



Michigan Department of Natural Resources – Procurement Services
 P.O. Box 30028, Lansing, MI 48909
 OR
 525 W. Allegan, Lansing, MI 48933

**CHANGE NOTICE NO. 03 TO CONTRACT NO. 751B1300041
 (Replaced 751B9200095)**

**Between
 STATE OF MICHIGAN
 and**

Required by authority of 1984 PA 431, as amended.

Name and Address of Contractor Michigan State University Office of Sponsored Programs 426 Auditorium Rd., Rm 2 301 Administraion Bldg Lansing, MI 48824-2601	Primary Contact Diane Cox	
	Email cox@osp.msu.edu	
	Telephone (517) 884-4243	Contractor #, Mail Code *****5984/283

State Contact	Division	Name	Telephone	Email
Contract Manager	Fisheries	Marisa Lay	(517) 284-5837	LayM@michigan.gov
Contract Administrator	Finance and Operations	Lisa VanOstran	(517) 284-5975	VanOstranL@michigan.gov

Initial Contract Summary

Description (Provide a basic but comprehensive description of services) Development and Implementation of a Fish Health Initiative for Michigan Inland and Great Lakes Fisheries and VHS Testing			
Effective Date 6/9/2011	Initial Expiration Date 9/30/2014	Initial Available Options 1 - 5 year option	Current Expiration Date 9/30/2016
Payment Terms Net 45	F.O.B. N/A	Shipped N/A	Shipped From N/A
Minimum Delivery Requirements N/A	Alternate Payment Options <input type="checkbox"/> P-Card <input type="checkbox"/> Direct Voucher (DV)		Available to MiDeal Participants <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Description of Change Notice

Option Exercised: <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, New Expiration Date: _____		
Provide the detail of the Change Notice Add \$36,600.00 to the contract to cover a portion of Dr. Thomas Loch's salary to do work under this contract. His expertise is being required on a full time basis (see attached) - he had been part time and paid for with supplemental funding (grants) which have expired.		
Change Contract Manager and Contract Administrator		
<table border="1"> <tr> <td>Value/Cost of Change Notice \$36,600.00</td> <td>Estimated Revised Aggregate Contract Value \$1,268,855.66</td> </tr> </table>	Value/Cost of Change Notice \$36,600.00	Estimated Revised Aggregate Contract Value \$1,268,855.66
Value/Cost of Change Notice \$36,600.00	Estimated Revised Aggregate Contract Value \$1,268,855.66	

FOR THE CONTRACTOR:

Michigan State University

 On-file in DNR Procurement
 Authorized Agent Signature
 Diane Cox, Senior Manager

 Authorized Agent (Print or Type)
 12/21/15

 Date

FOR THE STATE:

Department of Natural Resources

 Sharon Schafer for – On file in DNR Procurement
 Authorized Buyer Signature
 Laura Gyorkos, Buyer Manager

 Authorized Buyer (Print or Type)
 12/28/15

 Date

New Study: 2001-02

Name of Study: Development and Implementation of a Fish Health Initiative for Michigan Inland and Great Lakes Fisheries

A. Problem:

Michigan waters support a diverse and economically important fisheries resource base. As a steward of this public trust resource, Michigan's Department of Natural Resources (DNR) manages the state's inland and Great Lakes fisheries and strives to maintain stocks of healthy fish and the other aquatic life that fish depend on for their production. The Fish Production Program (FPP) of Michigan DNR supports fisheries rehabilitation by providing hatchery-reared fish for stocking of public waters. Key components of meeting requirements for healthy fish are to: routinely monitor the health of hatchery-reared fish stocks; to detect potential pathogens; and to effectively treat disease outbreaks in the state production system. Wild fish populations are routinely examined to determine the health of existing stocks, to determine potential disease threat, and evaluate the effects of stress and other environmental factors on the expression of fish and other aquatic animal diseases. Laboratory and field studies are designed to verify and explain trends identified during routine fish health monitoring. DNR is adequately staffed to perform routine fish health investigations but presently lacks the capabilities and resources to conduct intensive epidemiological studies and advanced laboratory analyses. These elements are essential to meeting the department's responsibilities as public trustees for the aquatic resources of the state.

B. Objectives:

- 1) Work with DNR and the Great Lakes Fish Health Committee to help develop fish health guidelines and policies governing broodstock development and management, hatchery production, and fish stocking for the Fisheries Division's Fish Production Program of the Michigan Department of Natural Resources.
- 2) Assess prevalence, intensity, and pathways of transmission of aquatic animal diseases in Michigan's Great Lakes and inland waters to protect Michigan's aquatic resources.
- 3) Collect, analyze, and interpret data regarding distribution of pathogens impacting both inland and Great Lakes sport fisheries to facilitate proper management of the state's public trust resources.
- 4) Identify emerging and introduced diseases of importance to fish reproduction and survival and develop guidelines and policies to prevent their spread to other areas within Michigan Great Lakes and inland waters.
- 5) Provide guidance regarding the vaccination and drug administration to hatchery-propagated fish.

C. Justification

Much of the historical biological diversity represented by Michigan's inland and Great Lakes fisheries has been altered and/or lost by habitat damage, the introduction of non-indigenous species, overfishing, and diseases. Diseases such as Viral Hemorrhagic Septicemia Virus and Bacterial Kidney Disease (BKD) have become widespread in the Great Lakes basin and have caused considerable losses. Undoubtedly, the keys to preventing further degradation of fisheries in the Great Lakes basin and developing effective management strategies depend on improved identification of fish pathogens in the lakes and hatcheries, elucidation of disease transmission pathways, and determination of direct effects on survival, growth, and reproduction.

A reliable assessment of fish health can best be achieved through the implementation of a rigorous monitoring program. The program must have the capacity to identify the presence of pathogens and to evaluate the impact of diseases on the general health of fish populations.

There have been several major impediments to the development of an effective disease monitoring program in the Great Lakes basin. First, a documented archive of fish disease in the region is not available but is starting to be developed at this time. Second, sensitive diagnostic reagents and tests have not been developed to locally isolate pathogens. Third, there has been a paucity of disease studies or monitoring of large feral populations.

Despite these constraints, FPP is using all available measures to ensure that fish reared for stocking are free of diseases. For example, FPP screens spawning and hatchery-produced fish to effect a reduction in vertical transmission of infectious diseases, particularly BKD caused by *R. salmoninarum*. However, there is a clear need to continuously revise and update fish health policy, procedure, analytical methods, and control measures adopted in DNR weirs and hatcheries.

In the last few years, a number of emerging microbial infections have been reported to affect feral fish populations in the United States, including *Piscirickettsia* sp., largemouth bass virus and viral hemorrhagic septicemia in Michigan waters. Management efforts to limit the spread of these pathogens and prevent introduction of new diseases must be continued. A greater fundamental understanding of disease dynamics, life cycle of pathogens, historical pathogen data, and host defense mechanisms of the fish populations at risk is needed for effective management of the fisheries. In brief, long-term management of Michigan's Great Lakes and inland fisheries must be based on sound disease control policies and implementation strategies.

Most recently, the infectious pancreatic necrosis virus (IPNV), a level 2 restricted fish pathogen according to the Great Lakes Model Program, was detected in two of the State Fish Hatcheries and associated with substantial mortality in production and future broodstock lots in one of them. Laboratory analyses to date suggest that it is possible that the broodstock in one of the hatcheries may be chronically infected with the virus and thereby act as a source of infection to their progeny, as IPNV is transmitted within the egg, which renders it safe from current egg disinfection practices. The use of surface water is a suspected source of IPNV in the other hatchery. Because of the devastation this virus can cause, additional surveillance efforts to reveal the source of the virus, as well as enhanced control and prevention strategies, are needed and being currently designed. This step will need additional control efforts, coupled with the application of more sensitive diagnostic assays. For this reason, we are proposing to have Dr. Thomas Loch (MSU-AAHL) devote his time for this DNR-funded contract. Another area of Dr. Loch's expertise is flavobacteriosis, a disease of salmonids that is caused by multiple members of the family Flavobacteriaceae. The devotion of Dr. Loch to the DNR contract will also allow him to design effective control strategy efforts to minimize the spread of these pathogens.

Because of the aforementioned developments, we have requested additional funds to put Dr. Thomas Loch on a full time appointment. His time and expertise will be invaluable in ensuring that these most recent fish health developments are investigated in a scientifically sound manner so that optimal and informed control and prevention strategies can be devised and implemented.



Michigan Department of Natural Resources – Procurement Services
 P.O. Box 30028, Lansing, MI 48909
 OR
 525 W. Allegan, Lansing, MI 48933

**CHANGE NOTICE NO. 02 TO CONTRACT NO. 751B1300041
 (Replaced 751B9200095)**

**Between
 STATE OF MICHIGAN
 and**

Required by authority of 1984 PA 431, as amended.

Name and Address of Contractor Michigan State University Office of Sponsored Programs 426 Auditorium Rd., Rm 2 301 Administraion Bldg Lansing, MI 48824-2601	Primary Contact Diane Cox	
	Email coxd@osp.msu.edu	
	Telephone (517) 884-4243	Contractor #, Mail Code *****5984/283

State Contact	Division	Name	Telephone	Email
Contract Compliance Inspector	Fisheries	Marlene Sublet-Smith	(517) 284-5837	Sublet-Smith@michigan.gov
Buyer	Finance and Operations	Jana Harding-Bishop	(517) 284-5938	HardingJ3@michigan.gov

Initial Contract Summary

Description (Provide a basic but comprehensive description of services) Development and Implementation of a Fish Health Initiative for Michigan Inland and Great Lakes Fisheries and VHS Testing			
Effective Date 6/9/2011	Initial Expiration Date 9/30/2014	Initial Available Options 1 - 5 year option	Current Expiration Date 9/30/2016
Payment Terms Net 45	F.O.B. N/A	Shipped N/A	Shipped From N/A
Minimum Delivery Requirements N/A	Alternate Payment Options <input type="checkbox"/> P-Card <input type="checkbox"/> Direct Voucher (DV)		Available to MiDeal Participants <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Description of Change Notice

Option Exercised: <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, New Expiration Date: _____	
Provide the detail of the Change Notice Per Change Notice 002 attached: Add \$376,572.00 to cover FY-15 and 16 contract costs Revise language in Sections G and H of Attachment A Revise Appendix D - Lab fee schedule	
Value/Cost of Change Notice \$376,572.00	Estimated Revised Aggregate Contract Value \$1,232,255.66

FOR THE CONTRACTOR:

Michigan State University

On-file in DNR Procurement

Authorized Agent Signature

Diane Cox, Manager

Authorized Agent (Print or Type)

11/11/14

Date

FOR THE STATE:

Department of Natural Resources

On-file in DNR Procurement

Authorized Buyer Signature

Joe Frick, Asst Chief

Authorized Buyer (Print or Type)

11/13/14

Date

The following sections of Attachment A have been revised:

G. Contract Requirements for Fish Health Analysis:

The following is a summary of the fish health work needed by the State of Michigan DNR on an annual basis. The numbers of cases by type have been estimated after reviewing the case history provided in Table 1 and evaluating needs based on most recent health histories and expected health trends. A case is generally defined as a group of fish of the same age and species, from the same water source and location, submitted together on the same day for the same purpose of disease investigation. For the purpose of this contract, wild fish analyses, the case definition includes a group of fish from the same species, water source, location and sampling date for the same purpose of disease investigation. The 213 annual cases requested represent the highest number of cases the Michigan DNR would submit for testing under the base-contract funding according to the appended price list of MSU-Aquatic Animal Healthy Laboratory (Appendix D). The composition of the total is estimated for each case type and is based on standard testing that is done annually as well as some estimates for other types of cases. The total number of cases contracted will not exceed the estimated number, but the number of any particular type may change to accommodate needs for that year, as long as the total costs of all submissions do not exceed the base contract amount within the fiscal year. Additional cases could be added by modifying this contract using similar costs per sample as indicated in this contract or by special research projects funded by Fisheries Division or outside funding sources.

Table 1. Fish Health Case History for State of Michigan 2009-2013

Case Type	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Inspection-Broodstock-Wild	27	22	21	16	17
Inspection-Broodstock-Captive	59	73	41	42	63
Diagnostic-Broodstock-Captive	0	0	0	1	1
Inspection-Fish Production	57	33	42	35	74
Diagnostic-Fish Production	30	16	16	20	18
Diagnostic-Wild-Clinical	0	0	0	1	2
Diagnostic-Wild-VHS	27	20	0	0	0
Diagnostic-Wild-Fish Kills	15	1	9	0	0
Inspection-Wild	2	7	7	26	35
Diagnostic-Wild-Transfers	0	0	9	5	0
Diagnostic-Wild-Future Broodstock	0	1	0	0	0
Total Number	217	173	145	146	210

An outline of the responsibilities and deliverables for the MSU AAHL and the DNR are outlined in Appendix A.

A calendar outlining the approximate timing for required annual DNR fish health work is provided in Appendix B. The actual dates for annual fish health work are determined by stocking and spawning dates, which can vary each year. Actual dates will be developed annually by the DNR Fish Health Coordinator in consultation with the Michigan State University Aquatic Animal Health Laboratory Liaison.

Annual testing required:

Per Change Notice 002 – the number of tests have been revised to those listed below. Several optional tests have been added and molecular and histo testing has been removed.

The DNR will annually submit up to 213 cases, which includes up to 146 cases for Fish Production and 10 for wild fish; which are required annual inspections; the other 57 cases are optional, at the discretion of the DNR, as funding allows. A breakdown by case type is outlined below.

- I. Fish Production: The DNR will annually submit up to 146 cases that include required annual production and broodstock inspections for fish in hatcheries and rearing ponds, BKD screening for select captive broodstock to manage BKD in hatcheries, and diagnostics for production fish and captive broodstocks in hatcheries.
 - A. Full Inspection Cases
 - a. Production—30 cases of 60 fish each
 - b. Broodstock—20 cases of 10 or 60 fish each; this includes mature broodstock currently used for spawning (10 fish submitted per case) and future immature brood lots (60 fish submitted per case).
 - B. Virology Only Cases
 - a. Production—36 cases of 60 fish each; this includes walleye and northern pike fry/fingerlings from rearing ponds and musky fry/fingerlings from Wolf Lake SFH
 - b. Broodstock—25 cases; up to 60 gamete samples per case for mature broodstocks where sacrifice of 60 individuals for full inspection is not desired.
 - C. BKD Screening Cases (for individual spawning adults)
 - a. Up to 15 cases of up to 120 gamete samples per case where results needed within a week of the day samples are received or up to 11 cases of up to 120 gamete samples per case where results are needed the same day the samples are received.
 - b. Cases include Atlantic salmon (2), Iron River brook trout (6), Assinica brook trout (10), and Sturgeon River brown trout (8); possible new additions for broodstock screening include Lake Superior lake trout, Eagle Lake rainbow trout, Gilchrist brown trout, and Wild Rose brown trout.
 - c. BKD screening done using QELISA test
 - d. Results of testing needed either within a week of the day samples are received or the day the samples are received, as agreed upon by MSU-AAHL and DNR.
 - D. Diagnostic Cases (case numbers estimated based on case history for past 4 years)
 - a. Production—15 cases up to 20 fish each
 - b. Broodstock—5 cases up to 10 fish each

II. Wild Fish: The DNR will annually submit up to 63 cases that include salmonid and coolwater broodstock inspections (required) and optional cases as determined by DNR

A. Full Inspection Cases

- a. Feral salmonid broodstock—Up to 5 cases of 60 fish each
 1. Salmon—Little Manistee River Weir, Swan River Weir, Platte River Weir
 2. Steelhead—Little Manistee River Weir
 3. Future broodstock or alternate broodstock (Boardman River weir or Medusa Creek weir)
- b. Feral coolwater broodstock—5 cases of 60 fish or non-lethal samples (gametes, blood, mucus, feces) from 60 fish
 1. Northern pike—Little Bay de Noc and one inland lake
 2. Walleye—Little Bay de Noc, Muskegon River, and Tittabawasee River
 3. Muskellunge—Lake Hudson, Lake St. Clair, and Thornapple Lake; non-lethal samples only
 4. Lake Sturgeon—One location; non-lethal samples only

B. Optional cases—Up to 53 cases; the actual number and tests for each category listed below to be determined by DNR as specific needs arise, as funds allow.

- a. Pre-transfer Cases—up to 5 cases of 60 fish each
- b. VIR/BKD Cases- up to 4 cases of 60 fish each
- c. VIR/WD Cases – up to 12 cases of 60 fish each
- d. VIR/BKD/WD Cases – up to 10 cases of 60 fish each
- c. VHS Only Cases—up to 18 cases of 60 fish each
- d. Fish Kill Cases—up to 4 cases of 60 fish each

III. Other fish health services:

A. Veterinary services

- a. Disease treatment recommendations that include dosage, length of treatment, and withdrawal time due 5 days after lab receives samples.
- b. Prescriptions for off-label drug or chemical treatments to be provided when treatment recommendations require the use of off-label drugs or chemical treatments
- c. Vaccines*—recommendations for appropriate vaccinations. Development of an autologous vaccine specific to pathogen strains found in Michigan facilities will be charged separately, according to Appendix D.
- d. Pathogen control strategies for fish production facilities

B. Investigational New Animal Drug (INAD) Coordination

- a. Lab coordinator/liaison will handle all DNR INAD needs and requirements
- b. Review all INAD paper work submitted for completeness.
- c. Sign all INAD paper work and send to the Aquatic Animal Drug Approval Partnership (AADAP) office.
- d. Review, sign, and send all requests for study numbers to AADAP the day they are received from DNR.
- e. Review, sign, and send all drug receipts and study results within 10 days of study conclusion to AADAP office.

C. Consultation for unique fish health issues — unlimited

D. Other

- a. Travel to Fish Production facilities and broodstock weirs for sample collection or where site evaluation due to disease issues is needed.
- b. The DNR shall provide the Michigan State University Aquatic Animal Health Laboratory a vehicle for such travel or will make other agreed upon arrangements for required travel to fulfill this contract.

IV. Pathogen testing

A. Protocols

- a. All protocols used for monitoring and disease diagnosis, certification, and notification must be those approved by the American Fishery Society and OIE. All protocols must also follow the recommendations of the Great Lakes Fishery Commission – Great Lakes Fish Health Committee and the Great Lakes Fish Health Model Program.
- b. Any deviation from this specification must be agreed upon by both the DNR contract administrators and the MSU Aquatic Animal Health Laboratory PI.

B. Required testing

- a. Tests required by type of case and species are listed in Appendix C of the original contract.
- b. If species is not listed, DNR will provide testing requirements at time of sample submission on fish health request form.
- c. Any deviation from this specification must be agreed upon by both the DNR contract administrators and the MSU Aquatic Animal Health Laboratory PI.

H. Schedule/Budget¹:

¹ NA = not scheduled

Proposed work	2014-15	2015-16
Job 1 Historical Pathogen Review	NA	NA
Job 2 Broodstock Plan Analysis	NA	NA
Job 3 Fish Health Inspection Policy Analysis	NA	NA
Job 4 Wild Fish Pathogen and Emerging Disease Analysis	NA	NA
Job 5 Species Fish Health Analysis	NA	NA
Job 6 Write annual reports	NA	NA
Job 7 Write final report	NA	NA
Contracts:	\$188,286	\$188,286
Totals	\$188,286	\$188,286

Appendix D. Aquatic Animal Health Laboratory Fee Schedule

Aquatic Animal Health Laboratory (AAHL)

1129 Farm Lane, Room 177K
 Food Safety & Toxicology Building
 Michigan State University, East Lansing, MI 48824
 Tel: (517) 884-2024; Fax: (517) 432-2310
 healthyfish@cvm.msu.edu

Fish Health Services

Laboratory Service	Fee/lot (lot: 60 fish of a single species and of same age, source, collecting event)
Fish Health Certification* package, includes dissection, clinical examination, and reportable parasitological analysis, reportable bacterial pathogens, and reportable viral pathogens, including confirmatory identification	\$1,885/lot
Fish Health Certification* package, includes dissection, clinical examination, and reportable parasitological analysis, reportable bacterial pathogens, and reportable viral pathogens, including confirmatory identification, <i>as well as other parasitic, bacterial, and viral pathogens of concern</i>	\$2,235/lot
DNA testing (<i>Renibacterium salmoninarum</i> , <i>Aeromonas salmonicida</i> , <i>Yersinia ruckeri</i> , VHSV, IPNV, IHNV, LMBV, or <i>Nucleospora salmonis</i>)	\$35/sample per pathogen nPCR: \$45/sample qPCR: \$55/sample
Genetic sequencing, up to 5 samples	\$150
Diagnostic case: includes clinical and postmortem examination, diagnostics (bacterial, viral, parasite), along with the necessary confirmation and treatment recommendation	\$585, up to 20 fish
Diagnostic case: diagnostic/treatment follow-up if needed (viral or bacterial)	\$150
Whirling Disease testing, including confirmation if necessary	\$460
Confirmatory histopathology	\$30/sample per stain
Virus testing (VHSV, IHNV, IPNV or LMBV), minimum 28-day results on Tissue Culture, 2 cell lines, including viral confirmation, 5 fish per pool (<i>not including necropsy</i>)	\$560
Fish health check for reportable bacterial pathogens only, including necropsy	\$635
Identification of non-reportable fish pathogens (i.e., viral, bacterial, or parasitological) for diagnostic or research purposes	determined on case by case basis
<i>Renibacterium salmoninarum</i> (BKD): Q-ELISA, individual fish (<i>not including necropsy</i>)	\$520
Dissections and organ collection for laboratory assays	\$225
Screen for <i>Heterosporis</i> sp., including confirmation	\$150
Parasitic evaluation of skin/gills	\$250
Serological analysis (PNT or cELISA)	\$900
Development of autologous vaccine	\$ 1,000/batch
Consultation	determined on case by case basis
Shipping cost	determined on case by case basis

Michigan Fish Health Certifications include testing for reportable fish diseases as listed by the GLFC.

If certifications are required for states outside of Michigan, please provide individual requirements for each state at the time of sample submission. Additional testing requirements may increase costs.



Michigan Department of Natural Resources – Procurement Services
 P.O. Box 30028, Lansing, MI 48909
 OR
 525 W. Allegan, Lansing, MI 48933

**CHANGE NOTICE NO. 01 TO CONTRACT NO. 751B1300041
 (Replaced 751B9200095)**

**Between
 STATE OF MICHIGAN
 and**

Required by authority of 1984 PA 431, as amended.

Name and Address of Contractor Michigan State University Office of Sponsored Programs 426 Auditorium Rd., Rm 2 301 Administration Bldg Lansing, MI 48824-2601	Primary Contact Diane Cox	
	Email coxd@osp.msu.edu	
	Telephone (517) 884-4243	Contractor #, Mail Code *****5984/283

State Contact	Division	Name	Telephone	Email
Contract Manager	Fisheries	Marlene Sublet-Smith	(517) 284-5837	Sublet-Smith@michigan.gov
Contract Administrator / Buyer	Finance and Operations	Jana Harding-Bishop	(517) 284-5938	HardingJ3@michigan.gov

Initial Contract Summary

Description (Provide a basic but comprehensive description of services) Development and Implementation of a Fish Health Initiative for Michigan Inland and Great Lakes Fisheries and VHS Testing			
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Payment Terms Net 45	F.O.B. N/A	Shipped N/A	Shipped From N/A
Minimum Delivery Requirements N/A	Alternate Payment Options <input type="checkbox"/> P-Card <input type="checkbox"/> Direct Voucher (DV)		Available to MiDeal Participants <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Description of Change Notice

Option Exercised: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, New Expiration Date: <u>9/30/2016</u>		
Provide the detail of the Change Notice Per Change Notice 001 is a time only no cost extension to this contract as budgets are not fully developed at this time. DNR is exercising 2 of the possible 5 option years at this time,		
<table border="1"> <tr> <td>Value/Cost of Change Notice \$0.00</td> <td>Estimated Revised Aggregate Contract Value \$855,683.66</td> </tr> </table>	Value/Cost of Change Notice \$0.00	Estimated Revised Aggregate Contract Value \$855,683.66
Value/Cost of Change Notice \$0.00	Estimated Revised Aggregate Contract Value \$855,683.66	

FOR THE CONTRACTOR:

Michigan State University

On-file in DNR Procurement

Authorized Agent Signature

Diane Cox, Manager

Authorized Agent (Print or Type)

9/30/14

Date

FOR THE STATE:

Department of Natural Resources

On-file in DNR Procurement

Authorized Buyer Signature

Joe Frick, Asst Chief

Authorized Buyer (Print or Type)

9/30/14

Date

June 9, 2011

DEPARTMENT OF NATURAL RESOURCES
FINANCIAL SERVICES
P.O. BOX 30028, LANSING, MI 48909
OR
530 W. ALLEGAN, LANSING, MI 48933

CONTRACT AGREEMENT NO. 751B1300041

(Replaces 751B9200095)

between
THE STATE OF MICHIGAN
and

NAME & ADDRESS OF VENDOR Michigan State University Contract and Grant Administration 301 Administration Building East Lansing, MI 48824	TELEPHONE (Fred Salas) (517) 355-9645
	VENDOR NUMBER/MAIL CODE 2 xxxxx5984 (283) BUYER
	Jana Harding-Bishop (517) 373-1190
DNR Contract Administrators: Gary Whelan, Fish Production Program Manager Martha Wolgamood, Southern Lower Peninsula Fish Production and Fish Health Program Manager Project Title: Development and Implementation of a Fish Health Initiative for Michigan Inland and Great Lakes Fisheries and VHS Testing	
CONTRACT PERIOD: From: June 9, 2011 To: September 30, 2014	
TERMS Net 45 Days	SHIPMENT N/A
F.O.B. N/A	SHIPPED FROM N/A
MINIMUM DELIVERY REQUIREMENTS N/A	

Due to administrative issues, this contract replaces Contract 751B9200095, as amended. The terms and conditions remain the same and are attached.

Note: The Department of Natural Resources and Environment has changed to the Department of Natural Resources and the DNR Buyer has changed to Jana Harding-Bishop.

**Original estimated contract value: \$869,075.00
Contract Change Notice No. 1 added: \$26,455.00
Contract Change Notice No. 2 added: \$150,000.00
Revised Estimated Contract Value: 1,045,530.00**

Remaining Contract Balance due to expenditures: \$855,683.66

February 17, 2011

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
FINANCIAL SERVICES
P.O. BOX 30028, LANSING, MI 48909
OR
530 W. ALLEGAN, LANSING, MI 48933

CONTRACT CHANGE NO. 2 TO
CONTRACT AGREEMENT NO. 751B9200095
Project 236100
between
THE STATE OF MICHIGAN
and

NAME & ADDRESS OF VENDOR Michigan State University Contract and Grant Administration 301 Administration Building East Lansing, MI 48824	TELEPHONE (Fred Salas) (517) 355-9645
	VENDOR NUMBER/MAIL CODE 2 xxxxx5984 (283) BUYER
	Sharon Walenga-Maynard, C.P.M. (517) 373-7587
DNRE Contract Administrators: Gary Whelan, Fish Production Program Manager Martha Wolgamood, Southern Lower Peninsula Fish Production and Fish Health Program Manager Project Title: Development and Implementation of a Fish Health Initiative for Michigan Inland and Great Lakes Fisheries	
CONTRACT PERIOD: From: October 1, 2009 To: September 30, 2014	
TERMS Net 45 Days	SHIPMENT N/A
F.O.B. N/A	SHIPPED FROM N/A
MINIMUM DELIVERY REQUIREMENTS N/A	

Change:

Per Contract Authorization Request 2011-001 attached, additional work and dollars have been added to this contract.

Revised Estimated Contract Value: \$1,045,530.00

CHANGE AUTHORIZATION REQUEST

Contract No. **751B9200095**, DNRE Project 236100/00
Change Authorization Request No. 2011-001

General

This Change Authorization Request is subject to all terms and conditions of the subject contract between Michigan State University and the State of Michigan. Except as expressly specified herein, all terms and conditions of the Contract shall remain in full force and effect upon execution of this request. This request is not valid until all parties sign it, the Issuing Office prepares a Contract Change Notice and the Department of Natural Resources & Environment issues a Purchase Order.

Description of Change

The purpose of this change is to add the Scope of Work attached and include this work in the contract through 2014. For FY 2011, DNRE is to contract with the Aquatic Animal Health Unit as Michigan State University to analyze 75 lots of fish for the presence /absence of VHSV by October 2011. A difference deadline may occur each year as well as the number of lots of fish to be analyzed and annual Pos will reflect the deadlines and quantity.

Costs

\$150,000 - The resulting PO is considered reimbursable due to the requirement of reimbursement per sample tested. The addition of a reimbursable PO to the contract is non-precedent setting.

Impact on Contract (\$ and Schedule)

Increase BPO budget by \$150,000 and add additional work (FY 11 - Analyze 75 lots of fish) to schedule. Pricing and terms remain the same.

April 20, 2010

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
FINANCIAL SERVICES
P.O. BOX 30028, LANSING, MI 48909
OR
530 W. ALLEGAN, LANSING, MI 48933

CONTRACT CHANGE NO. 1 TO
CONTRACT AGREEMENT NO. 751B9200095
Project 236100
between
THE STATE OF MICHIGAN
and

NAME & ADDRESS OF VENDOR Michigan State University Contract and Grant Administration 301 Administration Building East Lansing, MI 48824	TELEPHONE (Fred Salas) (517) 355-9645
	VENDOR NUMBER/MAIL CODE 2 xxxxx5984 (283) BUYER
	Sharon Walenga-Maynard, C.P.M. (517) 373-7587
DNRE Contract Administrators: Gary Whelan, Fish Production Program Manager Martha Wolgamood, Southern Lower Peninsula Fish Production and Fish Health Program Manager Project Title: Development and Implementation of a Fish Health Initiative for Michigan Inland and Great Lakes Fisheries	
CONTRACT PERIOD: From: October 1, 2009 To: September 30, 2014	
TERMS Net 45 Days	SHIPMENT N/A
F.O.B. N/A	SHIPPED FROM N/A
MINIMUM DELIVERY REQUIREMENTS N/A	

Change:

- 1) Per Contract Authorization Request 2010-001 attached, additional work and dollars have been added to this contract.
- 2) Department of Natural Resources is now known as the Department of Natural Resources and Environment (DNRE)

Revised Estimated Contract Value: **\$895,530.00**

CHANGE AUTHORIZATION REQUEST

Contract No. **751B9200095**, MDNR Project 236100/00
Change Authorization Request No. 2010-001

General

This Change Authorization Request is subject to all terms and conditions of the subject contract between Michigan State University and the State of Michigan. Except as expressly specified herein, all terms and conditions of the Contract shall remain in full force and effect upon execution of this request. This request is not valid until all parties sign it, the Issuing Office prepares a Contract Change Notice and the Department of Natural Resources and Environment (DNRE) issues a Purchase Order.

Description of Change

The purpose of this change is to add the Scope of Work attached. DNRE is to contract with the Aquatic Animal Health Unit as Michigan State University to analyze 50 lots of fish for the presence/absence of VHSv. A separate purchase order is to be established to fund the enclosed work.

Additionally, the Department of Natural Resources (DNR) is now the Department of Natural Resources and Environment (DNRE).

Costs

\$26,455 The resulting PO is considered reimbursable due to the requirement of reimbursement per sample tested. The addition of a reimbursable PO to the contract is non-precedent setting.

Impact on Contract (\$ and Schedule)

Increase BPO budget by \$26,455 and add additional work (analyze 50 lots of fish) to schedule.

SCOPE OF WORK

The Michigan Department of Natural Resources will contract with the Aquatic Animal Health Unit at Michigan State University to analyze 50 lots of fish for the presence/absence of VHSV by June 30, 2010 using American Fisheries Society Fish Health Section Bluebook methodology. All new detections of VHSV in new species, new locations or both will have appropriate tissue samples sent to the National Veterinary Services Laboratories (NVSL) in Ames, IA.

MEASURABLE OUTCOME:

The Michigan Department of Natural Resources will provide the VHSV results from a minimum of 50 lots of fish by June 30, 2010 as proposed in Appendix 2 of the grant. The NVSL will be provided samples from all new detections, either by species or location or both.

TIMELINE: 10/1/2009 – 9/30/2010

The Michigan Department of Natural Resources will collect sufficient lots of fish to ensure that a minimum of 50 lots of fish will be analyzed for VHSV as detailed above by June 30, 2010. These fish will be appropriately handled and shipped to the Michigan State University Aquatic Animal Health Unit as soon as they are collected. All sample results will be completed by June 30, 2010.

LABORATORY ASSAY BUDGET CATEGORIES:

	Total Budget	Proposed APHIS Portion
Personnel	0	0
Fringe Benefits	0	0
Travel	0	0
Equipment	0	0
Supplies	0	0
Contractual	\$26,455	\$18,510
Other	0	0
Total Direct Charges	\$26,455	\$18,510
Indirect -19.32%	0	0
Audit Charges -.38%	\$101	\$70
Total	\$26,556	\$18,589

REPORTING

USDA-APHIS Guidance. Collection of laboratory assay data is critical for assessing the distribution of VHS.

(Cooperative Agreement No. 09-9626-0821 CA)

October 1, 2009

DEPARTMENT OF NATURAL RESOURCES
 FINANCIAL SERVICES
 P.O. BOX 30028, LANSING, MI 48909
 OR
 530 W. ALLEGAN, LANSING, MI 48933

CONTRACT AGREEMENT NO. 751B9200095
Project 236100
 between
 THE STATE OF MICHIGAN
 and

NAME & ADDRESS OF VENDOR Michigan State University Contract and Grant Administration 301 Administration Building East Lansing, MI 48824	TELEPHONE (Fred Salas) (517) 355-9645
	VENDOR NUMBER/MAIL CODE 2 xxxxx5984 (283)
	BUYER Sharon Walenga-Maynard, C.P.M. (517) 373-7587
DNR Contract Administrators: Gary Whelan, Fish Production Program Manager Martha Wolgamood, Southern Lower Peninsula Fish Production and Fish Health Program Manager Project Title: Development and Implementation of a Fish Health Initiative for Michigan Inland and Great Lakes Fisheries	
CONTRACT PERIOD: From: October 1, 2009 To: September 30, 2014	
TERMS Net 45 Days	SHIPMENT N/A
F.O.B. N/A	SHIPPED FROM N/A
MINIMUM DELIVERY REQUIREMENTS N/A	

The attached represents the mutually agreed to description of services to be provided, and terms and conditions.

This is not an order. A Purchase Order will be issued and sent to the contractor to request goods or services as authorized under the terms and conditions of this contract.

Est. Contract Value: \$869,075.00

Fred Salas	Date	Sharon Walenga-Maynard, C.P.M.	Date
MSU, Contracts and Grants		DNR, Contracts and Purchasing	

I-A PURPOSE

It is the mutual desire of Michigan State University (MSU) and the Michigan Department of Natural Resources (DNR), Fisheries Division to undertake research specifically selected for its relevance to maintaining or enhancing the fisheries resource in the State of Michigan. It is the belief of the parties that this research will be to their mutual benefit and to the benefit of the people of Michigan. This contract is to obtain the services of MSU to conduct research titled: **Development and Implementation of a Fish Health Initiative for Michigan Inland and Great Lakes Fisheries**. This contract shall be conducted under the Agreement between MSU and DNR, executed 1989, as amended.

I-B CONTRACT PERIOD

The contract period will be from October 1, 2009 through September 30, 2014.

I-C TYPE OF CONTRACT

Contract type is fixed cost.

I-D ISSUING OFFICE

This contract is issued by the State of Michigan, Department of Natural Resources, Financial Services (FS), for Fisheries Division. FS is the only office authorized to change, modify, amend, alter, and clarify the prices, specifications, terms, and conditions of this contract. Oversight at FS is provided by:

Financial Services
Department of Natural Resources
6th Floor, Mason Building
P. O. Box 30028
Lansing, MI 48909

I-E CONTRACT ADMINISTRATORS

DNR Contract Administrators named below are authorized to administer both the contract and conduct of research, on a day-to-day basis during the term of the Contract.

Gary Whelan, Fish Prod. Program Manager
Fisheries Division
P. O. Box 30446
Lansing, MI 48909-7946
517-373-6948
Email: whelang@michigan.gov

Martha Wolgamood, Supervisor and
DNR Fish Health Coordinator
Wolf Lake State Fish Hatchery
34270 C.R. 652
Mattawan, MI 49071
269-668-2696, ext. 105
Email: wolgamoodm@michigan.gov

MSU Principal Investigator (PI) for project administration and conduct of research is:

Dr. Mohamed Faisal, Principal Investigator
Dept. of Pathobiology and Diagnostic Investigation

Michigan State University Aquatic Animal Health Laboratory
S-110 Plant Biology Lab
East Lansing, MI 48823
517-432-8259
faisal@msu.edu

The MSU PI shall designate a staff liaison from the Aquatic Animal Health Laboratory (AAHL) to work directly with DNR contract administrators to fulfill the requirements of this contract.

DNR Compliance Inspector (CI) named below serves as the DNR day-to-day manager of the awarded contract. Requests to change, modify, amend, alter, or clarify the prices, specifications, terms, or changes, modifications, amendments, and conditions of this contract must be addressed to the CI. However, monitoring of this contract implies no authority to change, modify, clarify, amend or otherwise alter the prices, terms, conditions and specifications of the contract as that authority is retained by DNR-Financial Services.

Marlene D. Sublet-Bennett
Financial Analyst, Program Support, Fisheries Division
Southfield Operations Services Center
26000 W. 8 Mile Road
Southfield, MI 48034
248-359-9062
Email: subletbm@michigan.gov

I-F PROGRAM OF WORK

Key components of meeting requirements for healthy fish are to routinely monitor the health of hatchery-reared fish stocks and to detect potential pathogens. Since identification of emerging diseases of importance to fish reproduction and survival could occur at any time, the Department may revise the program of work and funding by mutual agreement to meet those special needs as they are determined. The program of work is identified in Attachment A. This includes the program objectives, deliverables and reporting requirements.

I-G PROJECT CONTROL AND REPORTS

- 1 The PI will carry out this project under the direction of the Michigan Department of Natural Resources, Fisheries Division. Any problems, real or anticipated, should be brought to the attention of the DNR Contract Administrators to ensure that the contract remains on schedule and ensure the contract will be completed as scheduled.
2. The DNR Contract Administrators will meet as needed with the PI to review progress and provide necessary guidance in solving problems which arise.

I-H INVOICING

DNR will provide the Contractor funding from this contract through the issuance of purchase orders in support of the research project described. The Contractor shall submit quarterly invoices for 25% of the cost identified in these purchase orders. Invoices should be submitted within 30 days following the end of each quarter to the DNR CI identified in section I-E. Final payment will be withheld until all deliverables are received by DNR in the time frames outlined in Appendix A (including reports). Payments will be made in accordance with Public Act 279 of 1984.

Indirect costs usually charged by the University will be waived pursuant to Agreement between MSU and DNR, executed 1989, as amended.

I-I INDEMNIFICATION

Each party to this contract must seek its own legal representative and bear its own costs; including judgments, in any litigation that may arise from performance specific to each party's responsibilities. It is specifically understood and agreed that neither party will indemnify the other party in such litigation.

I-J CONTRACTOR'S LIABILITY INSURANCE

The Contractor shall purchase and maintain such insurance as will protect them from claims set forth below which may arise out of, or result from, the Contractor's operations under the Contract (Purchase Order), whether such operations be by themselves or by any Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

NOTE: CONTRACTOR MAY SUBMIT EVIDENCE OF SELF-INSURANCE AND/OR AMENDMENT OF EXISTING LIABILITY COVERAGE IN FULFILLMENT OF ABOVE PROVISIONS, IF THE STATE ACCEPTS THE EVIDENCE OR AMENDED LIABILITY COVERAGE AS PROVIDING COMPARABLE PROTECTION OF THE STATE'S INTEREST.

The Contractor is required to provide proof of the minimum levels of insurance coverage as indicated below. The purpose of this coverage shall be to protect the State from claims which may arise out of, or result from, the Contractor's performance of services under the terms of this Contract, whether such services are performed by the Contractor, or by any subcontractor, or by anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable.

The Contractor waives all rights against the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents for recovery of damages to the extent these damages are covered by the insurance policies the Contractor is required to maintain pursuant to this contract, unless such damages are the result of the negligence or omission of the State of Michigan.

The insurance shall be written for not less than any minimum coverage herein specified or required by law, whichever is greater.

BEFORE THE CONTRACT IS SIGNED BY BOTH PARTIES OR BEFORE THE PURCHASE ORDER IS ISSUED BY THE STATE, THE CONTRACTOR MUST FURNISH TO THE DNR, FS, CERTIFICATE(S) OF INSURANCE VERIFYING INSURANCE COVERAGE. THE CERTIFICATE MUST BE ON THE STANDARD "ACCORD" FORM. THE CONTRACT OR PURCHASE ORDER NUMBER MUST BE SHOWN ON THE CERTIFICATE OF INSURANCE TO ASSURE CORRECT FILING. All such Certificate(s) shall contain a provision indicating that coverage afforded under the policies WILL NOT BE CANCELLED OR MATERIALLY CHANGED without THIRTY (30) days prior written notice having been given to the DNR-FS. Such NOTICE must include the CONTRACT NUMBER affected.

The Contractor is required to provide the type and amount of insurance checked () below:

- 1. Commercial General Liability with the following minimum coverage:**
\$2,000,000 General Aggregate Limit other than Products/Completed Operations
\$2,000,000 Products/Completed Operations Aggregate Limit
\$1,000,000 Personal & Advertising Injury Limit

\$1,000,000 Each Occurrence Limit
\$500,000 Fire Damage Limit (any one fire)

- 2. If a motor vehicle is used to provide services or products under this Contract, the Contractor must have vehicle liability insurance for bodily injury and property damage as required by law.**
- 3. Worker’s disability compensation, disability benefit or other similar employee benefit act with minimum statutory limits. NOTE: (1) If coverage is provided by a State fund or if Contractor has qualified as a self-insurer, separate certification must be furnished that coverage is in the state fund or that Contractor has approval to be a self-insurer; (2) Any citing of a policy of insurance must include a listing of the States where that policy’s coverage is applicable; and (3) Any policy of insurance must contain a provision or endorsement providing that the insurers’ rights of subrogation are waived. This provision shall not be applicable where prohibited or limited by the laws of the jurisdiction in which the work is to be performed.**
- 4. Employers liability insurance with the following minimum limits:
\$100,000 each accident
\$100,000 each employee by disease
\$500,000 aggregate disease**

I-K MODIFICATION OF CONTRACT

Requests to change, modify, amend, alter, or clarify the prices, specifications, terms, and conditions of this contract are to be forwarded to the DNR Compliance Inspector identified in Section I-E.

This contract may be modified provided that any changes proposed by either party are requested in writing, and mutually agreed to by the official representative of the Contractor shown in this contract and the (Agency/DNR) Contract Administrator. This request is not valid until it is signed by all parties, a Change Notice is issued by the Issuing Office, and a “Revised” Purchase Order is issued by the DNR.

I-L CANCELLATION OF CONTRACT

Cancellation of this contract shall be in accordance with the 1989 Agreement, as amended.

I-M NON-INFRINGEMENT/COMPLIANCE WITH LAWS

The Contractor warrants that, in performing the services called for by this Contract, it will not violate any applicable law, rule, or regulation, or any intellectual rights of any third party; including but not limited to, any United States patent, trademark, copyright, or trade secret.

I-N APPROPRIATIONS

The State fiscal year is October 1st through September 30th. The Contractor should realize that payments in any given fiscal year are contingent upon enactment of State legislative appropriations for this purpose.

I-O ELECTRONIC PAYMENT AVAILABILITY

Public Act 533 of 2004 requires that payments under this contract be processed by electronic funds transfer (EFT). Contractor is required to register to receive payments by EFT at the Contract & Payment Express website (www.mi.gov/cpexpress).

I-P RENEWAL

This Contract may be renewed in writing by mutual agreement of the parties not less than 30 days before its expiration. The Contract may be renewed for one (1) five (5) year period.

I-Q HUMAN SUBJECTS

The Contractor and DNR agree to conduct the research project in conformance with **Attachment A** which is attached hereto. Both parties shall comply with their own policies, all applicable laws and regulations, particularly the laws, rules and regulations concerning the care and treatment of research participants.

The Contractor, through its PI, shall provide DNR (a) with written evidence of review and approval by the applicable Institutional Review Board (IRB) of both the project and any patient consent form which may be required prior to the initiation of the research project; (b) with written evidence of the IRB's continuing review and approval of the project whenever it is reviewed, but at least once per year; and if applicable (c) with written evidence that contractor and its PI are obtaining appropriate authorizations (acceptable to DNR) for use and disclosure of protected health information as required by HIPAA.

Contractor and/or PI shall immediately notify DNR (a) of any deviations from the project which are necessary to protect the safety, rights or welfare of research participants, and (b) of any serious adverse events which occur to research participants (except for serious adverse events identified in any Protocol or other document as not requiring immediate reporting).

For multi-center projects, DNR will notify contractor, PI, and the IRB on an expedited basis of any adverse event from another center or site which is both severe and unexpected and would be reported by contractor under the paragraph above.

In studies where DNR bears responsibility for monitoring the research, DNR (itself or through an agent) shall conduct an ongoing safety evaluation of any project material, project device, project instrument or project equipment and shall promptly notify, or cause its agent to notify, contractor and PI of any findings from that evaluation that could affect adversely the safety of research participants, impact the conduct of the trial, or alter the IRB's approval to continue the project.

Research participants will be promptly informed by the PI and/or DNR (as appropriate following consultation between the parties and based on the nature of the information and which party has primary knowledge or control of such information) of any events, deviations, research results, or any other information of which contractor and DNR become aware which could directly affect the safety or medical care of research participants.

In the event it is necessary for contractor to provide any information to DNR relating to the medical condition or care of a research participant in a manner that identifies the participant, DNR agrees to maintain the confidentiality of that information to the fullest extent required by laws and regulations.

In the event this research project is terminated early, or upon its completion, contractor agrees to return all information, know-how, samples, drawings or data, technical or non-technical, provided by DNR to

DNR pursuant to this contract and copies thereof which have been designed to be DNR's confidential information, EXCEPT that contractor may retain one copy of any such documents or other materials in a secure location for purposes of carrying out its obligations under this contract.

ATTACHMENT A

Study 236100

Amended: 2009-10
New Study: 2001-02

Name of Study: Development and Implementation of a Fish Health Initiative for Michigan Inland and Great Lakes Fisheries

A. Problem:

Michigan waters support a diverse and economically important fisheries resource base. As a steward of this public trust resource, Michigan's Department of Natural Resources (DNR) manages the state's inland and Great Lakes fisheries and strives to maintain stocks of healthy fish and the other aquatic life that fish depend on for their production. The Fish Production Program (FPP) of Michigan DNR supports fisheries rehabilitation by providing hatchery-reared fish for stocking of public waters. Key components of meeting requirements for healthy fish are to: routinely monitor the health of hatchery-reared fish stocks; to detect potential pathogens; and to effectively treat disease outbreaks in the state production system. Wild fish populations are routinely examined to determine the health of existing stocks, to determine potential disease threat, and evaluate the effects of stress and other environmental factors on the expression of fish and other aquatic animal diseases. Laboratory and field studies are designed to verify and explain trends identified during routine fish health monitoring. DNR is adequately staffed to perform routine fish health investigations but presently lacks the capabilities and resources to conduct intensive epidemiological studies and advanced laboratory analyses. These elements are essential to meeting the department's responsibilities as public trustees for the aquatic resources of the state.

B. Objectives:

- 1) Work with DNR and the Great Lakes Fish Health Committee to help develop fish health guidelines and policies governing broodstock development and management, hatchery production, and fish stocking for the Fisheries Division's Fish Production Program of the Michigan Department of Natural Resources.
- 2) Assess prevalence, intensity, and pathways of transmission of aquatic animal diseases in Michigan's Great Lakes and inland waters to protect Michigan's aquatic resources.
- 3) Collect, analyze, and interpret data regarding distribution of pathogens impacting both inland and Great Lakes sport fisheries to facilitate proper management of the state's public trust resources.
- 4) Identify emerging and introduced diseases of importance to fish reproduction and survival and develop guidelines and policies to prevent their spread to other areas within Michigan Great Lakes and inland waters.
- 5) Provide guidance regarding the vaccination and drug administration to hatchery-propagated fish.

C. Justification

Much of the historical biological diversity represented by Michigan's inland and Great Lakes fisheries has been altered and/or lost by habitat damage, the introduction of non-indigenous species, overfishing, and diseases. Diseases such as Viral Hemorrhagic Septicemia Virus and Bacterial Kidney Disease (BKD) have become widespread in the Great Lakes basin and have caused considerable losses. Undoubtedly, the keys to preventing further degradation of fisheries in the Great Lakes basin and developing effective management

strategies depend on improved identification of fish pathogens in the lakes and hatcheries, elucidation of disease transmission pathways, and determination of direct effects on survival, growth, and reproduction.

A reliable assessment of fish health can best be achieved through the implementation of a rigorous monitoring program. The program must have the capacity to identify the presence of pathogens and to evaluate the impact of diseases on the general health of fish populations.

There have been several major impediments to the development of an effective disease-monitoring program in the Great Lakes basin. First, a documented archive of fish disease in the region is not available but is starting to be developed at this time. Second, sensitive diagnostic reagents and tests have not been developed to locally isolate pathogens. Third, there has been a paucity of disease studies or monitoring of large feral populations.

Despite these constraints, FPP is using all available measures to ensure that fish reared for stocking are free of diseases. For example, FPP screens spawning and hatchery-produced fish to effect a reduction in vertical transmission of infectious diseases, particularly BKD caused by *R. salmoninarum*. However, there is a clear need to continuously revise and update fish health policy, procedure, analytical methods, and control measures adopted in DNR weirs and hatcheries.

In the last few years, a number of emerging microbial infections have been reported to affect feral fish populations in the United States, including *Piscirickettsia* sp., largemouth bass virus and viral hemorrhagic septicemia in Michigan waters. Management efforts to limit the spread of these pathogens and prevent introduction of new diseases must be continued. A greater fundamental understanding of disease dynamics, life cycle of pathogens, historical pathogen data, and host defense mechanisms of the fish populations at risk is needed for effective management of the fisheries. In brief, long-term management of Michigan's Great Lakes and inland fisheries must be based on sound disease control policies and implementation strategies.

D. Expected Results and Benefits:

State of the art diagnostic services and professional consultation will enable the FPP and fisheries managers to control extant and emerging diseases both in the hatcheries and in wild fish populations. Timely reports of fish health analyses will minimize the potential of transfer of diseases vertically within the hatcheries, between hatchery and natural waters, and between natural waters. A key potential outcome of this work will be to begin to manage natural mortality rates in aquatic species, an outcome that will revolutionize fisheries management.

E. Background:

Critical to the development of improved fish disease control strategy in Michigan is the ability to rapidly respond to potential disease problems. The Fisheries Division of the Michigan DNR recognized this need in the 1950s and established a fish health diagnostic laboratory on the premises of the Wolf Lake State Fish Hatchery by the 1970s. Most of the historic monitoring programs in Michigan targeted two diseases; Bacterial Kidney Disease, caused by *R. salmoninarum*, and Whirling Disease, caused by *Myxobolus cerebralis*. Mr. John Hnath directed the DNR diagnostic lab for three decades and retired on July 1, 2002. Soon after Mr. Hnath's retirement, Michigan State University Aquatic Animal Health Laboratory (AAHL) was contracted to provide the needed aquatic animal health work. The DNR also recognized that there was a critical need for advanced fish health diagnostic techniques and epidemiological knowledge beyond the ability of DNR to help solve the difficult fish health problems in our state, a role that Michigan State University is well positioned to provide.

The Aquatic Animal Health Laboratory was established in the Departments of Pathobiology and Diagnostic Investigation (College of Veterinary Medicine) and Fisheries and Wildlife (College of Agriculture and Natural Resources) at Michigan State University (MSU) and a veterinarian specializing in fish health (Dr. M. Faisal) was hired. The MSU AAHL is dedicated to the investigation of diseases of aquatic animals and responds to the needs of Michigan DNR and the Great Lakes Fishery Commission. Currently, this lab has the capability to perform all conventional diagnostic assays and provides needed services in education,

research, and outreach. Protocols used for monitoring and disease diagnosis, certification, and notification are those approved by the American Fishery Society and the Great Lakes Fishery Commission. This facility is ready and able to provide the needed expertise and advanced techniques to assist the DNR with a range of fish health research problems.

F. Procedures:

Job 1. Historical Pathogen Review

Continue developing background fish health information concerning historical fish pathogen data, broodstock fish health, and hatchery operations for all fish species currently in production in the state of Michigan to include the disease susceptibility/resistance traits of these fish. Reimbursable costs for this job include preparation and production of final documents with all cost estimations provided in advance.

Job 2. Broodstock Plan Analysis.

Review the Michigan DNR broodstock management plan, provide fish health input on revised sections of the broodstock management plan as they become available, and provide recommendations for improving the fish health of these key assets.

Job 3. Fish Health Inspection Policy Analysis.

Review and provide recommendations on general guidelines and policies governing fish health inspections for the FPP of Michigan DNR.

Job 4. Wild Fish Pathogen and Emerging Disease Analysis.

Assist DNR in identifying existing and emerging diseases in fish stocks and assessing their impact on fish stocks in the state. Conduct fish health inspection and advanced diagnostic assays to detect emerging diseases such as largemouth bass virus, *Nucleospora salmonis*, viral hemorrhagic septicemia virus, *Flavobacterium* spp., microsporidians, and other pathogens as needed.

Job 5. Species Fish Health Analysis

Conduct fish health inspections and advanced diagnostic assays on coldwater and coolwater species in both hatchery and wild populations.

Job 6. Management Recommendations

Provide recommendations on the proper fish health management of the existing and future broodstocks and on current hatchery operations. Work with Hatchery Biologists and support staff to identify aspects of hatchery operations that could be improved to enhance broodstock selection and control the transmission of diseases. Conduct coordinated fish health inspections for all state fish production facilities. See Section G. for detailed requirements.

Job 7. Write annual report

Requirements for the annual report are outlined in Appendix A, Section A.7.ii

Job 8. Write final report

Final report should summarize work done throughout the contract period as it relates to Jobs 1-5 above.

G. Contract Requirements for Fish Health Analysis:

The following is a summary of the fish health work needed by the State of Michigan DNR on an annual basis. The numbers of cases by type have been estimated after reviewing the case history provided in Table 1 and evaluating needs based on most recent health histories and expected health trends. A case is generally defined as a group of fish of the same age and species, from the same water source and location, submitted together on the same day for the same purpose of disease investigation. For the purpose of this contract, wild fish analyses, the case definition includes a group of fish from the same species, water source, location and sampling date for the same purpose of disease investigation. The 289 annual cases requested represent the highest number of cases the Michigan DNR would submit for testing under the base-contract funding according to the appended price list of MSU-Aquatic Animal Healthy Laboratory (Appendix D). The composition of the total is estimated for each case type and is based on standard testing that is done annually as well as some estimates for other types of cases. The total number of cases contracted will not exceed the estimated number, but the number of any particular type may change to accommodate needs for that year, as long as the total costs of all submissions do not exceed the base contract amount within the fiscal year. Additional cases could be added by modifying this contract using similar costs per sample as indicated in this contract or by special research projects funded by Fisheries Division or outside funding sources.

Table 1. Fish Health Case History for State of Michigan 2004-2009

<u>Case Type</u>	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009 (to date)
Inspection-Broodstock-Wild	8	14	13	24	25
Inspection-Broodstock-Captive	15	47	32	59	60
Inspection-Fish Production	78	49	36	46	42
Diagnostic-Fish Production	72	26	26	30	31
Diagnostic-Wild-VHS	0	0	168	61	34
Diagnostic-Wild-Fish Kills	0	0	11	10	15
Diagnostic-Wild-Wild Fish Survey	51	6	2	16	0
Diagnostic-Wild-Transfers	9	4	1	6	0
Diagnostic-Wild-Future Broodstock	3	12	3	0	0
Total Number	236	158	292	252	207

An outline of the responsibilities and deliverables for the MSU AAHL and the DNR are outlined in Appendix A.

A calendar outlining the approximate timing for required annual DNR fish health work is provided in Appendix B. The actual dates for annual fish health work are determined by stocking and spawning dates, which can vary each year. Actual dates will be developed annually by the DNR Fish Health Coordinator in consultation with the Michigan State University Aquatic Animal Health Laboratory Liaison.

Annual testing required: The DNR will annually submit up to 289 cases, which includes up to 185 cases for Fish Production and 14 for wild fish; which are required annual inspections; the other 90 cases

are optional, at the discretion of the DNR, as funding allows. A breakdown by case type is outlined below.

V. Fish Production: The DNR will annually submit up to 185 cases that include required annual production and broodstock inspections for fish in hatcheries and rearing ponds, BKD screening for select captive broodstock to manage BKD in hatcheries, and diagnostics for production fish and captive broodstocks in hatcheries.

E. Full Inspection Cases

- a. Production—35 cases of 60 fish each
- b. Broodstock—20 cases of 10 or 60 fish each; this includes mature broodstock currently used for spawning (10 fish submitted per case) and future immature brood lots (60 fish submitted per case).

F. Virology Only Cases

- a. Production—50 cases of 60 fish each; this includes walleye and northern pike fry/fingerlings from rearing ponds and musky fry/fingerlings from Wolf Lake SFH
- b. Broodstock—15 cases; up to 60 gamete samples per case for mature broodstocks where sacrifice of 60 individuals for full inspection is not desired.

G. BKD Screening Cases (for individual spawning adults)

- a. Up to 15 cases of up to 120 gamete samples per case where results needed within a week of the day samples are received or up to 11 cases of up to 120 gamete samples per case where results are needed the same day the samples are received.
- b. Cases include Atlantic salmon (2), Iron River brook trout (6), Assinica brook trout (10), and Sturgeon River brown trout (8); possible new additions for broodstock screening include Lake Superior lake trout, Eagle Lake rainbow trout, Gilchrist brown trout, and Wild Rose brown trout.
- c. BKD screening done using QELISA test
- d. Results of testing needed either within a week of the day samples are received or the day the samples are received, as agreed upon by MSU-AAHL and DNR.

H. Diagnostic Cases (case numbers estimated based on case history for past 4 years)

- a. Production—30 cases up to 20 fish each
- b. Broodstock—5 cases up to 10 fish each

VI. Wild Fish: The DNR will annually submit up to 104 cases that include salmonid and coolwater broodstock inspections (required) and optional cases as determined by DNR

C. Full Inspection Cases

- a. Feral salmonid broodstock—Up to 5 cases of 60 fish each
 1. Salmon—Little Manistee River Weir, Swan River Weir, Platte River Weir
 2. Steelhead—Little Manistee River Weir
 3. Future broodstock or alternate broodstock (Boardman River weir or Medusa Creek weir)
- b. Feral coolwater broodstock—9 cases of 60 fish or non-lethal samples (gametes, blood, mucus, feces) from 60 fish
 5. Northern pike—Little Bay de Noc and one inland lake
 6. Walleye—Little Bay de Noc, Muskegon River, and Tittabawasee River
 7. Muskellunge—Lake Hudson, Lake St. Clair, and Thornapple Lake; non-lethal samples only
 8. Lake Sturgeon—One location; non-lethal samples only

- D. Optional cases—Up to 90 cases; the actual number and tests for each category listed below to be determined by DNR as specific needs arise, as funds allow.
 - a. Wild Fish Pathogen Cases—up to 30 cases of 60 fish each
 - b. Pre-transfer Cases—up to 5 cases of 60 fish each
 - c. VHS Only Cases—up to 40 cases of 60 fish each
 - d. Fish Kill Cases—up to 15 cases of 60 fish each

VII. Other fish health services:

B. Veterinary services

- a. Disease treatment recommendations that include dosage, length of treatment, and withdrawal time due 5 days after lab receives samples.
- b. Prescriptions for off-label drug or chemical treatments to be provided when treatment recommendations require the use of off-label drugs or chemical treatments
- c. Vaccines*—recommendations for appropriate vaccinations. Development of an autologous vaccine specific to pathogen strains found in Michigan facilities will be charged separately, according to Appendix D.
- d. Pathogen control strategies for fish production facilities

C. Molecular and Histopathology testing

- a. PCR and histopathology testing as required by protocols outlined in Attachment A, Section IV. A. a
- b. PCR and histopathology testing as agreed upon between MDNR and the PI —up to 10 cases per year

D. Investigational New Animal Drug (INAD) Coordination

- a. Lab coordinator/liaison will handle all DNR INAD needs and requirements
- b. Review all INAD paper work submitted for completeness.
- c. Sign all INAD paper work and send to the Aquatic Animal Drug Approval Partnership (AADAP) office.
- d. Review, sign, and send all requests for study numbers to AADAP the day they are received from DNR.
- e. Review, sign, and send all drug receipts and study results within 10 days of study conclusion to AADAP office.

E. Consultation for unique fish health issues — unlimited

F. Other

- a. Travel to Fish Production facilities and broodstock weirs for sample collection or where site evaluation due to disease issues is needed.
- b. The DNR shall provide the Michigan State University Aquatic Animal Health Laboratory a vehicle for such travel or will make other agreed upon arrangements for required travel to fulfill this contract.

VIII. Pathogen testing

C. Protocols

- c. All protocols used for monitoring and disease diagnosis, certification, and notification must be those approved by the American Fishery Society and OIE. All protocols must also follow the recommendations of the Great Lakes Fishery Commission – Great Lakes Fish Health Committee and the Great Lakes Fish Health Model Program.
- d. Any deviation from this specification must be agreed upon by both the DNR contract administrators and the MSU Aquatic Animal Health Laboratory PI.

D. Required testing

- d. Tests required by type of case and species are listed in Appendix C
- e. If species is not listed, DNR will provide testing requirements at time of sample submission on fish health request form.

- f. Any deviation from this specification must be agreed upon by both the DNR contract administrators and the MSU Aquatic Animal Health Laboratory PI.

H. Schedule/Budget¹:

¹ NA = not scheduled

Proposed work	2009-10	2010-11	2011-12	2012-13	2013-14
Job 1 Historical Pathogen Review	NA	NA	NA	NA	NA
Job 2 Broodstock Plan Analysis	NA	NA	NA	NA	NA
Job 3 Fish Health Inspection Policy Analysis	NA	NA	NA	NA	NA
Job 4 Wild Fish Pathogen and Emerging Disease Analysis	NA	NA	NA	NA	NA
Job 5 Species Fish Health Analysis	NA	NA	NA	NA	NA
Job 6 Write annual reports	NA	NA	NA	NA	NA
Job 7 Write final report	NA	NA	NA	NA	NA
Contracts:	\$167,000	\$170,340*	\$173,747*	\$177,222*	\$180,766*
Totals	\$167,000	\$170,340*	\$173,747*	\$177,222*	\$180,766*

I. Geographic Location: Departments of Pathobiology and Diagnostic Investigation and Fisheries and Wildlife, Aquatic Animal Health Laboratory, Michigan State University, East Lansing, MI

J. Personnel: Principal Investigator: Mohamed Faisal, Professor, Departments of Pathobiology and Diagnostic Investigation and Fisheries and Wildlife, Aquatic Animal Health Laboratory, Michigan State University, East Lansing, MI; Michelle Gunn, AAHL Laboratory Manager, Department of Pathobiology and Diagnostic Investigation; Thomas Loch, MSU PhD student, Department of Pathobiology and Diagnostic Investigation.

(Attachments: Appendix A-Responsibilities and Deliverables, Appendix B-Calendar, and Appendix C-Pathogens, Appendix D-Aquatic Animal Health Laboratory Fee Schedule)

Appendix A. Responsibilities and Deliverables

A. MSU Aquatic Animal Health Laboratory Deliverables

- 1) Report form and submissions
 - i) Forms required by DNR for requesting fish health work from MSU AAHL and reporting to the DNR, will be provided by the DNR to MSU AAHL
 - ii) Reports to the DNR will be submitted to the DNR Fish Health Coordinator using the appropriate DNR data format, unless otherwise agreed upon by the parties
 - iii) Results of clinical exams, drug sensitivity, treatment recommendations, bacteriology, BKD screening, VHS only tests, and preliminary reports will be submitted to the DNR Fish Health Coordinator via email
 - iv) Final annual reports will be submitted electronically via email to the DNR Fish Health Coordinator and a hard copy signed by the certifying fish health person will be mailed to the DNR Fish Production Manager and DNR Fish Health Coordinator
 - v) Reporting time frames are provided below for each case type. If case submissions occur at the end of the fiscal year where final reports will be due after **October 15th**, they will be considered part of the next fiscal year for invoicing requirements
- 2) Inspection Case Reports
 - i) Preliminary Inspection reports are due 6 weeks after receipt of samples
 - ii) Final Inspection reports are due 10 weeks after receipt of samples
- 3) Diagnostic Case Reports
 - i) Results of clinical exam due one day after receipt of samples
 - ii) Drug sensitivity and treatment recommendations due 5 days after receipt of samples
 - iii) Results of bacteriology due 14 days after receipt of samples
 - iv) Results of virology and preliminary diagnostic reports are due 6 weeks after receipt of samples
 - v) Final diagnostic reports are due 10 weeks after receipt of samples
- 4) Virology Only Case Reports
 - i) Preliminary virology only reports are due 6 weeks after receipt of samples
 - ii) Final virology only reports are due 10 weeks after receipt of samples
- 5) BKD Screening Case Reports
 - i) Results of BKD testing due either within one week of day samples are received or 10 hours after receipt of samples
 - ii) Final BKD screening report due 2 weeks after testing of samples
- 6) VHS Only Case Reports
 - i) Preliminary VHS only report due 28 days after receipt of samples
 - ii) Final VHS only report due 10 weeks after receipt of samples
- 7) Other Reports
 - i) Case list—up to date list of all DNR cases submitted to MSU AAHL for the current fiscal year
 - (1) Prepared in the format provided by DNR
 - (2) Due the first of each month and submitted to the DNR Fish Health Coordinator
 - ii) Annual report
 - (1) Prepared in the format provided by DNR
 - (2) A summary of fish health work done by MSU AAHL for DNR for the fiscal year
 - (3) Includes completed Salmonid Importation and Hatchery Classification forms as required by the Great Lakes Fish Health Committee
 - (4) Due December 1 of the year following the fiscal year and submitted to the DNR Fish Health Coordinator.
 - iii) Final Report
 - (1) This report will be required if the contract is not renewed at the end of the contract period.

- (2) Prepared in the format provided by DNR.
 - (3) A summary of all fish health work done by MSU AAHL for DNR during the contract period for Jobs 1-5.
 - (4) Due December 1 of the year following the final fiscal year of the contract, if the contract is not renewed, and submitted to the DNR Fish Health Coordinator.
- 8) Equipment and Vehicles
- i) Specialized DNR fish health equipment on loan to MSU
 - (1) Maintenance of this equipment, including repairs, will be the responsibility of the MSU AAHL
 - (2) Equipment on loan will be returned to the DNR at the end of the contract, in a condition that is similar to the condition at the time of loan.
 - ii) A vehicle will be provided for travel related to DNR contracted fish health work or other agreed upon arrangements shall be made for DNR contracted fish health travel. The vehicle shall only be used for DNR required fish health work.
 - (1) Travel logs will be faxed to DNR on the first of every month to the DNR Fish Health Coordinator
 - (2) A fuel card is included with the vehicle; receipts for fuel must be retained and sent to the DNR monthly by the 15th of the next month to the DNR Fish Health Coordinator. Maintenance of the vehicle is the responsibility of the MSU AAHL and the costs for the maintenance are covered by the vehicle lease agreement with State of Michigan, Vehicle and Travel Services unit. All vehicle maintenance shall be coordinated with the DNR Fish Health Coordinator

B. DNR Responsibilities

- 1) Coordination of fish health work between DNR and MSU AAHL
 - i) Process requests from DNR
 - (1) Requests for non-critical fish health work made to AAHL at least two weeks prior to need
 - (2) Complete and submit inspection form to AAHL for annual production and broodstock inspections and develop schedule for inspection work with AAHL one month prior to inspections
 - (3) Complete and submit health history form to AAHL for diagnostic work at the time diagnostic work is requested
 - (4) Complete and submit disease form-wild fish to AAHL for diagnostic or inspection work on wild fish at the time samples are submitted
 - ii) Sample submission
 - (1) Submit samples following MSU AAHL protocols for sample preservation and shipping
 - iii) Distribute reports
 - (1) Distribute reports received from MSU AAHL to DNR personnel within one week of receipt
 - (2) Submit reports to MSU AAHL for groups where treatment was recommended that include results of treatment or justification if treatment was not administered within one week of receipt of report from MSU
 - iv) Manage fish health database
 - v) Manage fish health budget and contract
- 2) Database access
 - i) Provide full access to DNR fish production and fish health databases along with any other relevant information so MSU AAHL has access to information related to fish in hatcheries or wild, including environmental conditions, mortality trends, lot information for hatchery fish, and treatment records for hatchery fish.
- 3) Equipment
 - i) Specialized and available DNR fish health equipment will be made available to loan to the MSU AAHL
 - ii) Maintenance of this equipment, including repairs, will be the responsibility of the MSU AAHL
 - iii) Equipment on loan will be returned to the DNR at the end of the contract, in a condition that is similar to the condition at the time of loan.
- 4) Vehicle

- i) A vehicle will be provided to the MSU AAHL for travel related to DNR contracted fish health work or other agreed upon arrangements shall be made for DNR contracted fish health travel. The vehicle shall only be used for DNR required fish health work.

Appendix B. Anticipated calendar of required annual fish health work that includes full inspection, virology only and BKD screening (QELISA).

January	February	March	April
Virology Only-Broodstock Captive Broodstock-Marquette, Oden; gamete samples	Full Inspection-Production Yearlings-Wolf Lake	Full Inspection-Production Yearlings-Lake Superior State Univ. Spring fingerlings-Thompson, Wolf Lake	Full Inspection-Broodstock Walleye-Muskegon R.
Virology Only-Broodstock Captive Broodstock-Marquette, Oden; gamete samples		Full Inspection-Production Spring fingerlings-Platte	Full Inspection-Broodstock Steelhead-Little Manistee R. Weir Northern Musky-Thornapple, Hudson
Full Inspection-Production Yearlings-Thompson, Marquette		Full Inspection-Broodstock Northern Pike-Southern Lower Pen.	Full Inspection-Broodstock Northern Pike-Little Bay de Noc Walleye- Little Bay de Noc
Full Inspection-Production and Broodstock Yearlings- Harrietta, Platte, Oden Surplus broodstock-Oden	Full Inspection-Production Spring fingerlings-Marquette	Full Inspection-Broodstock Walleye-Tittabawasee R.	VHS Only-Production Fry-Northern Pike VHS Only-Wild Fish Pathogen Surveys Various field units
May	June	July	August
VHS Only-Production Fry-Walleye, musky	VHS Only-Wild Fish Pathogen Surveys Various field units	Full Inspection-Production Yearlings-Channel catfish-Ohio VHS Only-Wild Fish Pathogen Surveys Various field units	Full Inspection-Broodstock Captive Broodstock-Marquette VHS Only-Wild Fish Pathogen Surveys Various field units
Full Inspection-Broodstock Great Lakes Musky-Lake St. Clair Lake Sturgeon-Black R., Sturgeon R. VHS Only-Wild Fish Pathogen Surveys Various field units	VHS Only-Wild Fish Pathogen Surveys Various field units	Full Inspection-Production Fall fingerlings-Thompson, Wolf Lake, Marquette VHS Only-Wild Fish Pathogen Surveys Various field units	VHS Only-Wild Fish Pathogen Surveys Various field units
VHS Only-Wild Fish Pathogen Surveys Various field units	VHS Only-Wild Fish Pathogen Surveys Various field units	Full Inspection-Production Fall fingerlings-musky-Wolf Lake VHS Only-Wild Fish Pathogen Surveys Various field units	VHS Only-Wild Fish Pathogen Surveys Various field units
VHS Only-Production Spring fingerling walleye-rearing ponds	VHS Only-Wild Fish Pathogen Surveys Various field units	VHS Only-Wild Fish Pathogen Surveys Various field units	VHS Only-Wild Fish Pathogen Surveys Various field units
September	October	November	December
		BKD-Screening-Broodstock QELISA Screening-Marquette, Oden	BKD-Screening-Broodstock QELISA Screening-Marquette, Oden
	Full Inspection-Broodstock Coho-Platte R. Weir	BKD-Screening-Broodstock QELISA Screening-Marquette, Oden	BKD-Screening-Broodstock QELISA Screening-Marquette, Oden
Full Inspection-Broodstock Chinook-Swan R. Weir		BKD-Screening-Broodstock QELISA Screening-Marquette, Oden	
Full Inspection-Broodstock Chinook-Little Manistee R. Weir	Full Inspection-Broodstock Captive Broodstock-Oden BKD-Screening-Broodstock QELISA Screening-Marquette		BKD-Screening-Broodstock QELISA Screening-Oden

Appendix C. Required annual full inspection testing by species. Testing for species not listed below or for other purposes, such as wild fish pathogen surveys or VHS only, may not require same level of testing. For work other than full inspections, required tests will be identified by DNR when testing is requested.

Species	VHSv	IHN WD Yr ISA	IPN Rs As	<i>Heterosporis</i> sp.	LMBv	Channel Catfish Virus	WSIv WSHv	SVC Koi Herpesvirus
Salmonids								
Atlantic salmon	X	X	X					
Brook trout	X	X	X					
Brown trout	X	X	X					
Chinook salmon	X	X	X					
Coho salmon	X	X	X					
Lake herring	X	X	X					
Lake trout	X	X	X					
Rainbow trout	X	X	X					
Splake	X	X	X					
Steelhead	X	X	X					
Cool and Warmwater								
Channel catfish	X		X			X		
Lake sturgeon	X		X				X	
Muskellunge	X	X	X					
Northern Pike	X	X	X					
Walleye	X		X	X				
All others	Tests for other species not listed will be specified from those listed above, when testing is requested							

Test Codes:

VHSv—Viral Hemorrhagic Septicemia virus
 IHN—Infectious Hematopoietic Necrosis
 WD—*Myxobolus cerebralis* (whirling disease)
 Yr—*Yersinia ruckeri* (ERM)
 ISA—Infectious Salmon Anemia

IPN—Infectious Pancreatic Necrosis
 Rs—*Renibacterium salmoninarum* (BKD)
 As—*Aeromonas salmonicida* (furunculosis)
 LMBv—Largemouth Bass virus
 WSIv—White Sturgeon Iridovirus

WSHv—White Sturgeon Herpesvirus
 SVC—Spring Viremia of Carp

Appendix D. Aquatic Animal Health Laboratory Fee Schedule

Fish Health Services

Laboratory Service	Fee/lot (lot: 60 fish of a single species and of the same age)	Fee/sample
Fish Health Certification* package, including dissection, clinical examination, external & GIT parasitological analysis, bacterial pathogens of concern, and identification & verification of isolated notifiable pathogens with serological and/or molecular assays	\$1700/lot \$1200/lot if submitting >100 cases/year	N/A
DNA testing (<i>Renibacterium salmoninarum</i> , <i>Aeromonas salmonicida</i> , <i>Yersinia ruckeri</i> , VHSV, IPNV, IHNV, LMBV, or <i>Nucleospora salmonis</i>)	N/A	\$30/sample per pathogen
Clinical cases: including: clinical and postmortem examination, diagnostics (bacterial, viral, parasite), along with the necessary confirmation and treatment recommendation	\$500, up to 20 fish	N/A
Clinical case: diagnostic/treatment follow-up if needed (viral or bacterial)	\$150	
Whirling Disease testing, including confirmation if necessary	\$400	\$10/sample, minimum 12 samples
Confirmatory histopathology	N/A	\$20/sample
Virus testing (VHSV, LMBV, IHNV, IPNV), minimum 28-day results on Tissue Culture, 2 cell lines, including viral confirmation, 5 fish per pool	\$450, up to 60 fish/lot \$800, up to 120 fish/lot	\$40/pool (maximum 5 samples per pool)
Fish health check for reportable bacterial pathogens only	\$450	\$10/sample, minimum 12 samples
Identification of other non-reportable bacterial pathogens for diagnostic or research purposes	determined on case by case basis	
<i>Renibacterium salmoninarum</i> (BKD): Q-ELISA, individual fish	\$450, up to 60 fish/lot \$800, up to 120 fish/lot	\$10/sample, minimum 12 samples
Dissections and organ collection for diagnostic assays	\$100	\$1.75/fish
Screen for <i>Heterosporis</i> sp., including confirmation	\$150	\$3/fish
Parasitic evaluation of skin/gills	\$250	\$5/fish
Development of autologous vaccine	\$ 1,000/batch	
Consultation	determined on case by case basis	
Shipping cost	determined on case by case basis	

* Michigan Fish Health Certifications include testing for reportable fish diseases as listed by the GLFC. If certifications are required for states outside of Michigan, please provide individual requirements for each state at the time of sample submission. Additional testing requirements may increase costs.