish populations in Michigan waters.
    - Develop methods for non-lethal sampling of fish for VHS monitoring;
- Agents of transmission of VHS. Examples of specific research needs include:
    - What is the survival time of VHS in water and ballast water?
    - What are the transmission mechanisms from water body to water body (ballast water, fish or other animal vectors)?

    - What are the transmission mechanisms from fish to fish (vertical and horizontal)?
    - Are there methods of disinfection (operational procedures) to make possible low-risk transportation of eggs from VHS-positive egg sources of feral cool-water species (i.e. walleyes) to state fish hatcheries?
    - Develop efficient, low risk methods (i.e. operational procedures) for disinfection of water and equipment used to transport potentially VHS positive fish or fish products;
    - Determine prevalence and intensity of VHS infections in bait-fish species collected or transported through Michigan by the bait industry; and
    - Determine prevalence and intensity of VHS infections in commercial fish species collected in, or transported through, Michigan by the commercial live fish industry.
- Establish the relationship between fish health parameters and the quality of hatchery products, as measured by post-stocking performance of the products and cost effectiveness of their culture.

FUNDING

This Priorities Notice is principally for the purpose of sharing with other agencies and universities the priority research themes of the Michigan DNR Fisheries Division. It is hoped this notice will encourage research collaborations into these questions. This notice also serves to identify the research work the Fisheries Division might consider funding, using a mix of Federal Aid to Sport Fish Restoration and Michigan State Game and Fish Fund dollars. In recent years the Fisheries Division has funded 1 to 4 new projects annually with costs ranging from $30,000 to $60,000 per year. In a typical year, several studies end and several new ones, of 2-5 year duration, are begun. The number and total dollar amount of studies funded varies from year to year, depending on Division budgets and overall priority of proposed research. Studies successfully funded under this Notice will begin October 1, 2008 (FY 2009). FY 2009 forecasts project there will only be sufficient funds to cover existing obligations; therefore, only if there is an infusion of new revenues (license fee increase, for example) will it be likely that new projects will be funded.

PROPOSAL SUBMISSION PROCESS, SCHEDULE, AND RANKING CRITERIA

The Fisheries Division Management Team, with guidance from the research program manager, will annually review all research study proposals to select those that will receive Division support (as funding permits). The research theme framework will assist the Management Team in deciding: whether proposed studies truly represent a needed scientific advance in a particular theme area; to what degree they are supported within the Division and by other partners; and how to prioritize funding across themes.

Study proposals must be developed using the Fisheries Division template (available at: http://www.michigan.gov/documents/NewProposalTemplate_146928_7.pdf). To review an example proposal see http://www.michigan.gov/documents/Example_Proposal_146933_7.pdf .

New proposals will include:

- Documentation of the strategic value of the proposed research to the Division's management programs. Strategic arguments might come from the Division's Strategic Plan, annual

Research Theme Assessments, annual Division Areas of Emphasis, the Department's Comprehensive Wildlife Conservation Plans, the Great Lakes Council of Lake Committees (CLC) Research Priorities, CLC Environmental Goals, CLC Lake Area Management Plans, or similar documents.

- A completed budget sheet for each year of the study.
  Spreadsheet templates available at:
  PDF - http://www.michigan.gov/documents/annual-budget-template_148662_7.pdf
  MS Excel - http://www.michigan.gov/documents/Annual_Budget_Template_1_148663_7.xls
- Written endorsement of either a basin team or a Division management team member. This step helps demonstrate that the researcher has obtained management "buy in".
- A written science content review by an outside expert in the area of study. This step demonstrates that the researcher has obtained an objective, expert review of their proposal.

Research Study Proposals must be submitted to the research program manager, using the Division template format, via email by second week February.

The Fisheries Research Section leadership reviews all study proposals submitted according to the criteria specified above by early March. The research program manager submits all complete proposals along with recommendations to the management team for final selection.

The management team reviews the proposal package prior to the March management team meeting. At the March meeting the management team will discuss the merits of study proposals in light of Division priorities and quality of proposals, and make final selections with regards to allocation of funding for external (university) studies and also to allotment of Division personnel time where appropriate.

PREVIOUSLY FUNDED RESEARCH
Many examples of completion reports for previously funded research can be found at:
http://www.michigan.gov/dnr/0,1607,7-153-10364_10951_19056---,00.html