



## 2025 Early Detection Monitoring Results

### Aquatic Invasive Species



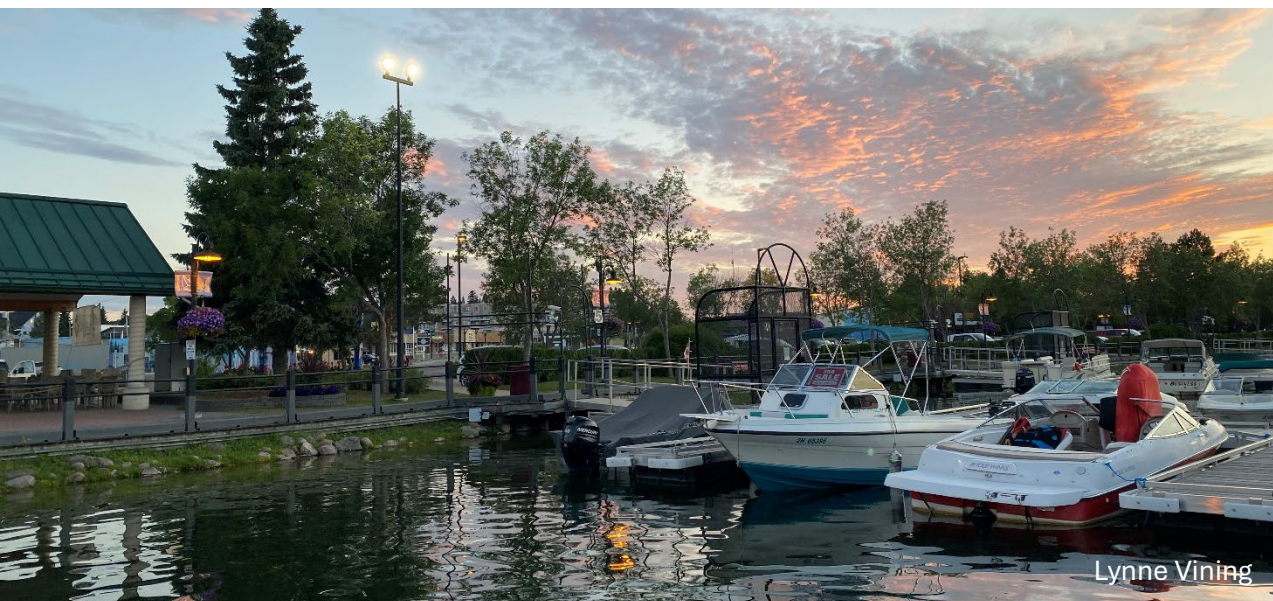
## LICA's Early Detection Monitoring Program

Due to the growing threat of aquatic invasive species in the province and in the Beaver River watershed, the Lakeland Industry and Community Association (LICA) took a proactive approach to develop an early detection monitoring program to catch the earliest signs of invasive species presence in the watershed. The Beaver River watershed, also known as the 'Lakeland', is home to diverse landscapes and, as the name suggests, many lakes. This watershed is not only enjoyed by those who reside in this area but also is an attraction to those from far and wide. Aquatic Invasive Species (AIS) early detection monitoring was determined as a data gap in the Beaver River watershed, and this program aims to provide decision makers with information to effectively and proactively manage any introduction of the targeted species.

### Acknowledgements:

This program was made possible by the generous personal donation received by Kim Sturgess, the founder and CEO of WaterSMART. With this donation, sample equipment and filters were purchased to enable LICA's staff to carry out the monitoring program. This program is also made possible by Patrick Hanington and Jacob Hambrook at the University of Alberta, who have committed their in-kind support with the use of the required infrastructure to run validated, digital/quantitative PCR (d/qPCR) tests for organisms identified in this program during the years of 2025 & 2026.

This report was prepared by Kayla Metcalfe, LICA's Environmental Coordinator.



## Introduction:

Aquatic invasive species (AIS) pose an ongoing risk to Alberta’s lakes and streams, and specifically to LICA, the waterways within the Beaver River watershed. LICA identified early detection monitoring as a priority in the fight against invasive species spread. Environmental DNA (eDNA) is being utilized for this program, as a relatively new technology that has been found to be an effective tool for early detection of aquatic invasive species.

eDNA samples were collected and analyzed with the intent to catch the earliest signs of invasive species of interest in the Beaver River watershed. eDNA is genetic material shed by organisms into their environment. This analysis of eDNA, collected from a sample of water, allows for the identification of organisms present at a given location, specifically when they are visually challenging to identify and when abundance may still be low.

During the 2025 sample season, ten lakes and two rivers were chosen to be sampled with one sample event in July and the second in August. Each waterbody was sampled with a 5.0 µm self-preserving eDNA filter, where two litres of water were filtered per sample. Sampling efforts were done in accordance with LICA’s Standard Operating Procedure, developed specifically for this project, to uphold integrity and credibility.

The sampling strategy considers and aligns with the organism’s life cycle and the time of year they will be present when considering pathways of spread and the recreational use of lakes (relevant to invasive mussels). Please note that spatial variability plays a role in species detection. This program sampled one site per waterbody, with the exception of Fork Lake, where an alternative site was used for the second sample event due to accessibility and water level constraints. As a result, species could potentially be introduced in other areas of the waterbodies and remain undetected by these sampling efforts. The site selection has considered a likely introduction area based on popular community access; however, there are no guarantees that the sites selected will be an introduction site. There are many ways that DNA can be introduced into a system, with or without a living organism, and repeat sampling is the best way to determine live presence. Each river site was sampled twice during both sample events. Duplicate samples are necessary due to variable DNA availability in lotic systems, which assists in ensuring a more representative sample at each river site.

## Sample Events

Table 1: Waterbodies sampled as part of the early detection monitoring program in 2025.

<b>Waterbody Name</b>	<b>Sample Event 1</b>	<b>Sample Event 2</b>
<b>Moose Lake</b>	7-Jul	5-Aug
<b>Kehewin Lake</b>	7-Jul	5-Aug
<b>Beaver River</b>	10-Jul	5-Aug
<b>Cold Lake</b>	10-Jul	5-Aug
<b>Crane Lake</b>	10-Jul	5-Aug
<b>Floating Stone Lake</b>	8-Jul	6-Aug
<b>Fork Lake</b>	9-Jul	6-Aug
<b>Whitefish Lake</b>	8-Jul	6-Aug
<b>Sand River</b>	9-Jul	6-Aug

<b>Beaver Lake</b>	8-Jul	6-Aug
<b>Skeleton Lake</b>	9-Jul	6-Aug
<b>Buffalo Lake</b>	9-Jul	6-Aug

## 2025 Targeted Aquatic Invasive Species: Fish

### Goldfish

Goldfish are a common ornamental fish and pet that pose significant harm to aquatic ecosystems when released into the wild.

Goldfish can be identified from native fish by their plump, deep bodies and large heads with a terminal mouth. Contrary to their name, goldfish can present in various colours, including olive-bronze to silvery-white and gold-orange. They have large scales, a forked tail, lack barbels on their face and can also be distinguished by their first dorsal fin ray and first anal fin ray being strongly serrated (Government of Alberta, 2025).

Goldfish are native to eastern Asia and are currently known to be persisting in various waterbodies in Alberta due to illegal release into the wild.



*Figure 1. A Government of Alberta image illustrating goldfish captured in the wild.*

### Prussian Carp

Prussian carp is another invasive fish species that has made its way into Alberta's waterbodies. They are known to disrupt aquatic ecosystems and pose potential threats to native fish.

Prussian carp can be confused with other fish species present in Alberta, so proper identification is key. This fish species is deep-bodied and plump with a terminal mouth, similar to a goldfish. They are silver-gold in colour with darker shading on top. They have large scales with their first dorsal fin ray and first anal fin ray being strongly serrated (Government of Alberta, 2025).

Unfortunately, this invasive fish species has been confirmed within various river watersheds, including at this time: Bow, North Saskatchewan, Oldman, Red Deer, Rosebud and South Saskatchewan. The distribution of this species continues to spread due to natural dispersal and illegal introductions.



Figure 2. A government of Alberta image of a Prussian Carp.

## Invertebrates

### Northern Crayfish

In Alberta, most Crayfish species are considered invasive; however, there are studies that suggest that Northern crayfish were once isolated to the Beaver River watershed and were therefore considered 'native' to this area of Alberta. Northern crayfish were included in this program to understand the distribution in the two rivers sampled, and to confirm that the DNA collected suggest that the crayfish present are in fact this species, and not another, such as rusty crayfish.

Northern crayfish can be identified by being 10-13 cm long (not including their claws) and are an olive to reddish-brown colour, with long antennae, a straight rostrum, and bumps on the sides of the carapace and claws. They have large, broad, flattened claws, often with reddish-orange tips. Their claws and legs may also appear blue.

In Alberta, in order to limit the spread, northern crayfish can be legally captured in any quantity without a fishing license in Alberta. However, it is mandatory to kill captured crayfish on site, and their use as fishing bait is strictly prohibited (Alberta Invasive Species Council, 2024)



Figure 3. An Alberta Invasive Species Council image of a Northern Crayfish.

## Quagga Mussel

Quagga mussels pose a significant threat to Alberta's aquatic ecosystems and economy.

Quagga mussels can be identified by their brown and yellow-white colouring, with a possible faint banding pattern. They are 1-5 cm in size, with their shell presenting in a D-shape.

These mussels can individually live up to 5 years and are more adaptable than zebra mussels, as they can attach to softer substrates and survive in colder water (Government of Alberta, 2025).

These mussels are native to Ukraine. Based on current knowledge, quagga mussels are not currently established in Alberta.



*Figure 4. A Government of Alberta image illustrating a quagga mussel.*

## Red Swamp Crayfish

Red swamp crayfish are an invasive species of crayfish growing from 5-13 cm long. They are dark red in colour with long, narrow claws. A blue-grey coloured line running along the underside of their tail is almost always present. Raised bumps can help to distinguish them from other crayfish species as they can appear bright red, white or black. However, juveniles do not have the red colouring, which can make it difficult to distinguish them from other species (Invasive Species Council, 2026).



*Figure 5. An Invasive Species Centre image of a red swamp crayfish.*

## Rusty Crayfish

Rusty crayfish is an invasive species of crayfish with an aggressive feeding nature, meaning they outcompete native species for food and space. This species is also known to damage fish populations by consuming aquatic vegetation needed for fish spawning.

Rusty crayfish are large, with adults reaching a body length of 7.5-13 cm (not including their claws). They get their name from the rust-coloured patches that run along their sides. This species of crayfish can be distinguished by their grayish-green to reddish-brown claws having black bands near the tips. Their claws have an oval shape when closed, and their rostrum, is smooth, pinched, and distinctly concave (Invasive Species Centre, 2025).

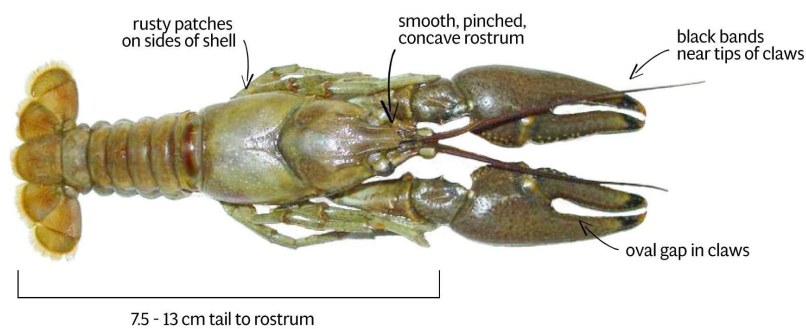


Figure 6. An Invasive Species Centre image of a rusty crayfish, including details on their distinguishing features.

## Zebra Mussel

Similar to quagga mussels, these invasive mussels also pose a serious threat to Alberta.

Zebra mussels can be identified by their brown and yellow-white colouring that usually also consists of light to dark banding or a zig-zag pattern. They grow 1-3 cm in size and have a triangular-shaped shell.

These mussels are native to Russia. Based on current knowledge, zebra mussels are not currently established in Alberta.



Figure 7. A Government of Alberta image illustrating a zebra mussel.

## Context: Native Mussels vs Invasive Mussels

In Alberta and the Beaver River watershed, there are species of native mussels. These can be easily distinguished from invasive mussels due to their size, shape and growth mediums. Native mussels in Alberta are much larger, with adults often being larger than 7 cm, with an elongated oval-shaped shell. Different from the invasive mussels, which attach to a surface or substrate, native mussels are free-living, meaning you will find them buried in the bottom of lakes and slow-flowing rivers. Remember, an attached mussel is an invasive mussel. (Government of Alberta, 2025).



Figure 8. A Government of Alberta image comparing native mussels in Alberta to invasive mussels. Native mussels are shown on the bottom row, and invasive mussels are shown on the top.

**If you think you've spotted a quagga or zebra mussel, report it to Alberta's Invasive Species Hotline at [1-855-336-BOAT](tel:1-855-336-BOAT) (2628).**

## Disease

### Proliferative Kidney Disease & Bryozoan

Bryozoan or 'moss animal' is the parasitic host of Proliferative Kidney Disease (PKD). Spores, released from fish, are found to infect bryozoan invertebrates through feeding, where they multiply within spherical sacs and burst, which then releases a second type of spore that attaches to a fish through skin or gills. The parasite will first replicate in the blood and will then disperse to several organs, like the spleen and kidneys. From here, the spores will multiply and produce a tumour-like enlargement (Government of Alberta, 2018).

The presence of PKD in fish is noted through abdominal swelling due to fluid accumulation and swollen kidneys and/or pale gills. In some circumstances, such as under temperature stress, PKD can lead to fish mortality. However, we have no evidence that fish in Alberta will experience any detrimental impacts from this parasite.

Environmental DNA surveillance suggests that PKD is in Alberta and could be quite widespread. This disease is in the same *family* as the more commonly known Whirling Disease, but as the name suggests targets the fish's kidneys. It is important to note that Bryozoan is the host for PKD, thus you can only have PKD if you have a specific bryozoan species in a waterbody.

## Whirling Disease

Whirling disease is caused by *Myxobolus cerebralis*, a microscopic parasite that affects salmonid fish such as salmon, trout and whitefish.

Specific salmonoid species, including whitefish, are particularly susceptible to whirling disease; however, the impacts of this disease differ among the species and waterbodies impacted.

Fish infected with this disease may demonstrate a 'whirling' swimming behaviour from the parasite invading the cartilage that impairs the nervous system. Their physical appearance may also change, which may include skeletal deformities of the body or head if the cartilage is infected at a young age. If so, the tail of the fish will appear crooked, and their head cartilage sunken to appear sloped. Colour changes are also a possible sign due to nerve compression, where the tail may appear dark or even black (Government of Alberta, 2025).

Whirling disease has been declared in the following four major watersheds in Alberta: Bow River, North Saskatchewan River, Oldman River, and Red Deer River.

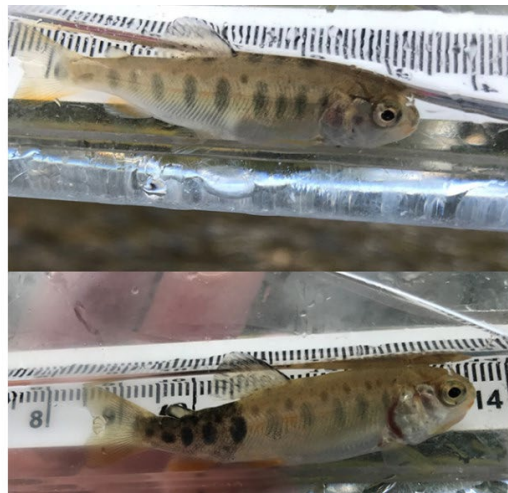


Figure 9. A Government of Alberta image comparing a healthy rainbow trout (top image) with a rainbow trout exhibiting whirling disease symptoms (bottom image).

**If you suspect you witnessed a fish with whirling disease, email [aep.whirl@gov.ab.ca](mailto:aep.whirl@gov.ab.ca).**

## eDNA Results Interpretation Guide:

Risk Level	Explanation
3	Strong likelihood of a true positive. (This organism's DNA was detected in the water sample.)
2	Unable to make a definitive statement. (Sample needs to be re-analyzed. Once it has, if it retains this risk level, a positive or negative risk level cannot be assigned.)
1	Very likely to be truly negative. (This organism's DNA was not present in the water sample.)
N/A	Species not analyzed in the sample.

## Individual Waterbody, eDNA Results

### Moose Lake

Targeted Species	July 7, 2025	August 5, 2025
<b>Fish</b>		
Goldfish CytB	1	1
Goldfish/Common Carp ND2	1	N/A
Prussian Carp CytB	1	1
Prussian Carp ND2	1	N/A
<b>Invertebrates</b>		
Quagga Mussel	1	1
Zebra Mussel	1	1
<b>Disease</b>		
Bryozoan	1	N/A
Proliferative Kidney Disease	1	N/A
Whirling Disease	1	N/A

### Moose Lake Considerations:

Moose Lake was sampled twice during 2025 from the Vezeau Beach Boat Launch. As noted in the table above, the targeted species analyzed were not found to be present in the water sample.

## Kehewin Lake

Targeted Species	July 7, 2025	August 5, 2025
<b>Fish</b>		
Goldfish CytB	1	1
Goldfish/Common Carp ND2	1	N/A
Prussian Carp CytB	1	1
Prussian Carp ND2	1	N/A
<b>Invertebrates</b>		
Quagga Mussel	1	1
Zebra Mussel	1	1
<b>Disease</b>		
Bryozoan	1	N/A
Proliferative Kidney Disease	1	N/A
Whirling Disease	1	N/A

### Kehewin Lake Considerations:

Kehewin Lake was sampled twice during 2025 from the Provincial Park boat launch. As noted in the table above, the targeted species analyzed were not found to be present in the water sample.

## Floating Stone Lake

Targeted Species	July 8, 2025	August 6, 2025
<b>Fish</b>		
Goldfish CytB	1	1
Goldfish/Common Carp ND2	1	N/A
Prussian Carp CytB	1	1
Prussian Carp ND2	1	N/A
<b>Invertebrates</b>		
Quagga Mussel	1	1
Zebra Mussel	1	1

### Floating Stone Lake Considerations

Floating Stone Lake was sampled twice during 2025, from the County of St. Paul Campground. As noted in the table above, the targeted species analyzed were not found to be present in the water sample.

## Beaver Lake

Targeted Species	July 8, 2025	August 6, 2025
<b>Fish</b>		
Goldfish CytB	N/A	1
Prussian Carp CytB	N/A	1
<b>Invertebrates</b>		
Northern Crayfish	1	N/A
Quagga Mussel	1	1
Rusty Crayfish	1	N/A
Zebra Mussel	1	1

### Beaver Lake Considerations

Beaver Lake was sampled twice during 2025, from the Provincial Park campground. As noted in the table above, the targeted species analyzed were not found to be present in the water sample.

## Whitefish Lake

Targeted Species	July 8, 2025	August 6, 2025
<b>Fish</b>		
Goldfish CytB	N/A	1
Prussian Carp CytB	N/A	1
<b>Invertebrates</b>		
Northern Crayfish	1	N/A
Quagga Mussel	1	1
Rusty Crayfish	1	N/A
Zebra Mussel	1	1
<b>Disease</b>		
Bryozoa	1	N/A
Proliferative Kidney Disease	1	N/A
Whirling Disease	1	N/A

### Whitefish Lake Considerations

Whitefish Lake was sampled twice during 2025, from the Paradise Cove Resort boat launch. As noted in the table above, the targeted species analyzed were not found to be present in the water sample.

## Sand River

Targeted Species	July 9, 2025 Sample 1	July 9, 2025 Sample 2	August 6, 2025 Sample 1	August 6, 2025 Sample 2
<b>Fish</b>				
Goldfish CytB	N/A	N/A	1	1
Prussian Carp CytB	N/A	N/A	1	1
<b>Invertebrates</b>				
Northern Crayfish	1	1	1	1
Red Swamp Crayfish	N/A	N/A	1	1
Rusty Crayfish	1	1	1	1
<b>Disease</b>				
Bryozoa	1	1	N/A	N/A
Proliferative Kidney Disease	1	1	1	1
Whirling Disease	1	1	1	1

### Sand River Considerations:

The Sand River was sampled twice during 2025, at the Highway 55 crossing point, just north of the conjunction with the Beaver River. As noted in the introduction of this report, duplicate samples are necessary due to variable DNA availability in lotic systems, which assists in ensuring a representative sample at each river site. As noted in the table above, the targeted species analyzed were not found to be present in the water sample.

## Fork Lake

Targeted Species	July 9, 2025	August 6, 2025
<b>Fish</b>		
Goldfish CytB	1	1
Goldfish/Common Carp ND2	3	N/A
Prussian Carp CytB	1	1
Prussian Carp ND2	1	N/A
<b>Invertebrates</b>		
Quagga Mussel	1	1
Zebra Mussel	1	1
<b>Disease</b>		
Bryozoa	3	N/A
Proliferative Kidney Disease	1	N/A
Whirling Disease	1	N/A

### Fork Lake Considerations:

Fork Lake was sampled twice in 2025. During the July sample event, the sample was collected from the Fork Lake Campground, located on the south-east side of the lake. Due to low water levels, affecting appropriate site accessibility and sample collection, the August sample was taken from the public boat launch located on the north side of the lake. As noted in the table above, two targeted species were found to be at a risk level of 3, meaning that there is a strong likelihood of a true positive in that specific sample.

As detailed on Page 8, Bryozoan is the host for Proliferative Kidney Disease (PKD), thus you can only have PKD if a specific bryozoan species is present in that waterbody. These results suggest that the organism was identified in the eDNA sample collected; however, it is stressed that only this host organism was found, as PKD remained at a risk level of 1.

In light of the risk level received for the Goldfish/Common Carp analysis during the July 9<sup>th</sup> sample event, repeat samples were run in August for individual Goldfish and Prussian Carp DNA. These results came back with a risk level of 1, meaning that it is very likely for a true negative. Based on these results, there is not enough evidence to suggest that these fish species are present at this location. It is recommended to conduct further monitoring and additional investigation via increased sampling efforts on Fork Lake in future years to monitor any potential introduction. It is worth noting that there are many ways that DNA can be introduced into a system, with or without a living organism, and repeat sampling is the best way to determine live presence.

### Skeleton Lake

Targeted Species	July 9, 2025	August 6, 2025
<b>Fish</b>		
Goldfish CytB	1	1
Goldfish/Common Carp ND2	1	N/A
Prussian Carp CytB	1	1
Prussian Carp ND2	1	N/A
<b>Invertebrates</b>		
Quagga Mussel	1	1
Zebra Mussel	1	1

### Skeleton Lake Considerations:

Skeleton Lake was sampled twice during 2025, from the public boat launch located near Heritage Park. As noted in the table above, the targeted species analyzed were not found to be present in the water sample.

## Buffalo Lake

Targeted Species	July 9, 2025	August 6, 2025
<b>Fish</b>		
Goldfish CytB	N/A	1
Prussian Carp CytB	N/A	1
<b>Invertebrates</b>		
Northern Crayfish	1	1
Quagga Mussel	1	N/A
Red Swamp Crayfish	N/A	1
Rusty Crayfish	1	1
Zebra Mussel	1	N/A

### Buffalo Lake Considerations:

Buffalo Lake was sampled twice during 2025, from a private member access point of Buffalo Lake Métis Settlement. A member of the Buffalo Lake Métis Settlement Consultation team accompanied LICA staff at each sample event. As noted in the table above, the targeted species analyzed were not found to be present in the water sample.

## Beaver River

Targeted Species	July 10, 2025 Sample 1	July 10, 2025 Sample 2	August 5, 2025 Sample 1	August 5, 2025 Sample 2
<b>Invertebrates</b>				
Northern Crayfish	1	1	1	1
Red Swamp Crayfish	N/A	N/A	1	1
Rusty Crayfish	1	1	1	1
<b>Disease</b>				
Bryozoa	1	1	N/A	N/A
Proliferative Kidney Disease	1	1	1	1
Whirling Disease	1	1	1	1
<b>Physical Sample of Crayfish</b>				
Northern Crayfish	Upon evaluation, it was determined that the crayfish moults collected were Northern Crayfish.			

### Beaver River Considerations:

The Beaver River was sampled twice during 2025, at the Highway 28 crossing point, just west of the Saskatchewan border. As noted in the introduction of this report, duplicate samples are necessary due to variable DNA availability in lotic systems, which assists in ensuring a representative sample at each river site.

Please note that crayfish species are found to be challenging to detect from DNA, as they do not release a high volume of DNA unless they are actively shedding. Even then, in a flowing system, this is challenging to collect. Visual observation of crayfish presence was identified, and specimens of crayfish moults were sent to the lab for species verification. Upon laboratory evaluation, it was determined that the crayfish moults visually observed at this location were Northern Crayfish. As noted on page 5, Northern Crayfish are considered native to the Beaver River watershed.

## Cold Lake

Targeted Species	July 11, 2025	August 5, 2025
<b>Invertebrates</b>		
Northern Crayfish	1	N/A
Quagga Mussel	1	1
Rusty Crayfish	1	N/A
Zebra Mussel	1	1
<b>Disease</b>		
Bryozoa	3	N/A
Proliferative Kidney Disease	1	1
Whirling Disease	1	1

### Cold Lake Considerations:

Cold Lake was sampled twice during 2025, from the marina dock. As noted in the table above, one targeted species was found to be at a risk level of 3, meaning that there is a strong likelihood of a true positive.

As detailed on Page 8, Bryozoa is the host for Proliferative Kidney Disease (PKD), thus you can only have PKD if a specific bryozoa species is present in that waterbody. These results suggest that the organism was identified in the DNA sample collected; however, it is stressed that only this host organism was found, as PKD remained at a risk level of 1.



## Crane Lake

Targeted Species	July 11, 2025	August 5, 2025
<b>Fish</b>		
Goldfish CytB	N/A	1
Prussian Carp CytB	N/A	1
<b>Invertebrates</b>		
Northern Crayfish	1	N/A
Quagga Mussel	1	1
Rusty Crayfish	1	N/A
Zebra Mussel	1	1

### Crane Lake Considerations

Crane Lake was sampled twice during 2025, from the M.D. of Bonnyville Campground (West). As noted in the table above, the targeted species analyzed were not found to be present in the water sample.

**Please report Invasive Species sightings to Alberta's Invasive Species Hotline at [1-855-336-BOAT](tel:1-855-336-BOAT) (2628).**

For questions on this report, please contact LICA's Environmental Coordinator at [watershed@lica.ca](mailto:watershed@lica.ca).