

AIS Monitoring Summary

2024

AIS Monitoring Program Structure

The overall goal of the aquatic invasive species (AIS) monitoring program is to understand and report the profile of AIS in Manitoba waterbodies. The strategic value of understanding this profile is to 1) understand the spatial extent of AIS presence in Manitoba to inform management decisions; 2) test the effectiveness of AIS prevention activities in keeping Manitoba waterbodies AIS free; 3) support *Early Detection and Rapid Response*, and 4) understand the AIS threat in adjacent areas that can threaten Manitoba's waterbodies.

The monitoring program is broadly grouped into three categories that determine the frequency and quantity of samples taken:

Surveillance monitoring focuses on monitoring non-invaded waterbodies to confirm AIS free status or trigger the *Early Detection and Rapid Response* protocol if a detection occurs. The locations, frequency and quantity of samples taken is based on a risk assessment, with high-risk water bodies undergoing to most frequent sampling. Risk assessments are based on data from the Manitoba AIS Watercraft Inspection Program, proximity and hydrologic connectivity to known invasions, water chemistry and environmental factors, and expert opinion. Increased effort has been exerted by the province to increase the probability of detecting AIS early in their invasion which may assist in eradicating them or to control their spread to other waterbodies.

The active surveillance monitoring portion of the overall monitoring program is centered on Dreissenid mussels (i.e. Zebra and Quagga Mussels) as invasive mussels are the AIS that pose the greatest environmental, economic and societal threat to Manitoba. While zebra mussels are the focus of surveillance monitoring, samples are also analyzed for other AIS (e.g., spiny waterflea) which can also trigger the Manitoba AIS Unit's *Early Detection and Rapid Response* protocol.

Validation monitoring is initiated by the *early detection* and rapid response program following an AIS detection and involves frequent sampling of the waterbody to determine if a detected or otherwise reported AIS is truly present and/or the extent to which an AIS is established. If an AIS detection cannot be validated within an established timeframe, a waterbody is de-listed from the *Rapid Response* protocol and returns to surveillance monitoring protocols. The decision to de-list a water body is complex and determined by a number of factors including the nature of the detection(s), size of water body and monitoring effort.

Colonization and Establishment monitoring involves demarcating the extent of an invading population and/or population dynamics within a waterbody to inform containment and adaptation efforts. Zebra Mussels and Spiny Waterflea are incapable of moving against the natural flow of water, therefore monitoring upstream of an AIS detection location can provide valuable insight into the contribution human-mediated transport plays in facilitating within-waterbody movement. Colonization and Establishment monitoring efforts are initiated based on a need to guide future decision making and management plans.

How we monitor

The monitoring program is primarily designed to target zebra mussels, particularly in their larval form (veligers) by conducting plankton tows with fine mesh nets. Veliger collections can be advantageous for early detection monitoring programs because they are free-floating and therefore are generally more widely distributed within a waterbody relative to adult / settled Zebra Mussel populations that can be highly localized. Veliger collections also allow for concurrent monitoring of Spiny Waterflea, and other AIS of concern.

In addition to veliger monitoring with plankton tows, the Manitoba AIS unit periodically employs environmental DNA (eDNA) monitoring. eDNA describes the genetic material present within a water or sediment sample, which is shed from individuals through natural phenomena, such as release from mucus and feces, or through decomposition. eDNA is extremely sensitive and requires specialized technology and analytical interpretation. More recently, Manitoba is benefiting from some early generation eRNA monitoring work. RNA found in the environment provides important distinguishing information from eDNA.

The other primary monitoring method used to screen waterbodies for invasive mussels are substrate samplers. Substrate samplers are constructed of ABS and PVC materials preferential for byssal thread attachment of settling/settled Dreissenid mussels. Substrate samplers are advantageous in that they are integrated samples, where samples are acquired over long periods of time. Plankton tows, eDNA and substrate monitoring are frequently used concurrently in high-risk waterbodies to increase the likelihood of detection if invasive mussels are present. Substrate samplers belong to the class of monitoring known as passive sampling, since these devices are deployed and then sit in place awaiting colonization by plant and animal life within the water column. Once removed from the waterbody, they require significant effort to analyze. Tactile searches in and under floating docks and other similar water infrastructure is a field-based approach that utilizes this infrastructure as a second form of passive sampler.

Along with these active and passive methods for sampling within the water column, AIS monitoring is conducted through visual surveillance of the margins and littoral zone of the waterbody. This visual scan adds another layer to the overall AIS monitoring program.

All water-users play an important role as additional eyes and ears on the landscape to protect waterbodies from new AIS invasions. If you suspect you have found an AIS, report it by emailing: AIS@gov.mb.ca or following the attached link: https://www.manitoba.ca/stopais/ais_reporting.html

Results

During the 2024 open-water season, a total of 146¹ waterbodies were monitored for Aquatic Invasive Species. This effort would not have been possible without the invaluable support from partners, which includes First Nations, other government agencies, research organisations, environmental groups and civic minded individuals, namely:

Norway House Cree Nation

Tataskweyak Cree Nation

Skownan First Nation

Misipawistik Cree Nation

Fisheries and Oceans Canada (DFO) Science and DFO AIS (Ontario and Prairies Region)

Environment and Climate Change Canada

Riding Mountain National Park (RMNP)

Manitoba Hydro

Coordinated Aquatic Monitoring Program (CAMP)

Lake Winnipeg Research Consortium

Dr. Brenda Hann, Professor Emeritus, University of Manitoba

The City of Winnipeg

Citizens Protecting our Northern Waterways (CPNOW)

Swan Valley Sport Fish and Enhancement (SVSFE)

Poplar Bay Park Cottagers Association

Ditch Lake Cottagers Association

Surveillance Monitoring

In 2024, 135 waterbodies were sampled under surveillance monitoring, of which, 133 had no new detections of Zebra Mussels or Spiny Waterflea. New AIS detections were confirmed in two waterbodies – St Malo Reservoir and the Upper Assiniboine River. Both of these detections represent new human-mediated introductions and have triggered Manitoba's AIS Early Detection and Rapid Response Protocol.

¹ Determined to be a unique "waterbody" if they are named, even if they are within a larger river system (e.g. Lac du Bonnet is considered a unique waterbody despite being part of the Winnipeg River).

Early Detection and Rapid Response

New Responses in 2024

St Malo Reservoir

Live zebra mussel veligers were found within the St Malo Reservoir during several independent sampling events between June and August 2024 and further corroborated by positive eDNA samples. No Zebra Mussel positive samples were detected upstream of the reservoir in the Rat River, indicating the introduction is to the reservoir and not from upstream sources.

The province has placed the reservoir under *Restricted Access*, requiring all watercraft and water-related equipment to be clean, drain, dry and decontaminated before moving to other waterbodies within Manitoba. The Manitoba AIS Unit continues to assess the feasibility eradicating Zebra Mussels within the reservoir.

Upper Assiniboine River

Dead zebra mussel veligers were detected in the Upper Assiniboine River at the Brandon Generating Station as part of *Manitoba Hydro's* routine monitoring program and confirmed in follow up sampling. The Manitoba Aquatic Invasive Species Unit has initiated its *Early Detection and Rapid Response* plan which includes development of a detection specific monitoring plan and the establishment of a containment plan.

On-going Responses

Four waterbodies currently fall under the validation monitoring protocol of the *Early Detection and Rapid Response* program: Foot Print Lake, Assean Lake, Lake of the Woods and Shoal Lake (Manitoba-Ontario Border).

Foot Print Lake had an initial detection of Spiny Waterflea in 2022, a subsequent detection in 2023 and no detections in 2024. Spiny Waterflea are notoriously patchy and highly seasonal, a lack of findings in 2024 does not provide a high level of confidence that a population is not present. Further monitoring of the waterbody is required to confirm this detection, and therefore, will continue to undergo validation monitoring.

Zebra Mussel veligers were first detected within **Assean Lake** in 2019 and further found in 2020, albeit at low densities. Intensive monitoring from 2021 to 2024 failed to find further veligers. Validation monitoring of Assean Lake will continue throughout the 2025 open-water season.

Zebra Mussel veligers were detected in the U.S portion of **Lake of the Woods** in 2019. Subsequent monitoring by U.S counterparts continues to find low densities of veligers, suggesting a slowly increasing population. To date, no Zebra Mussels have been detected in the Canadian portion of the lake.

Shoal Lake, a waterbody of shared jurisdiction between Manitoba and Ontario, and the source of the City of Winnipeg's drinking water, had a detection of a single Zebra Mussel veliger in 2018. Joint monitoring efforts by Manitoba and Ontario authorities have yet to find other Zebra Mussel positive samples since the initial detection.

Colonization and Establishment Monitoring

Colonization and Establishment monitoring has largely been carried out by sampling partners for research purposes and/or to guide management programs. Lake Winnipeg has been monitored for Zebra Mussel adults and Spiny Waterflea annually to assess how populations have fluctuated through time, and to screen for the presence of Quagga Mussels. These works have largely been supported by the *Lake Winnipeg Research Consortium* through operation of the MV Namao cruises.

Manitoba Hydro continues to monitor Zebra Mussel populations in the Nelson River system to guide management programs and infrastructure maintenance, as well as screen for Quagga Mussels. The province, in collaboration with *Norway House Cree Nation*, regularly monitors Nelson River tributaries for Zebra Mussels as they potentially pose a threat to the nearby Hayes River watershed. In 2022, Zebra Mussel veligers were detected in the **Echimamish River**, and live veligers were detected in **Hairy Lake** in 2024, upstream of the Echimamish River detection. These detections suggest human-mediated transport of mussels upstream from the Nelson River. The Hayes River watershed remains free of Zebra Mussels thanks in large part to the strong AIS prevention program run by *Norway House Cree Nation*.

The province continues to monitor Zebra Mussel and Spiny Waterflea populations in the Saskatchewan River/Cedar Lake control zone. Presently, Zebra Mussels have only been detected in the Cross Bay portion of Cedar Lake, whereas Spiny Waterflea have been found throughout Cedar Lake, but not in other waterbodies within the control zone. In 2024, Spiny Waterflea were detected in two independent samples from **South Moose Lake**, a lake that drains into northwest Cedar Lake, near the Saskatchewan River inflow. Both Zebra Mussels and Spiny Waterflea cannot move against the natural flow of water, therefore this range expansion of Spiny Waterflea was facilitated by human-mediated transport upstream. This is an important reminder to remain diligent when working and recreating in waterbodies with patchy populations of AIS. Planning activities ahead of time to move from upstream to downstream areas can help minimize the spread of AIS within a waterbody.

Table 1: List of waterbodies monitored between 2019 to 2024 for Zebra Mussels and/or Spiny Waterflea. Black circles (•) indicate surveillance monitoring, Red circles (◐) indicate validation monitoring, and red Xs (X) indicate establishment and colonization monitoring OR a new confirmed detection.

Waterbodies	2019	2020	2021	2022	2023	2024	Major Findings
Adam Lake		•	•	•		•	
Aime Lake						•	
Anton's Lake	•	•	•	•			
Apussigamsi Lake			•			•	
Assean Lake	•	◐	◐	◐	◐	◐	Zebra Mussels first detected in 2019; no detections last 4 years
Assean River						•	
Assiniboine River							
<i>Downstream of Portage Diversion</i>	X	X	X	X	X	X	Zebra Mussels only found near the confluence with the Red River
<i>Upstream of Portage Diversion</i>	•	•	•	•	•	X	New detection of Zebra Mussels at Brandon Generation Station in 2024
Athapapuskow Lake	•	•		•	•	•	
Audy Lake	•	•	•		•	•	RMNP Authority
Barbe Lake					•	•	
Beautiful Lake	•	•	•	•	•	•	
Beaver Lake	•	•	•	•		•	
Bell Lake	•	•	•	•	•	•	
Betula Lake						•	
Big Island Lake						•	
Big Whiteshell Lake		•	•	•	•	•	
Billard Lake	•			•			
Birdtail River	•			•			
Bobhill Lake	•	•	•	•	•	•	
Bowden Lake		•					
Bower Lake		•	•			•	
Brereton Lake						•	
Burntwood River		•	•	•	•	•	
Butneau River				•	•		
Caddy Lake		•	•	•		•	
Cedar Lake							
<i>Cross Bay</i>	•	X	X	X	X	X	Spiny Waterflea detected in 2020; Zebra Mussels detected in 2021
<i>Cedar Lake Proper</i>	•	•	•	•	•	•	Spiny Waterflea detected in 2020; No Zebra Mussels detected

Waterbodies	2019	2020	2021	2022	2023	2024	Major Findings
Chains Lakes						•	
Childs Lake	•	•	•	•	•	•	
Churchill River		•			•		
Clarke Lake		•		•			
Clear Creek					•	•	
Clear Lake	•	•	•	•	X	X	RMNP Authority; Zebra Mussels detected in 2023
Clearwater Lake	•	•	•	•	•	•	
Cormorant Lake	•	•	•	•	•	•	
Corstophine Lake	•	•	•	•	•		
Crawford Lake						•	
Cross Lake	X	X	X				
Dauphin Lake	•	•	•	•	•	•	
Davidson Lake			•	•	•		
Deep Lake	•	•	•	•	•	•	
Deloraine Reservoir	•			•			
Ditch Lake	•	•	•	•	•	•	
East Blue Lake	•	•	•	•	•	•	
East Goose Lake	•			•		•	
Echimamish River			•	X	X	X	Zebra Mussels detected in 2022
Elgin Reservoir						•	
Fairford River				•	X		Zebra Mussels detected in 2023
Falcon Lake	•	•	•	•		•	
Fidler Lake		•			•		
First Cranberry Lake	•			•	•	•	
Foot Print Lake	•	•	•	•	•	•	Spiny Waterflea detected in 2022 and 2023.
Footprint Lake	•			•			
Gauer Lake	•	•	•	•	•	•	
George Lake						•	
Glad Lake	•	•	•	•	•	•	
Granville Lake	•	•	•	•	•	•	
Grass River		•				•	
Grayling Lake	•	•	•	•	•	•	RMNP Authority
Gull Lake (Eastern)	•	•	•	•	•	•	
Gull Lake (Duck Mountain Provincial Park)	•	•	•	•	•	•	
Hairy Lake			•	•	•	X	Zebra Mussels detected in 2024

Waterbodies	2019	2020	2021	2022	2023	2024	Major Findings
Hayes River	•	•	•	•	•	•	
Henday Quarry				•	•		
Hunt Lake		•	•	•			
Imrie Lake						•	
Iskwasum Lake		•		•		•	
Jackpine Lake			•	•	•	•	
Jackson Lake						•	
Kenton Reservoir						•	
Kerrs Lake	•	•	•	•		•	
Kettle River			•		•		
Killarney Reservoir	•					•	
Kississing Lake				•	•	•	
La Salle River						•	
Lac du Bonnet	•	•	•	•	•	•	Spiny Waterflea detected in 2009; also positive for Flowering Rush
Lake Irwin	•	•	•	•	•	•	
Lake Katherine	•	•	•	•	•	•	RMNP Authority
Lake Manitoba	•	•	X	X	X		Zebra Mussels detected in 2021
Lake Metigoshe	•	•	•	•		•	
Lake Minnewasta	•	•	•	•			
Lake of the Prairies	•	•	•	•	•	•	
Lake of the Woods	•	•	•		•	•	Confirmation monitoring for zebra mussels - none detected; Spiny waterflea detected in 1990's
Lake St Andrew	•	•	•		•	•	
Lake St George	•				•	•	
Lake St Martin	•	•	•	•	X		Zebra Mussels detected in 2023
Lake Wahtopanah	•	•	•	•	•	•	
Lake Winnipeg	X	X	X	X	X	X	Zebra Mussels detected in 2013; Spiny Waterflea in 2011
Lake Winnipegosis	•	•	•	•	•	•	Detection of single Zebra Mussel veliger in 2019; no detections in subsequent years
Laurie Lake	•	•	•	•	•	•	
Lee River		•	•			•	Spiny Waterflea detected in 2009; also positive for Flowering Rush
Leftrook Lake	•	•	•	•	•	•	
Little Jackfish Lake						•	
Little Limestone Lake		•			•	•	

Waterbodies	2019	2020	2021	2022	2023	2024	Major Findings
Little Saskatchewan River						•	
Little Waterhen River						•	
Manigotagan Lake	•	•	•	•	•	•	Single Spiny Waterflea detected in 2020, no detections in subsequent years
Mantagao Lake	•			•			
Marge lake	•	•	•	•		•	
Mary Jane Reservoir						•	
Max Lake	•	•	•	•		•	
Minnedosa Lake	•	•	•	•	•	•	
Molson Lake		•	•	•	•	•	
Moon Lake	•	•	•	•	•	•	RMNP Authority
Moose Lake	•	•	•	•		•	
Mossy River						•	
Mynarski Lakes		•					
Nelson River	X	X	X	X	X	X	Zebra Mussels detected in 2019
Neso Lake						•	
Norris Lake	•			•		•	
North Shoal Lake						•	
North Steeprock Lake	•	•	•	•	•	•	
North Thomas Lake	•	•	•	•	•	•	
Northern Indian Lake	•	•	•	•	•	•	
Notigi Lake			•			•	
Nutimik Lake	•	•	•	•	•	•	Spiny Waterflea detected in 2009
Oak Lake	•	•	•	•	•	•	
Octopus Lake	•	•	•	•	•	•	
Odei River						•	
Opachuanau Lake		•			•		
Otter Lake	•	•	•	•	•		
Overflowing River						•	
Paimusk Creek					•	•	
Paint Lake		•	•	•	•	•	
Partridge Breast Lake			•			•	
Patterson Lake	•	•	•	•	•		
Pelican Lake	•	•	•	•	•	•	
Pembina River						•	
Perch Lake	•	•	•	•	•	•	

Waterbodies	2019	2020	2021	2022	2023	2024	Major Findings
Persee Lake						•	
Playgreen Lake	X	X	X	X			Zebra Mussels detected in 2019
Pybus Lake	•	•	•	•	•		
Rat Lake	•			•			
Rat River (Eastern)						•	
Rat River (Northwest)						•	
Red Deer River						•	
Reed Lake		•		•		•	
Rock Lake	•				•	•	
Rocky Lake	•	•			•	•	
Rossman Lake	•	•	•	•	•	•	
Sandy Lake	•	•	•	•	•	•	
Saskatchewan River	•	•	•	•	•	•	
Schist Lake						•	
Seech Lake	•	•	•	•	•	•	
Setting Lake	•	•	•	•	•	•	
Shoal Lake (Manitoba-Ontario Border)	•	•	•	•	•	•	Validation monitoring for Zebra Mussels; Spiny Waterflea detected in 2018
Shoal Lake (Western)	•	•	•	•	•	•	
Silver Beach Lake	•	•	•	•	•	•	
Simonhouse Lake			•		•	•	
Singush Lake	•	•	•	•	•	•	
Sipiwisk Lake		X	X				
Snow Lake						•	
Souris River						•	
South Moose Lake			•			X	New detection of Spiny Waterflea in 2024
Southern Indian Lake	•		•	•	•	•	
Split Lake	X	X	X	X			Zebra Mussels detected in 2019
Spray Lake	•	•	•	•	•	•	
St. Malo Reservoir						X	New detection of Zebra Mussels in 2024; also positive for Flowering Rush
Stephenfield Reservoir				•		•	
Stephens Lake	X	X	X	X	X	X	Zebra Mussels detected in 2019
Stuart Lake	•	•	•	•	•	•	
Threepoint Lake	•	•	•	•	•	•	
Tokaryk Lake	•	•	•	•	•		

Waterbodies	2019	2020	2021	2022	2023	2024	Major Findings
Tramping Lake						•	
Two Mile Lake	•	•	•	•	•	•	
Verrall Lake	•			•			
Walker Lake	•			•			
Waterhen Lake	•				•	•	
Waterhen River	•	•	•	•	•	•	
Wekusko Lake		•		•	•	•	
Wellman Lake	•	•	•	•	•	•	
West Blue Lake	•	•	•	•	•	•	
West Hawk Lake	•					•	
West Shoal Lake						•	
West Waterhen River						•	
Whirlpool Lake	•	•	•	•	•	•	RMNP Authority
Whitefish Lake	•	•	•	•	•	•	
William Lake (Northern)			•	•	•	•	
William Lake (Western)						•	
Winnipeg River	•	•	•	•	•	•	Spiny Waterflea detected in 2009; also positive for Flowering Rush

Number of Waterbodies by Year	2019	2020	2021	2022	2023	2024	
Surveillance	92	94	93	103	89	135	
Validation	6	6	5	5	5	4	
Colonization and Establishment	7	8	10	8	10	7	
TOTAL	105	109	108	116	104	146	