



GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES
LANSING



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DIRECTOR

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You are receiving this letter because you have: conducted fish health inspections or testing on game or bait fish to be imported into the State of Michigan; delivered fish destined to be stocked in public waters from out-of-state sources to aquaculture facilities or to baitfish facilities in the State of Michigan; or stocked fish from your facility into public waters, as defined as having permanent inflows or outflows, in the State of Michigan in the last 5 years. The Michigan Department of Natural Resources (DNR), Fisheries Division is responsible for the aquatic public trust resources of the State of Michigan under the authorities provided in Natural Resources and Environmental Protection Act (Act 451 of 1994). Under this Act, the DNR has authorities for game and bait fish importation and stocking to protect the aquatic public trust resources as stated in Michigan Compiled Laws (MCL) 324.503, 324.1301, 324.45906, 324.48730, and 324.48735. As one component of those authorities, DNR has recently updated Fisheries Order 245.16, Fish Disease Control. This order provides additional details concerning pathogen testing requirements for fish that are being imported to be used for bait or stocked in public waters of Michigan.

Attached to this letter is a summary of these testing guidelines that fully meet the statutory requirements from the Michigan Compiled Code noted above and Fisheries Order 245.16. Please use this information to assist you with setting up fish health testing for any fish that are destined for bait facilities or stocking in waters of the State of Michigan. If you have questions or need assistance with setting up a testing strategy for your facility, we are happy to work with you.

**Michigan Department of Natural Resources (DNR)
Fish Health Testing Guidelines for Moving Game and Bait Fish into the State of
Michigan, Stocking of Fish into Public Waters of Michigan, and Baitfish
Certification for the State of Michigan**

Sampling and Testing

- Sample collection must be conducted by either: 1) a veterinarian who is licensed and USDA accredited; 2) a MI DNR Fisheries Division employee approved by the MI DNR Competent Fish Health Authority or designate; 3) a state, federal or tribal fisheries or other agency employee approved by the MI DNR Competent Fish Health Authority or designate; 4) an AFS-FHS Certified Fish Health Inspector or Fish Pathologist; or 5) any other qualified individual acceptable upon consultation with the MI DNR Competent Fish Health Authority or designate.
- Samples should be shipped live whenever possible. Fresh on ice is acceptable if holding time is less than 24 hours from death until arrival to the laboratory for immediate processing. Frozen samples should only be used in consultation with MI DNR Competent Fish Health Authority or designate. Arrange all submissions with the receiving lab prior to fish collection.
- Sample processing laboratories should be selected in consultation with MI DNR Competent Fish Health Authority or designate prior to collecting samples. The following laboratories are acceptable and do not need additional consultation:
 - Michigan State University – Aquatic Animal Health Laboratory
 - Kennebec River Biosciences
 - State of Ohio Department of Agriculture – Animal Disease Diagnostic Laboratory
 - Wisconsin Veterinary Diagnostic Laboratory
 - Fish Diseases Diagnostic Laboratory University of Arkansas – Pine Bluff
 - University of Minnesota Veterinary Diagnostic Laboratory
 - Washington Animal Disease Diagnostic Laboratory
 - Fish Vet Group
- Minimum numbers of fish to be sampled are outlined in Table 1 except for minnow collection areas within the State of Michigan with continuing positive VHSv sample results where lot sample sizes will be 150 fish. Affected entities in these areas will be notified of the need for the higher sample size. At this time, the higher sample size will be required for waters in Saginaw Bay and the St. Clair River to Lake Erie corridor. For other circumstances, please consult with MI DNR Competent Fish Health Authority or designate to determine what is needed for your situation.

- The testing strategy for a farm-level certification will depend on the configuration of the facility and should be approved by DNR, prior to sampling. Facilities that have been approved for farm level inspection in the past by MI DNR Fisheries Division can continue to do so using the annual testing listed in the tables below. At minimum, three consecutive years of detailed fish health history will be needed in order for MI DNR Fisheries Division to accept farm-level certifications for facilities that wish to start using farm level inspections.
- All fish health certifications are valid for one year from the date of the fish health inspection if no additional fish are added to the inspected lots and adequate biosecurity measures are in place to ensure lot separation at the facility. If new fish are added, new fish health inspections and certifications are required following the guidance in this document.

Table 1. Number of fish required for testing by source.

Source of Fish	Minimum Number to Test by Species (see details below)¹	Minimum Number to Test for Farm Level (see details below)
Aquaculture Facility with minimum 3 consecutive years health history, starting with the immediate past year, demonstrating the absence of pathogens that are required for testing (Table 2)	60 fish per species for viruses and bacteria ² with a minimum of 120 fish per facility and 60 fish per species for parasites ³	170, preferably with 60 fish from the species to be imported or stocked in MI waters
Aquaculture Facility with unknown or incomplete health history over past 3 consecutive years.	150 fish per species for viruses and bacteria ² and 120 fish per species for parasites ³	To Be Determined; consult with DNR fish health staff
Wild Fish Collections or Transfers - State of Michigan waters or out of state waters with a known fish health history of no less than consecutive 3 years, starting with the immediate past year.	120 fish per species for viruses and bacteria ² and 60 fish per species for parasites ³	N/A
Wild Fish from out-of-state waters with an unknown fish health history	150 fish per species for viruses and bacteria ² and 60 fish per species for parasites ³	N/A
Baitfish from State of Michigan waters or out-of-state waters with a known fish	120 fish per species for viruses and	N/A

health history of no less than 3 years, starting with the immediate past year, except as noted below	bacteria ² and 60 fish per species for parasites ³	
Baitfish from out-of-state sources with unknown fish health histories	150 fish per species for viruses and bacteria ² and 60 fish per species for parasites ³	N/A
All juvenile and adult salmonids originating west of the western borders of Minnesota, Iowa, Missouri, Oklahoma and Texas	120 fish per species for <i>Tetracapsuloides bryosalmonae</i> (causative agent of Proliferative Kidney Disease, PKD)	NA
All juvenile and adult salmonids originating east of the eastern borders of New York and Ontario	150 fish per species for all Infectious Salmon Anemia virus (ISAv) variants (e.g., HPR0 and HPR-deleted)	NA
All salmonid eggs originating east of the eastern borders of New York and Ontario	150 brood fish per species for all Infectious Salmon Anemia virus (ISAv) variants (e.g., HPR0 and HPR-deleted)	NA

¹ See Table 2 and the Required Pathogen Testing Section for pathogens required by species.

² Viruses include VHSV, IHNV, IPNV, LMBV, and/or CCV. No bacterial testing is required at this time.

³ Parasites include Mcer and/or HSP.

Required Pathogen Testing

- Pathogen testing outlined in Table 1 will be completed on all fish submitted; pooling of fish in pools of five fish is acceptable for all pathogens except for *Heterosporis* sp. (i.e., a 120 fish sample for fathead minnows being imported into our state for baitfish will have 24 5-fish pools of samples for virus analysis, and 60 individual fish inspected for *Heterosporis* sp.).
- Minnows harvested within the waters of the State of Michigan only need to be tested for Viral Hemorrhagic Septicemia virus using the wild fish sample sizes in

Table 1, except in known positive VHSV areas, where the sample size will be 150 fish for virology.

- Pathogen testing requirements by species are listed in Table 2 below, except for the following additional requirements not included in Table 2:
 - For all juvenile and adult salmonids originating west of the western borders of Minnesota, Iowa, Missouri, Oklahoma and Texas:
 - Fish must also be tested for *Tetracapsuloides bryosalmonae* (causative agent of Proliferative Kidney Disease, PKD) using a minimum sample size of 120 fish per species.
 - For all juvenile and adult salmonids originating east of the eastern borders of New York and Ontario:
 - Fish must also be tested for all variants (e.g., HPR0 and HPR-deleted) of Infectious Salmon Anemia virus (ISAv) using a minimum sample size of 150 fish per species.
 - For salmonid eggs originating east of the eastern borders of New York and Ontario:
 - Broodstock fish must also be tested for and free of all Infectious Salmon Anemia virus (ISAv) variants using a minimum sample size of 150 fish per species for three consecutive years.
 - For all minnows (cyprinids) originating west of the Minnesota-Wisconsin stateline and the Mississippi River:
 - Fish must also be tested free for Fathead Minnow Nidovirus (FHMNV) and Golden Shiner Reovirus (GOSV) using a minimum sample size of 120 fish for facilities with known fish health histories and 150 fish for facilities with unknown fish health histories.
 - For all frozen baitfish originating west of the Minnesota-Wisconsin-Illinois statelines, and the Ontario western and northern provincial boundaries; south of the Ohio River and the southern Pennsylvania and New York statelines; and east of the eastern borders of New York and Ontario:
 - Consultation with DNR Fisheries Division Fish Health staff must be conducted to fully determine testing needs, which will depend on the fish species and harvest location. The species including scientific name, harvest location, date, and specifics of storage location must be provided to DNR Fisheries Division Fish Health staff prior to consultation. At minimum for frozen baitfish lots identified as needing testing by DNR Fisheries Division Fish Health staff, frozen baitfish must be tested for and free of Viral Hemorrhagic Septicemia virus using a minimum sample size of 150 fish and must come from a specific lot that must remain separate from other frozen bait lots and not be mixed with other frozen bait.

- All Pacific and Atlantic Herring, Alewives, Menhaden, other herring and smelt species, anchovies and similar species from the Pacific and Atlantic coasts are covered in this testing guidance. Other species may require testing based on consultation with MI DNR Competent Fish Health Authority or designate.
- Samples for parasitological analyses can be collected from the same fish examined for viruses and bacteria.
- All testing that follows procedures outlined in the American Fisheries Society – Fish Health Section (AFS-FHS) Blue Book or OIE Manual of Diagnostic Tests will be accepted by MI DNR Fisheries Division. Any other testing methodology will require consultation with MI DNR Fisheries Division Fish Health staff.
 - For Viral Hemorrhagic Septicemia virus (VHSV) testing:
 - Isolation on cell culture, followed by confirmatory identification is accepted by the MI DNR Fisheries Division as the primary method of VHSV detection. At minimum, two cell lines should be used, along with a positive control. The preferred cell line is EPC, plus FHM or another second susceptible cell line (e.g., CHSE or BF-2) at 15°C. Other cell lines can be used following consultation with and approval by MI DNR Competent Fish Health Authority or designate. If CPE is detected, confirmation using molecular or serological assays acceptable by the USFWS-AFS-FHS Bluebook) or the OIE Aquatic Manual must be followed.
 - Real-time reverse transcriptase (rRT) PCR using the protocol originally developed by Jonstrup et al. (2013) and adopted by USDA APHIS NAHLN (Warg et al. 2014 a, b as provided at <https://www.ncbi.nlm.nih.gov/pubmed/25144112> and <https://www.ncbi.nlm.nih.gov/pubmed/25144113>) is also an acceptable method to the MI DNR Fisheries Division. The rRT-PCR must use the approved primer sets used in the above references or another agreed upon primer set and must use appropriate controls. If positive pools are found, the results must then be confirmed using cell culture following the guidance above.
- Testing requirements for any species not listed in Table 2 must be done in consultation with DNR Fisheries Division Fish Health staff.

For your reference, the link to Fisheries Order 245.16, Fish Disease Control, is provided below.

http://www.michigan.gov/documents/dnr/FO_245.10_317517_7.pdf

Table 2. List of Fish Species and Pathogen Testing Requirements for Importation of Fish Destined for Stocking Into Public Waters of Michigan, and for Baitfish Certification

Species	Scientific Name	Species Code	Importation	Baitfish	Stocking	Pathogen Testing Required						
						VHSV	IHNv, IPNV, and Mcer	HSP	PKD*	LMBv	CCV	ISAV**
Atlantic Salmon	<i>Salmo salar</i>	ATS	X		X	X	X		X			X
Black Bullhead	<i>Ameiurus melas</i>	BLB	X		X	X		X			X	
Black Crappie	<i>Pomoxis nigromaculatus</i>	BCR	X		X	X				X		
Bluegill	<i>Lepomis macrochirus</i>	BLG	X		X	X				X		
Brook Trout	<i>Salvelinus fontinalis</i>	BKT	X		X	X	X		X			X
Brown Bullhead	<i>Ameiurus nebulosus</i>	BRB	X		X	X					X	
Brown Trout	<i>Salmo trutta</i>	BNT	X		X	X	X		X			X
Channel Catfish	<i>Ictalurus punctatus</i>	CCF	X		X	X					X	
Flathead Catfish	<i>Pylodictis olivaris</i>	FCF	X		X	X					X	
Green Sunfish	<i>Lepomis cyanellus</i>	GSF	X		X	X				X		
Hybrid Sunfish	<i>Lepomis spp.</i>	HSF	X		X	X				X		
Lake Herring	<i>Coregonus artedii</i>	LHR	X		X	X	X	X				
Lake Trout	<i>Salvelinus namaycush</i>	LKT	X		X	X	X		X			X
Lake Whitefish	<i>Coregonus clupeaformis</i>	LWF	X		X	X	X		X			X
Largemouth Bass	<i>Micropterus salmoides</i>	LMB	X		X	X				X		
Muskellunge	<i>Esox masquinongy</i>	MUS	X		X	X		X				
Northern Pike	<i>Esox lucius</i>	NOP	X		X	X		X				
Pumpkinseed Sunfish	<i>Lepomis gibbosus</i>	PSF	X		X	X		X		X		
Rainbow Trout (Steelhead)	<i>Oncorhynchus mykiss</i>	RBT	X		X	X	X		X			X
Redear Sunfish	<i>Lepomis microlophus</i>	RSF	X		X	X				X		
Rock Bass	<i>Ambloplites rupestris</i>	RKB	X		X	X		X		X		
Smallmouth Bass	<i>Micropterus dolomieu</i>	SMB	X		X	X				X		
Walleye	<i>Sander vitreus</i>	WAE	X		X	X		X				
Warmouth	<i>Lepomis gulosus</i>	WAR	X		X	X						
White Bass	<i>Morone chrysops</i>	WHB	X		X	X				X		
White Crappie	<i>Pomoxis annularis</i>	WCR	X		X	X				X		
Yellow Bullhead	<i>Ameiurus natalis</i>	YLB	X		X	X					X	
Yellow Perch	<i>Perca flavescens</i>	YEP	X		X	X		X				
Imported Baitfish Species												
Bluntnose Minnow	<i>Pimephales notatus</i>	BNM	X	X	X	X		X				
Common Shiner	<i>Luxilus cornutus</i>	CSH	X	X	X	X		X				
Common White Sucker	<i>Catostomus commersonii</i>	CWS	X	X		X		X				

Creek Chub	<i>Semotilus atromaculatus</i>	CRC	X	X		X		X				
Emerald Shiner	<i>Notropis atherinoides</i>	EMS	X	X	X	X		X				
Fathead Minnow	<i>Pimephales promelas</i>	FHM	X	X	X	X		X				
Golden Shiner	<i>Notemigonus crysoleucas</i>	GOS	X	X	X	X		X				
Northern Redbelly Dace	<i>Phoxinus eos</i>	NRD	X	X	X	X		X				
Sand Shiner	<i>Notropis stramineus</i>	SAS	X	X		X		X				
Spotfin Shiner	<i>Cyprinella spiloptera</i>	SFS	X	X		X		X				
Spottail Shiner	<i>Notropis hudsonius</i>	STS	X	X		X		X				

VHSv – Viral Hemorrhagic Septicemia, IHNv – Infectious Hematopoietic Necrosis, IPNv – Infectious Pancreatic Necrosis, ISAv – Infectious Salmon Anemia, Mcer – *Myxobolus cerebralis*, causative agent of Whirling Disease, HSP – Heterosporis sp, PKD – Proliferative Kidney Disease, LMBv – Largemouth Bass Virus, CCv – Channel Catfish virus
 *PKD testing only required for adult and juvenile salmonids originating west of the western borders of Minnesota, Iowa, Missouri, Oklahoma and Texas
 **ISAv testing only required for all juvenile and adult salmonids and brostock source of eggs originating east of the eastern borders of New York and Ontario