

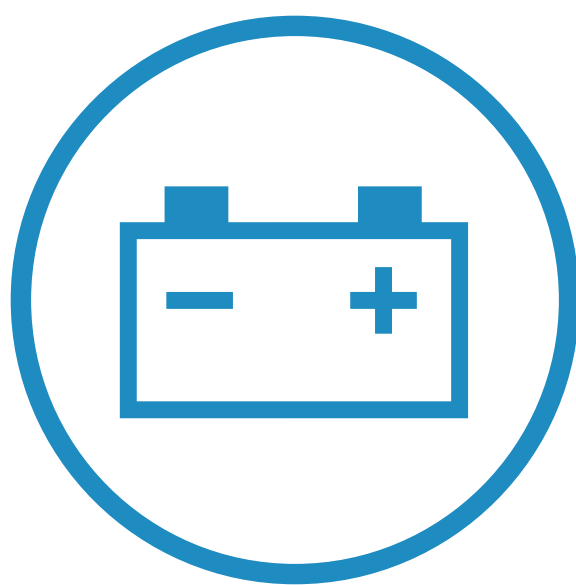
our 10-year renewable electricity plan

We need a mix of energy projects to meet Yukoners’ growing demand for electricity, and to build a sustainable, reliable and affordable energy future for Yukon. The result is our future-focused portfolio, a collection of different electricity projects that will support Yukon’s growth.

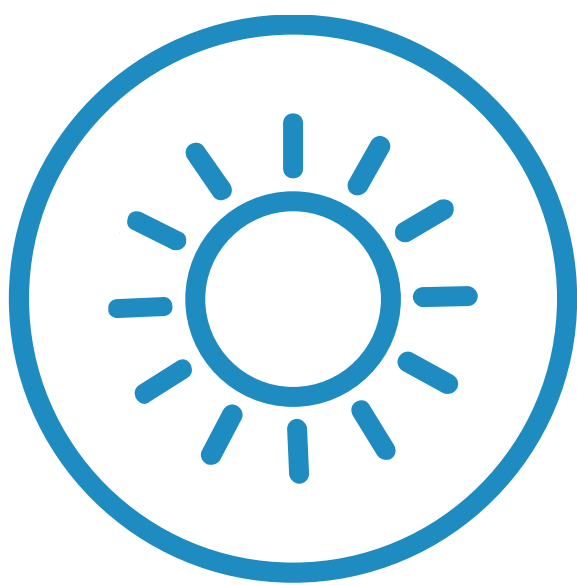


Future-Focused Portfolio

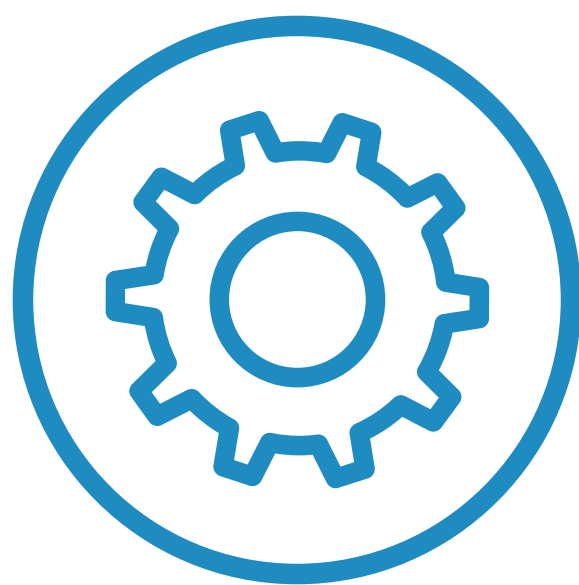
under development



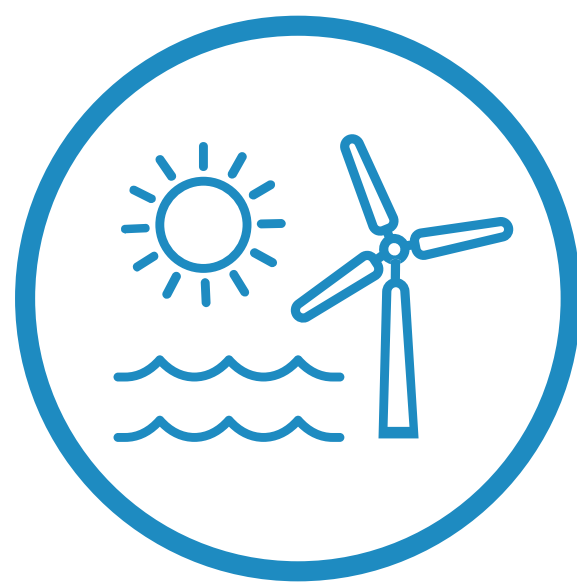
Battery Storage



Microgeneration



Hydro Upgrades

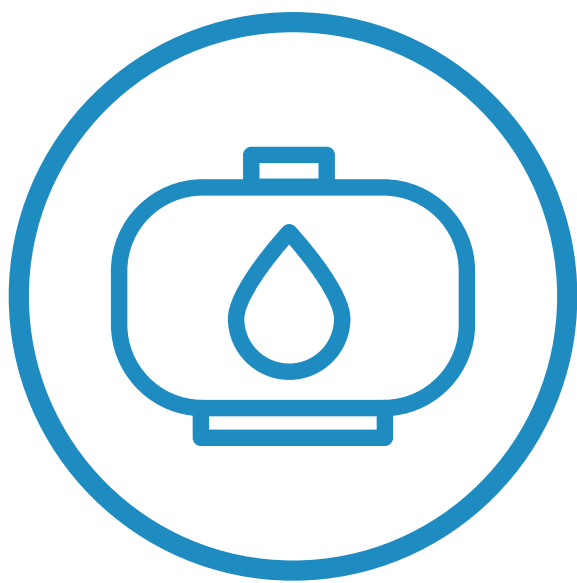


Independent
Power Producers

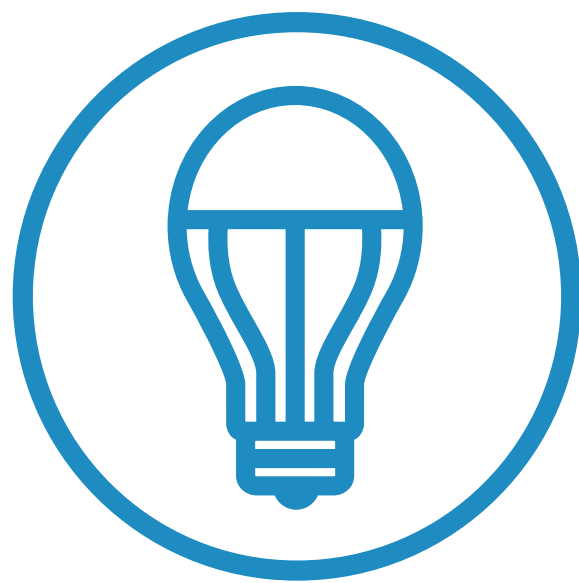
in planning



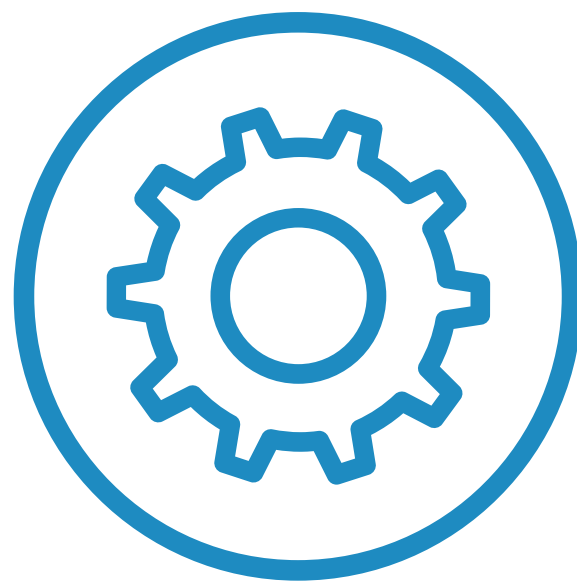
Hydro Storage
Enhancements



Thermal
Replacement



Energy Conservation



Hydro Upgrades

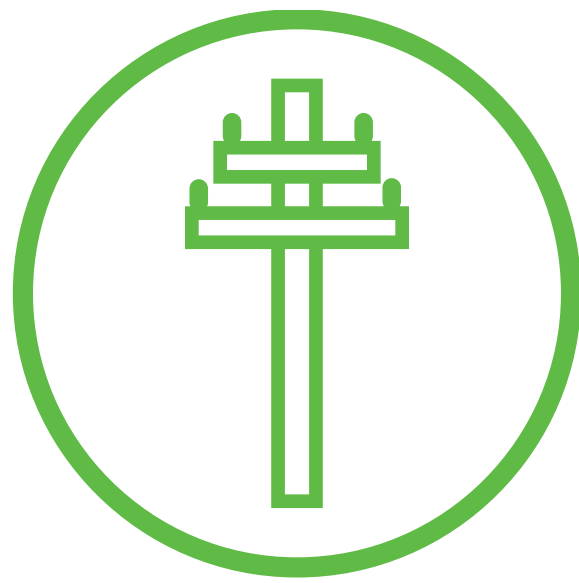
new projects



Atlin Hydro
Electricity Purchases



Moon Lake
Pump Storage



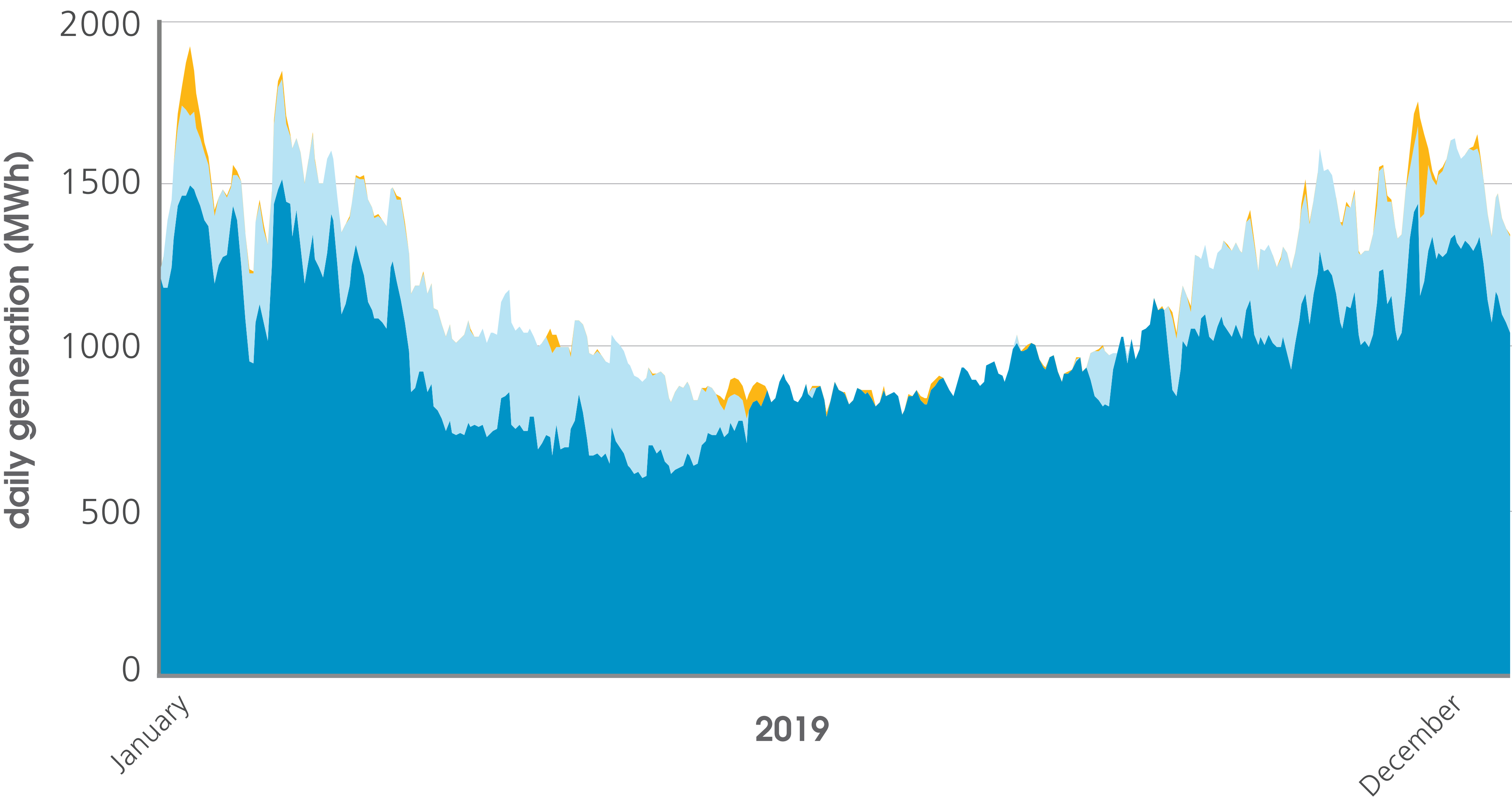
Southern Lakes
Transmission Network



the need: more renewable winter power

In winter, when demand for electricity is at its highest, we must use liquefied natural gas (LNG) and diesel to generate electricity when water levels are low and to meet peak demands for power.

resources used to meet electricity needs



- Hydro Generation
- LNG Generation
- Diesel Generation

The Mayo Lake Enhanced Storage Project would provide more water to generate electricity in the late winter and spring. This renewable electricity would help reduce the amount of liquefied natural gas (LNG) and diesel we need to use.



Mayo Lake enhanced storage project

As we work to build new long-term sources of renewable electricity, we're committed to making the most of the renewable sources we have now.

proposed change

The Mayo Lake Enhanced Storage Project would help us generate more renewable electricity in the late winter and spring on average, by using more of the water available in Mayo Lake.

This does not mean raising lake levels. Instead, we would amend our existing water use licence to allow us to use an additional one metre of water that is already available on the lake. This is called bottom storage.

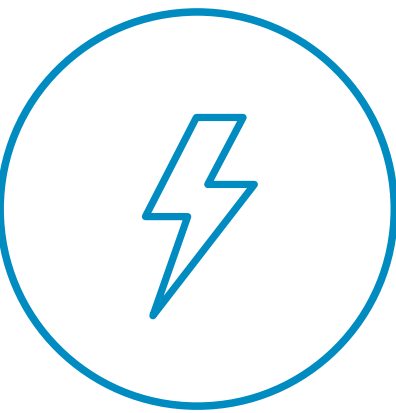
This would happen in two phases.

- » **Phase 1:** In the first few years, we would lower the current low supply level on the lake by up to 0.5 metres.
- » **Phase 2:** After several years of monitoring, we, together with the First Nation of Na-Cho Nyäk Dun, would determine if the low supply level could be lowered again by another 0.5 metres, or if it should stay the same, or be raised back to the previous licence limit. This would be determined according to the results of our ongoing annual monitoring program and the environmental thresholds in our adaptive management plan.

This project also includes the removal of sediment in Mayo Lake.

- » During Phase 1, we would remove the old cofferdam remnants which are affecting water flows – possibly as early as spring 2021.
- » If needed, after several years of monitoring, Phase 2 would include narrow dredging of the main outlet channel.

benefits



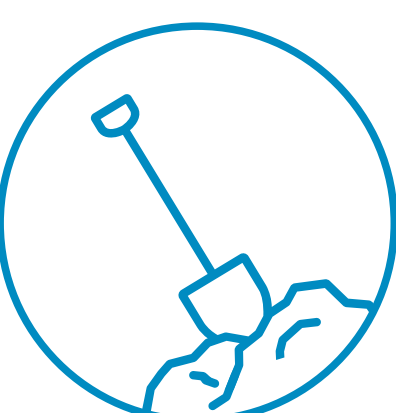
Generates more renewable electricity



Reduces greenhouse gas emissions

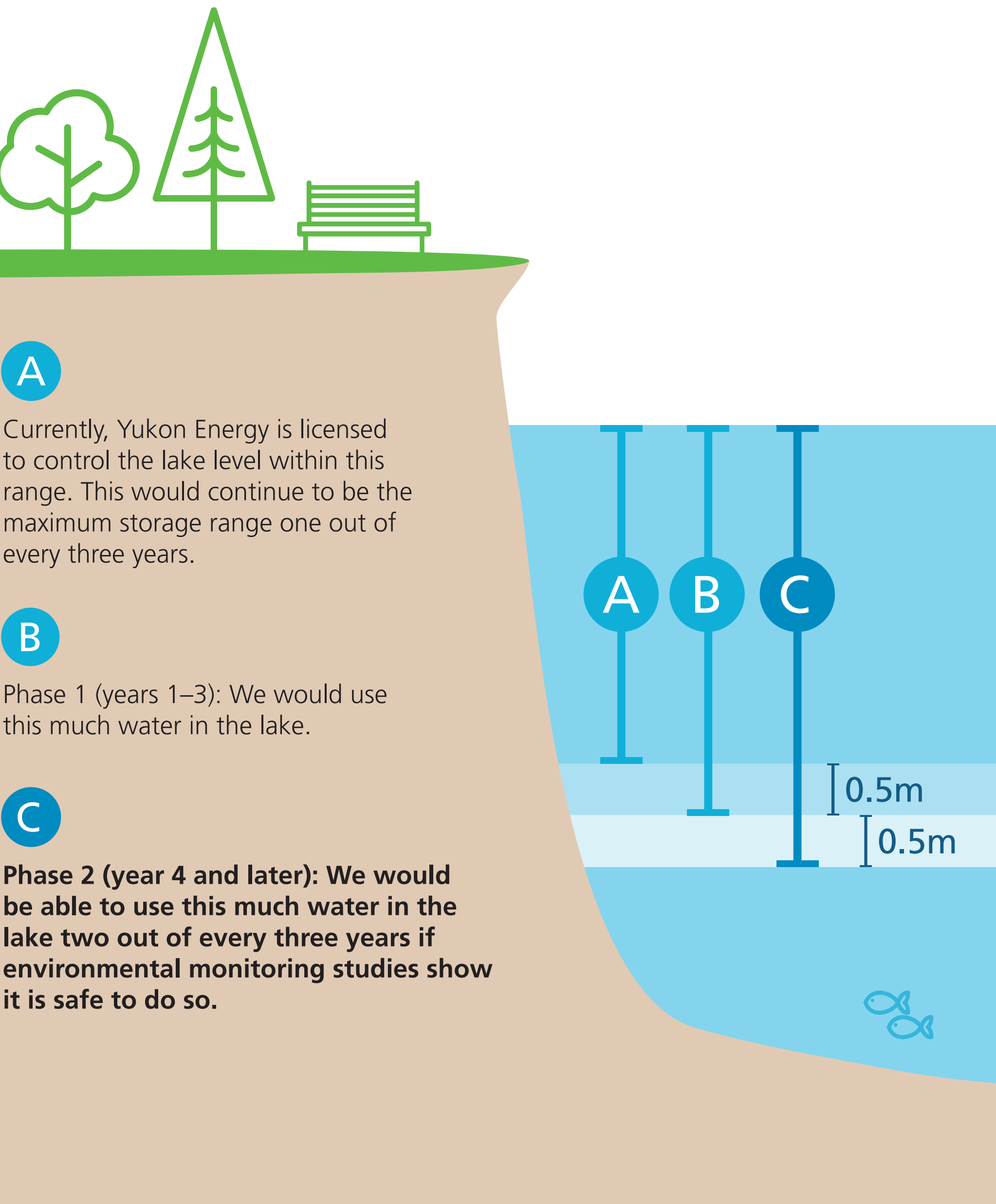


Saves Yukoners money by avoiding the use of some fossil fuels. Hydro power is cheaper than current diesel and LNG prices



PHASE 1: Old cofferdam remnants will be removed

PHASE 2: If needed, narrow dredging of the main outlet channel would occur



Mayo Lake outlet channel sediment

In the nearly 70 years since the Mayo Lake control structure was built, the outlet channel has accumulated a considerable amount of sediment. Some of this sediment needs to be removed so water can move more efficiently from Mayo Lake. This is true whether or not we proceed with this project. Improvements to the outlet channel will also make it easier to access Mayo Lake by boat across a wider range of water levels.

maintenance activities are planned over two phases

During each phase of the maintenance activities, a number of mitigation measures will be used to reduce any adverse effects to fish, wildlife or their habitats.

PHASE 1

Removing the cofferdam remnants near the existing boat launch.

This will likely be done with a long reach excavator. This may cause the portion of the outlet channel closer to Mayo Lake to naturally create a deeper channel. This will be monitored to determine if this occurs.

PHASE 2 (IF NEEDED)

Dredging in the main outlet channel to remove sediment in order to restore a deeper channel.

Multiple options for how the dredging will be done and where the sediment will be moved to will be assessed.

Mayo Lake outlet channel



We have discussed this project with the public and the Mayo District Renewable Resources Council. In addition, we've been planning the project with the First Nation of Na-Cho Nyäk Dun for a number of years. Over time, we have learned what your concerns are and how these can be mitigated to address what matters to you.



We recognize the importance of fish in Mayo Lake to local residents, and the environment in general. Our 12 consecutive years of fisheries studies have largely focused on lake trout and lake whitefish – the two fish species that you’ve told us are important to you. These highly detailed studies have filled numerous knowledge gaps about these species, not only in Mayo Lake but also in Yukon as a whole.

We recognize how important it is to maintain boat access to Mayo Lake. The lake allows users to reach placer claims and carry out important activities such as fishing, hunting and other harvesting activities. We will continue to work towards maintaining access to Mayo Lake, including making improvements to the existing boat launch this year.

We recognize the strong traditional and cultural connection between the First Nation of Na-Cho Nyäk Dun and the Mayo Lake area, including the Roop Lakes wetlands. We continue to have discussions with the First Nation of Na-Cho Nyäk Dun to understand and mitigate impacts on traditional land uses and heritage resources in the project area and have worked with the First Nation to prepare the project's monitoring and adaptive management program.



affects on fish

We've conducted more than 12 years of research on fish in Mayo Lake. Detailed studies have shown that lake trout and lake whitefish populations are healthy and continue to do well despite low water levels during the past few years.

Lake trout are an important fish species in Mayo Lake. They support a considerable fishery and are at the top of the food chain in the lake, making them sensitive to changes. Lake whitefish are also important because they are a key food fish for other species including lake trout, pike and burbot.

what we have done

- » Studies have been done to understand where and how deep lake trout spawn. We discovered that they can be attracted to spawn in deeper areas which are "safer" during low water levels.
- » We located lake whitefish spawning areas in larger tributaries to the lake and identified important areas for spring rearing (feeding and growing).
- » Detailed studies have shown that lake trout and lake whitefish continue to do well despite low water levels during the past few years.

lake trout and lake whitefish

Both species spawn during the fall and their eggs incubate over the winter months. This overlaps with the time of year when water is used to generate power and therefore their egg survival may be affected by the project. Most lake whitefish spawn in streams that flow into the lake. They rely on the shallow areas at the ends of Roop and Nelson arms to feed and grow during the spring.

beach seining and spawning

Since 2008, very detailed studies have been carried out to understand lake trout and lake whitefish in Mayo Lake. These have included annual beach seining since 2009 to track the numbers of juvenile lake trout as well as studies to understand where (and how deep) the lake trout spawn. We are currently completing a study using lake trout eggs from Mayo Lake in an aquarium to understand how the eggs develop and when they hatch. Studies on lake whitefish have focused on learning where important spawning and rearing (feeding) areas are located.



From the top: 1. Juvenile lake trout 2. Juvenile lake whitefish 3. Beach seining 4. Mayo Lake trout eggs incubation in an aquarium

access to Mayo Lake

We recognize that access to Mayo Lake is important to local users. Access to the area by boat is used for recreation, harvesting, and placer mining operations. We are committed to installing the mitigation measures needed to provide users with access to Mayo Lake during seasonal and annual variations in water levels.

Access may be affected by the project, at times, due to seasonal or annual variations in Mayo Lake water levels.

summer access

This project will result in lower water levels in the spring in some years. This may affect access to Mayo Lake for a short time period (roughly two weeks) in late May or early June, after ice-off, except in drought years when the effect will be extended.

This may affect:

- » placer mining access
- » traditional resource user access (fishing)
- » timing and use of beach and boat launch

mitigation

- » We will improve the west end boat launch in the spring of 2020 whether or not the Mayo Lake Enhanced Storage Project goes forward.
- » When we remove the cofferdam remnants, some of the accumulated sediments may likely be flushed from the main channel. This may deepen the channel and improve boat access to the lake across a larger range of water levels.
- » **We will not draw down the lake every winter. We will ensure that winter draw downs are not more than the existing 2.59 metres more than two years in a row.**
- » We will continue to meet with the Mayo Renewable Resource Council and local residents annually to hear their observations and potential issues as they may arise and to share results of our monitoring program.

Barge with placer equipment

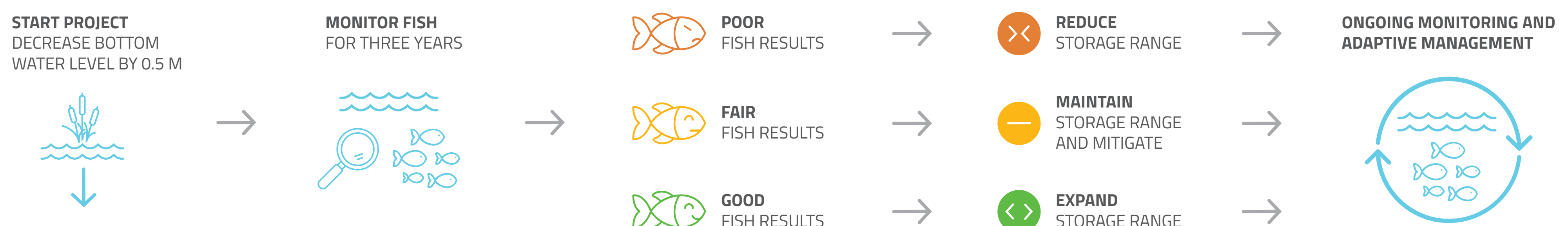


Existing boat launch at west end of Mayo Lake at low water levels



monitoring program and adaptive management

ADAPTIVE MANAGEMENT PROGRAM



monitoring program

A detailed monitoring plan is key to implementing this project and will form an enforceable part of our licence.

Monitoring to feed into adaptive management

Studies in the Mayo Lake area:

- » annual lake trout and lake whitefish monitoring (spawning and rearing)
- » periodic sub-adult lake trout and lake whitefish monitoring
- » long-term fish population surveys
- » Roop Lakes water level and wetland health monitoring
- » Upper Mayo River land surface monitoring

Additional baseline monitoring

- » lake elevation and climate data
- » water temperature and turbidity monitoring
- » late winter ice thickness and water quality monitoring
- » aquatic macrophyte surveys
- » fish harvest (creel) surveys

adaptive management program

The purpose of the adaptive management program is to ensure that a fully functioning, healthy and sustainable aquatic ecosystem in Mayo Lake is maintained. Its primary focus is ensuring healthy and sustainable lake trout and lake whitefish populations, because we know that if these species are doing well in the lake, it's a sign that the ecosystem is also doing well.

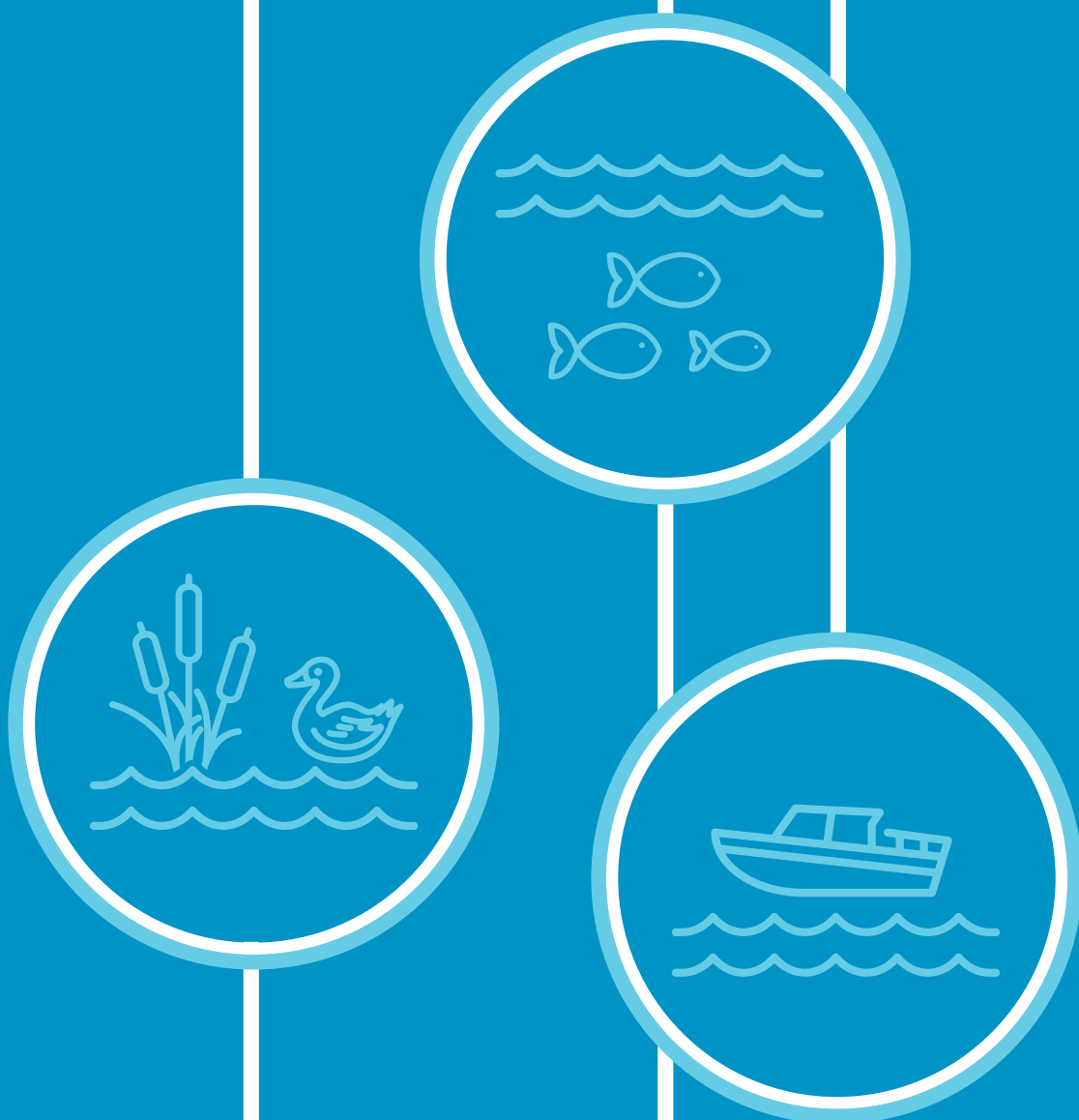
Adaptive management addresses risk and uncertainty and ensures that any unacceptable effects can be reversed.

The plan would form a part of the project's authorizations. This means we would be *required* to meet the conditions in the plan.

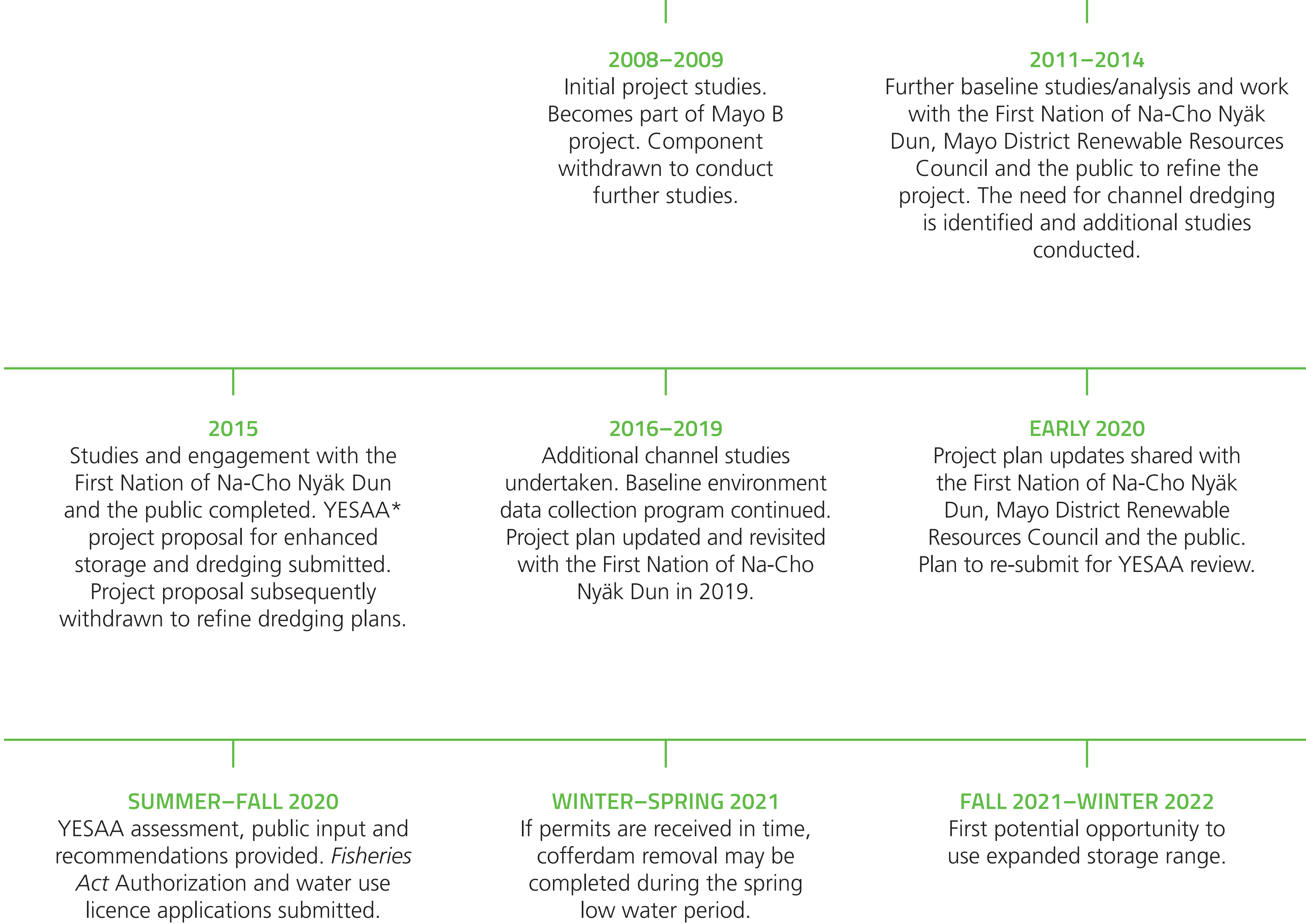
The adaptive management program will set out measures that we will take in response to positive or negative monitoring outcomes.

- » It is the main instrument for managing water levels and water used for power generation.
- » It can measure and report, in a timely way, changes in identified key indicators (e.g., fish populations).
- » It has established thresholds that define acceptable and unacceptable conditions or changes in identified key indicators.
- » We will work with the First Nation of Na-Cho Nyäk Dun, the Mayo Renewable Resources Council and Yukon government Fisheries to review the monitoring program and make decisions on the use of bottom storage according to the adaptive management program thresholds.

project timeline and next steps



project timeline

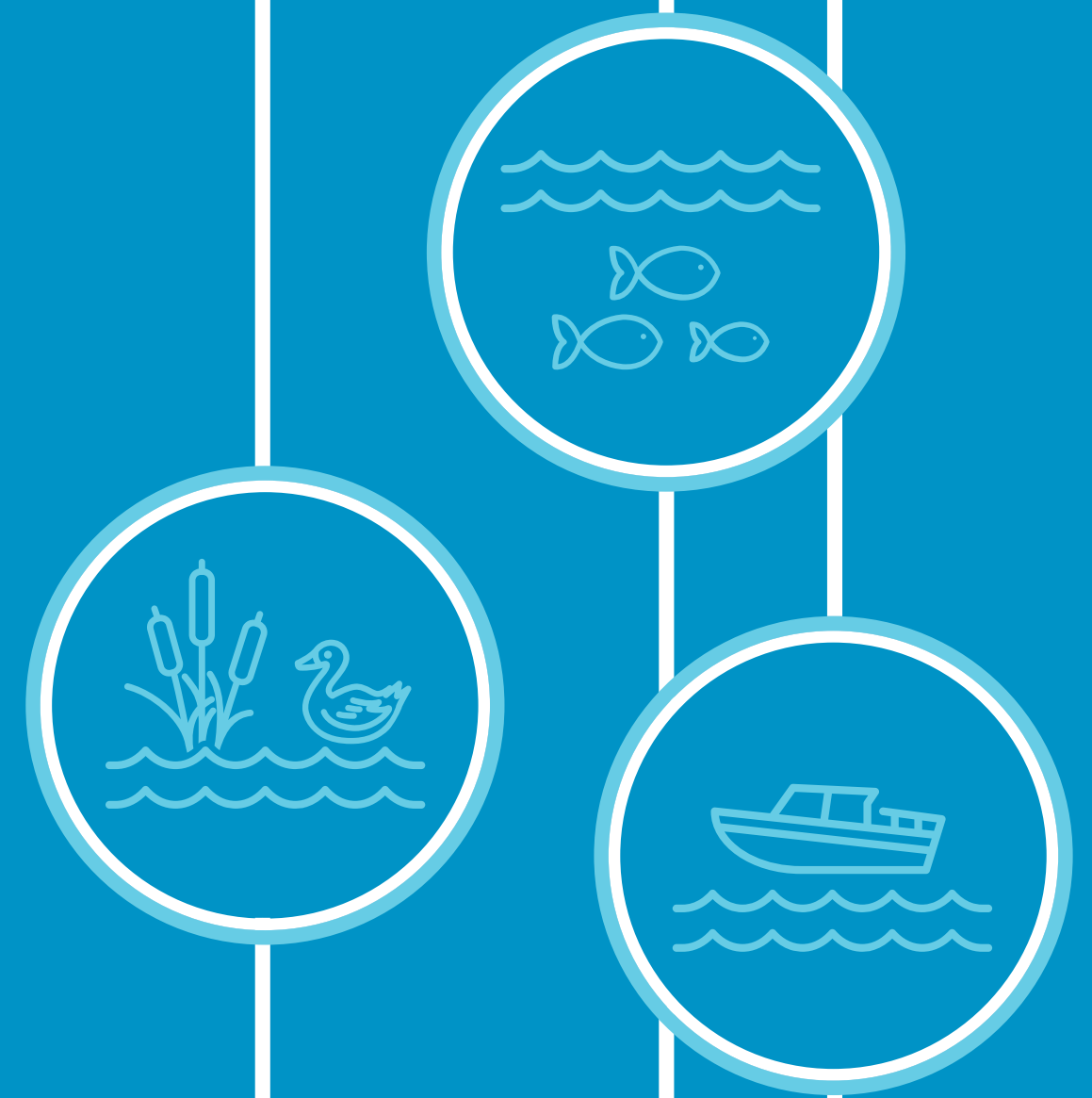


An ongoing monitoring and adaptive management plan will be implemented to confirm effect predictions and mitigation effectiveness.



*Yukon Environmental and Socio-economic Assessment Act

affects on wildlife and wetlands



Wildlife in the Mayo Lake area are important to people in Mayo. Many species, such as moose, support important hunting activities.

Wetlands are important habitat for wildlife; many species of mammals and birds use wetland habitats in the area.

Roop Lakes is a regionally important wetland habitat, which is located directly to the northeast of Mayo Lake.

what we have done

A variety of studies have been undertaken to understand how this project may affect wetlands and wildlife in the project area. Studies have largely focused around Roop Lakes due to the significance this area has on a wide variety of wildlife including moose, beaver and numerous species of birds.

what we found

- » Studies have found that the very lower portion of Roop Lakes is influenced by water levels on Mayo Lake at some times; however, the middle and upper portions of Roop Lakes are not affected.
- » Even without this project, the main body of Mayo Lake is not ideal habitat for beavers due to seasonal water level changes. Wetlands and streams flowing into Mayo Lake will continue to provide suitable beaver habitat.

Beaver in Roop Creek

Moose at Roop Lakes

