Supplementary Information: Pathogen Descriptions and Susceptible Species

Viral hemorrhagic septicemia virus

Viral hemorrhagic septicemia virus (VHSV) is a highly pathogenic, psychrophilic virus of fishes with a wide host range (Faisal et al. 2012). Found throughout the Great Lake states, it has been detected in Lake Superior (Cornwell et al. 2011), but has not been found in inland waters in Minnesota after over a decade of surveillance and regulation (Phelps et al. 2015). VHSV is listed as a certifiable fish diseases in Minnesota and fish culture facilities producing VHSV-susceptible species (MN State Statute 17.4892 Subd. 6).

Ovipleistophora ovariae

Ovipleistophora ovariae is a vertically-transmitted microsporidian parasite of golden shiners, one of the most popular species of live baitfish (Gunderson 2019; Stone, Kelly, and Roy 2016). Affecting oogony in ovarian tissues, *O. ovariae* can cause sterilization of female golden shiners and dramatic population declines in cultured populations (Summerfelt and Warner 1970; Phelps and Goodwin 2008). Cited as one of the reasons for ongoing prohibition of baitfish importation from other states such as Arkansas (Gunderson 2018), *O. ovariae* is nonetheless unregulated in Minnesota at present and has been reported in golden shiners sold at Minnesota baitshops (McEachran, Mor, and Phelps 2021).

Asian fish tapeworm

The Asian fish tapeworm *Schizocotyle acheilognathi* (AFT) is an invasive macroparasite with a very broad host range (Marcogliese 2008), infecting over 300 species of fish (Kuchta, Choudhury, and Scholz 2018). AFT has been found in live baitfish in other Great Lakes states (Hejna, et al. 2019; Marcogliese et al. 2016) and can reduce a fish's ability to cope with stressors (Kuchta, Choudhury, and Scholz 2018), but has not been yet reported in Minnesota waters and is not regulated.

Table summarizing evidence of susceptibility of legal baitfish species to three high-priority pathogens in Minnesota

Non-exhaustive list of some of the most commonly used legal baitfish species in Minnesota corresponding to answer options in the McEachran et al. 2022 angler survey. Susceptibility was defined using the OIE definition of susceptibility demonstrated by natural pathways of infection, e.g. immersion, or naturally occurring infection (World Organization for Animal Health (OIE) 2017). "Incomplete evidence" denotes partial or unconfirmed susceptibility demonstrated, and "no evidence" indicates that we were unable to find any information regarding that species' susceptibility to the pathogen.

	VHS	OVIO	AFT
Golden Shiners *Notemigonus crysoleucas*	incomplete evidence	Yes	Yes
Fathead Minnows *Pimephales promelas*	Yes	incomplete evidence	Yes
Redbelly Dace *Phoxinus eos*	no evidence	no evidence	no evidence
White Suckers *Catostomus commersonii*	No evidence	no evidence	No evidence
Spottail *Notropis hudsonius*	Yes	no evidence	Yes
Emerald *Notropis atherinoides*	Yes	no evidence	Yes
Common *Luxilus cornutus*	no evidence	no evidence	no evidence
Redtail Chub *Nocomis biguttatus*	No evidence	no evidence	no evidence
Creek Chubs *Semotilus atromaculatus*	no evidence	no evidence	Yes
Black Bullhead *Ameiurus melas*	no evidence	no evidence	no evidence
Madtoms *Noturus* spp	no evidence	no evidence	no evidence
Mooneye *Hiodon* spp.	no evidence	no evidence	no evidence

Table providing detailed evidence for susceptibility of legal baitfish species to each of the three high-priority pathogens examined in the study.

This table provides more detailed information on species-specific susceptibility to viral hemorrhagic septicemia virus, *Ovipleistophora ovariae* and Asian fish tapeworm, including references for each of the three pathogens evaluated. "search terms" indicate the terms used to scan available literature for evidence of susceptibility for each baitfish species.

	Viral hemorrhagic septicemia virus	*Ovipleistophora ovariae*	Asian fish tapeworm
Search Terms (Web of Science, SCOPUS, PubMed	"Viral Hemorrhagic Septicemia"	"Ovipleistophora ovariae"; "plistophora ovariae"	"Bothriocephalus" ; "Acheilognathi" ; Asian "Fish Tapeworm"
Golden shiner (*Notemigonus crysoleucas)*	Confirmed susceptible via intraperitoneal injection (Cornwell et al. 2013) **Incomplete evidence for natural susceptibility**	**Confirmed Susceptible**, Natural ([USFWS] U.S. Fish and Wildlife Service and [AFS] American Fisheries Society-Fish Health Section 2010; Summerfelt and Warner 1970)	**Confirmed Susceptible**, Natural (Boonthai et al. 2017; Reyda, Pommelle, and Doolin 2019)
Fathead minnow (*Pimephales promelas*)	**Confirmed Susceptible**, Natural (World Organization for Animal Health (OIE) 2021; U.S. Fish and Wildlife Service and American Fisheries Society-Fish Health Section 2014)	Fathead minnows found to be incidentally infected with *O. ovariae* -like microsporidian parasites but genotyping was not performed (Ruehl-Fehlert et al. 2005; Nagel and Hoffman 1977) **Incomplete evidence for natural susceptibility**	**Confirmed Susceptible**, Natural (Kuchta, Choudhury, and Scholz 2018)

Northern redbelly dace (*Phoxinus eos)*	**Incomplete Evidence for Susceptibility** Little is known about the diseases that infect *P. eos* and we did not find any evidence for susceptibility of any of the pathogens examined in this study. (Stasiak 2006)		
White sucker (*Catostomus commersoni*)	**Incomplete Evidence for Susceptibility** Although C. commersoni was listed as susceptible to VHSV on the MNDNR website (https://www.dnr.state.mn.us/fish_diseases/vhs.html) and Michigan requires in-state white suckers to be certified VHSV free (Boonthai et al. 2018), we could not independently verify their susceptibility to natural infection. No other data was found concerning this species' susceptibility to the other pathogens.		
Spottail shiner (*Notropis hudsonius*)	**Confirmed Susceptible**, Natural (U.S. Fish and Wildlife Service and American Fisheries Society-Fish Health Section 2014; World Organization for Animal Health (OIE) 2021)	**Incomplete Evidence for Susceptibility** No evidence	**Confirmed Susceptible**, Natural (Muzzall, Thomas, and Whelan 2016)
Emerald shiner (*Notropis atherinoides*)	**Confirmed Susceptible**, Natural (U.S. Fish and Wildlife Service and American Fisheries Society-Fish Health Section 2014; World Organization for Animal Health (OIE) 2021)	**Incomplete Evidence for Susceptibility** No evidence	**Confirmed Susceptible**, Natural (Boonthai et al. 2017; Muzzall, Thomas, and Whelan 2016)
Common shiner (*Luxilus cornutus*)	**Incomplete Evidence for Susceptibility** Unknown, Unconfirmed Little is known about the pathogens that affect *L. cornutus* and we were unable to find evidence for susceptibility to any of the pathogens examined in this study.		

Redtail chub (aka Horneyhead chub; *Nocomis biguttatus)*	**Incomplete Evidence for Susceptibility** Unknown, Unconfirmed Little is known about the pathogens that affect *N. biguttatus* and we were unable to find evidence for susceptibility to any of the pathogens examined in this study.		
Creek chubs (*Semotilus atromaculatus)*	**Incomplete Evidence for Susceptibility** Unknown, Unconfirmed	**Incomplete Evidence for Susceptibility** Unknown, Unconfirmed	**Confirmed Susceptible**, Natural (Reyda, Pommelle, and Doolin 2019)
Black bullhead (*Ameiurus melas*)	**Incomplete Evidence for Susceptibility** Unknown, Unconfirmed Little is known about the pathogens that affect *A. melas* and we were unable to find evidence for susceptibility to any of the pathogens examined in this study.		
Madtom (*Noturus* spp.)	**Incomplete Evidence for Susceptibility** Unknown, Unconfirmed Little is known about the pathogens that affect *Noturus* spp. and we were unable to find evidence for susceptibility to any of the pathogens examined in this study.		
Goldeye/Mooneye (*Hiodon* spp.)	**Incomplete Evidence for Susceptibility** Unknown, Unconfirmed Little is known about the pathogens that affect *Hiodon* spp. and we were unable to find evidence for susceptibility to any of the pathogens examined in this study.		

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