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Science 7

**Ecosystem Shift:
Aquatic**

Indigenous Knowledge Lesson Plan

Local and Traditional Knowledge in Watershed Governance
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Science 7

Ecosystem Shift: Aquatic

RATIONAL OF CURRICULUM CONNECTIONS

This lesson meets cross-curricular outcomes for Science 7 and Social Studies 7. Students will learn about Indigenous knowledge of freshwater ecosystems in the Mackenzie River Basin, which is within the circumpolar region, including how Indigenous peoples track environmental impacts of industrial projects.

Purpose

Students will learn the significant relationship between humans and the ecosystems of which they are part, including the consequences of human activities on the environment. This lesson shares important quotes from Elders, land users, and community members who have noticed shifts in the local ecosystem.

SCIENCE 7

Unit A: Interactions and Ecosystems (Social and Environmental Emphasis)

Focusing Questions: How do human activities affect ecosystems? What methods can we use to observe and monitor changes in ecosystems, and assess the impacts of our actions?

- Investigate and describe relationships between humans and their environments, and identify related issues and scientific questions:
 - Students will describe examples of interaction and interdependence within an ecosystem (e.g., identify examples of dependency between species, and describe adaptations involved; identify changing relationships between humans and their environments, over time and in different cultures—as, for example, in aboriginal cultures)
 - Students will identify examples of human impacts on ecosystems, and investigate and analyze the link between these impacts and the human wants and needs that give rise to them (e.g., identify impacts of the use of plants and animals as sources of food, fibre and other materials, etc.)

SOCIAL STUDIES 7

This lesson explicitly utilizes Indigenous Knowledge, a key focus of the social studies curriculum (Junior Secondary Social Studies Curriculum, 1993, p. 10), in order to address key Social Studies 7 questions: What are the major changes facing the circumpolar world? What are the main environmental problems facing the circumpolar world? What impacts do physical geography and climate have on the human populations of the circumpolar world?

Major Understandings: Circumpolar regions are changing rapidly in areas of technology, economic activity, social structure and political organization.

Common Learning Experiences: Students will analyze changes that have occurred in a certain circumpolar society.

Knowledge: Students will demonstrate knowledge of the following:

- How technological, societal, political, and economic changes have impacted traditional circumpolar societies
- How the environment of the circumpolar regions affects peoples: their lifestyles, occupations, leisure and economic activities

Attitudes: Students will be encouraged to develop:

- Respect for the rights, needs and concerns of others
- An appreciation for the consequences of people's interactions with their physical and social environments

Teacher Resources:

- A NWT Map showing fish consumption demonstrates certain areas in which fish consumption is not suggested due to contamination
- <http://www.arcgis.com/home/webmap/viewer.html?webmap=7199b8175dac48dc8513c824e39aa3fd&extent=-125.8875,60.1396,-102.1131,66.8855>
- This short bulletin talks about how Traditional, local and scientific knowledge were used to understand the Patterns of Fish Habitat Use and Migration in the Slave River System"
- http://sdw.enr.gov.nt.ca/nwtdp_upload/128-CIMP_Bulletin_v2i12_press.pdf
- Mackenzie River Basin (location and introduction):
- <http://www.trackingchange.ca/river-basins/mackenzie/>
- This lesson is based on research from Tracking Change: Local and Traditional Knowledge in Watershed Governance:
- <http://www.trackingchange.ca/>
- Protocol for inviting elders into NWT schools:
- https://www.ntassembly.ca/sites/assembly/files/13-06-3td_84-174.pdf

Materials Needed:

- Copies of "Tracking Change: Fish Health, Population, and Habitat" handout
- Tracking Change Worksheet
- Individual writing supplies (for individual responses) or large poster paper and felt pens (for group responses)

INTRODUCTION

Industrial projects are becoming more commonplace in the Mackenzie River Basin, causing changes in the local aquatic ecosystem. One key ecosystem shift is the change in fish habitat, health, and population. This lesson introduces students to the implications/consequences of human activities and how these changes have been noticed and recorded.

Key questions for student inquiry:

- Why is fish or fishing important in the Mackenzie River Basin and local waterways? How has the ecosystem that local people rely on and interact with changed over time? How might certain human activity contribute to this change? How does this change impact the people who are living and relying on the river?

LESSON PLAN PROPER

- **Location:** In classroom
- **Length of activity:** 45-60 minutes / 1 - 1.5 class periods
- **Activating Strategies:**
 - *Introduction.* Briefly introduce how development is becoming more commonplace, including such projects as mining, hydro damming, and industrial development causing a change in the local aquatic ecosystem (i.e. changes in fish habitat, health, and population). This has significant impacts on the lives of people who live in northern regions and the continued practice of their traditional harvesting of fish. People who rely on the local fish species have a strong awareness of these changes and impacts. They also find ways to adapt to the changing land and explain the issue. Listening to people who know and understand the land can help us understand these changes and the adaptations and actions that are required.
 - *Individual Brainstorm.* Ask students how the river/water body near them is used and if it is used to harvest any local fish species. Ask students to share their own experiences on the river throughout different seasons (e.g. What type of fish do they harvest and eat in the area? Where do they get their fish from and how is it caught? Did they notice anything unusual about the fish or not?).

- **Learning Experiences:**
 - *Class Activity.* Introduction to an ecosystem shift resulting from climate change - change in fish habitat, health, and population.
 - Display and read selections from the news article, "Oilsands poisoning fish, say scientists, fishermen."
 - <https://www.cbc.ca/news/canada/edmonton/oilsands-poisoning-fish-say-scientists-fishermen-1.939507>.
 - *Individual or Group Activity.* Indigenous knowledge of ecosystem shift in the Mackenzie River Basin.
 - Introduce the handout, "Tracking Change: Fish Health, Population, and Habitat," which provides excerpts from Indigenous knowledge holders about an ecosystem shift event (i.e about changes in fish habitat, health, and population).
 - Distribute and introduce the "Tracking Change Worksheet." Have the students read the provided excerpts and respond to the questions. They might work individually or in groups, using poster paper to present their responses.
 - Option: have each student select an excerpt and write a more in-depth response:
 - Choose one of the excerpts and generate a series of interview questions to ask the speaker. Think: what more do you want to learn about the changes in fish habitat, health, and population. What is important to ask in order to more fully understand the links between local fish species and human life?
 - Discuss student responses together as a class.

CONCLUSION/REFLECTION

- *Individual or Group Reflection.* Discuss:
 - What did you notice about the excerpts? Was there anything you were surprised by? Anything you disagreed with? Anything you wanted to learn more about? If you wanted to learn more, who in your own community could you ask about this topic?
 - These quotes were gathered as part of a research project to understand local people's knowledge of the changes in fish habitat, health, and population. What do we know from these people that we might not know otherwise? What do you think is the value of research that listens to people in this way?
- *Class Discussion for Moving Forward.* Based on the group discussion, ask students to brainstorm ways community members can respond to the changing ecosystem (e.g. share observations about the changes in fish habitat, health, and population on Facebook groups; present/write to local or national governments

to advocate for an increase in safety measures in the development sector; present to the United Nations Conference of Parties (COP) to motivate action on climate change; learn from Elders how to identify the different changes in fish habitat, health, and population; adapt harvesting patterns to the changes in fish habitat, health, and population).

- **Extension:** Many communities rely on the fish for food, sometimes art with fish scales, and to continue the traditional fishing practice. Have students consider the ways that the different changes in fish health, habitat, and population could affect a community's ability to continue their traditional fishing practice. What challenges does change in the aquatic ecosystem pose to communities relying on fish? What alternatives are there to fishing in the community? Have students conduct additional research to find real-world examples of this issue and what is being done (or not being done) about it (e.g. creation of a community monitoring program to monitor fish, or an appeal that has helped change government policy regarding protecting fish habitat).
- **Extension:** invite an Elder, harvester, or other land user to speak to the class about fish health and habitat. The class could meet in the classroom or outside near a waterway. In advance of the visit, have students generate questions for the guest, building on this activity but in reference to their home community. For details on how to guide your class through an interview with an Elder or community member, see the lesson plan on co-management.

INDIGENOUS LANGUAGES - WORD BANK

Indigenous knowledge of the land is interwoven with language. The following are key terms in northern languages that are directly related to this lesson. Following the NWT's whole-school approach to language learning, we recommend bringing these terms into the science classroom, according to the language(s) spoken in your community. In this way, it is possible to provide students with a holistic understanding of the land, language, and culture in ways that support their own identities.

To use any of the Northern Indigenous languages fluently means that the speaker observes and interacts with their environment. They are relational languages. The connection between the speaker, their actions and the environment speaks to a worldview where relationships are important – relationships with self, others, the land and one's spirituality. - Our Languages, 2020, p. 5

We encourage collaboration with language teachers to support student learning. A few ideas to bring northern languages into science classrooms include:

- Creating classroom displays that highlight terms from this list using diagrams, photographs, artwork, and/or definitions
- As a teacher, using these words in conjunction with or in place of English words throughout the lesson (and others) where possible
- Encouraging students to incorporate these terms into written and oral components of this lesson (and others)

- Discussing with students how the precision of some of these words is linked with Indigenous knowledge of the land
- Incorporating terms into a game/activity/lab assignment to make language learning fun

Source: Our Languages: Curriculum (OLC) and Program of Study https://www.ece.gov.nt.ca/sites/ece/files/resources/our_languages_curriculum_2020_low_res.pdf

TRADITIONAL WORDS					
English	<u>Tsaat'ine</u> <u>tthadeh</u> / Dene (Beaver or xe'ghont'e)	<u>Sahtúq̓t'ine</u> / Dene (Slavey or Kaguntu)	<u>Nēhiyaw-</u> <u>ēwin</u> / Cree	<u>Dinjii Zhu'</u> <u>Ginjik</u> / Gwich'in	<u>Inuvialuktun</u> / Inuvialuit
Fish	ługe	łue	Pastew Sip̓is̓is	Łuk	Iqaluk
Fish that are new to this area (invasive)	ługe edu j̓o wotsin	Echue gotsi łue	mōya ohci ôta kinosēw	Łuk k'eejit	Iqaluk
Fish liver	ługe tthhe'	tuethhe'	kinosē- wōskwan	Łuk dhat	Tinguk
Fish heart	ługe dze'	łue dzae	kinosēwoht̓i	Łuk drii'	Uumman
Fish head	ługe tthi'	łue tthii	kinosē- wōstikowān	Łuk ch̓i'	Iqaluk
Fish stomach	ługe beh	łue mbe'	kinosēwatay	Ets'igo- ghòo'	Iqaluk
Bad intestine	ługe tlessi edu uuj̓o	łue ts'ie dzo'on'te	mâyā- cimitakisiya	Its'ik iizuu	No Trans-lation Available
Healthy	Uuj̓o ghedii	Nezu q̓te'	maska- wātisiwin	Srii gwandaii	Surraituq
Healthy, in good shape, its not changed	ługe uuj̓o onte uh edu echaonte'	Nezu ont'e uh edu naden̓o'ile	miyo- mahcihew	Srii gwandaii, ej̓uk t'iinch'uh kwāh	Surraituq

Fish that is contaminated	ługe mbeta woli atiin	łue beta dzont'e	apiscipô kinosêw	Ejiich'ii iizuu k'iighè' łuk tagwiniin dhat	Iqaluk
Skinny Fish	ługe gonaa	łue ghela'	sihkaciw kinosêw	Łuk ts'ik	Amittuq Iqaluk
Sound of ice breaking up in spring	E'teni ya'itu'ii adii	Te tadetu'	kasekwahk pêhtâwihk maskwamiy epîkopayt	Tan dhatràih	Siquqpa-luktuaq
Rotten fish	ługe ghejj	Ghejide łue	pikiskatew kinosêw	Łuk ahjat	Tibliqtuaq Iqaluk
Fish Liver that looks bad	ługe thhe' edu uujo mbe odatii	łue thhe'-nezu'ile	misi-wanâtanah ôskwana kinosêw	Łuk dhât iizuu vigwid eech'in	Iqaluk
Spots on Fish	ługe k'e denditessi thela	łue k'e goli thela	imisinâsôt kinosêw	Łuk kak gijuudlii	Iqaluk
Cyst	ługe dedihe'	łue dedihii' / eyah	akosi-wpiskayow kinosêw	Chuundat	No Trans-lation Available
Worms in the Stomach	ługe beh t'a tehtsa woli	łue membe'ta gu'woli	manchosahk ehayawak watayihk	Ets'-igoghoo zhit gyuu	Qupil-ruyuak
Bugs in the Fish	ługe tah tehtsa aati	łue met'a tehtsa ati	kinosê-wôtayihk ehayawak manchosahk	Łuk zhit gwitt'ak	Iqaluk
Fish with large heads but really skinny bodies	ługe tthicho uwh mbe gona	łue gona ih' me thhi cho	miyay	Łuk vichi' nichii gòo jidii ts'ik nilih	Iqaluk angiyuk naiquk, amittuq kuyapig
Catching fish for food	ługe tsetthi ghada'e't'se ah'	łue tse'kahi gha mbe'-tsande'	nakwatat kinosêw mîcôn oschi	Etr'ihée'aa eenjit łuk katr'idi'in	Iqalliyuaq

Keywords: river, fish, habitat, climate change

Themes: traditional knowledge, community, livelihood, climate change, ecosystem shift

Student Handout: Fish Health, Population, and Habitat

In the following excerpts, Indigenous people from various communities in the Mackenzie River Basin share their deep knowledge of aquatic ecosystems and fish. This knowledge has been developed through long-term experience and observations from living, harvesting, and travelling through the water, throughout people's entire lives and also across generations. Because this knowledge is developed over time, it expresses large patterns in change, not just small changes from day-to-day or year-to-year. Such deep knowledge of the land and water is sometimes referred to as "Indigenous knowledge" or "local and traditional knowledge."

FISH HEALTH AND HABITAT:

A participant explained that these unhealthy fish will come in waves or batches. For some, he can feel the stomach and it is solid like a bone whereas the next batch will be thin and he will almost put his thumb right through the stomach of the fish. - p. 38, 2016-2017 Report

Several participants described using the fish's liver to determine the health of the fish. "If it is red, it is no good" one said, "white livers are healthy. The fish will tell you what state your water is in." - Decho participant, p. 38, 2016-2017 Report



**Whitefish with tumour from Lake Athabasca
Collected by Ray Ladouceur, Dec. 2009**

Photo Credit: Kelly/Radmanovich - <https://thetyee.ca/News/2010/09/17/AthabascaDeformedFish/>

In Nonacho Lake, there are "lots of sick fish, the colours are different, they're blacker" according to elders from Lutsel K'e Dene First Nation - p. 55, 2016-2017 Report

Most people don't fish in the Peace anymore because they're scared to eat that fish because of the mercury - Thomas Hale, SFN fisher, Treaty 8 area, p. 64, 2016-2017 Report

There are concerns about the health of the fish from the river, which also affects the willingness of people to eat a lot of fish from the river. There is currently a Health Canada Advisory to limit the consumption of fish from the Williston (which flows into the Peace River), which has changed the dependence on fish as a major source in the past 20 years. - Eagle Island Fish Camp participant, Treaty 8 area, p. 64, 2016-2017 Report

There are a lot of fish that look like they have cancer. People might eat it but if you open it up and you see how it looks, then there are things growing in the stomach, then you throw it away. There are more and more fish that seem to have growths inside. There are little spots and little lumps in it. About 2 of 10 fish you might get are no good. It's all kinds of fish—whitefish, walleye, jackfish etc., but there is no lake trout. The trout left a long time ago. When they had mink farms and fox farms back before the 1950s, they were allowed to fish all year round. The Indians could not fish for food to feed their families but the mink farmers could take as much fish as they wanted - Lesser Slave Lake Elder, Treaty 8 FN Alberta, p. 88-89, 2016-2017 Report



Images (left to right): Fish with Tumour in the Athabasca Delta and 2 Mouthed Fish (Lake Champlain)

Photo Credit (left to right): John Ulan EPIC Photography <https://thetyee.ca/News/2010/09/17/AthabascaDeformedFish/>

Debbie Geddes <https://www.cbsnews.com/news/two-mouth-fish-in-lake-champlain-new-york-woman-catches-fish-with-two-mouths-claims-its-a-two-headed-trout/>

Long ago we used 5.5 inch nets because there used to be big Lih (whitefish). The lih are getting smaller. We now use 4.5 to 5 inch nets. Since the 2014 fire, our we are getting smaller. I think it is the smoke and ash.... - Elder Joe Champlain 2016-17 WRRB Report

I notice the difference in the loche, not sick or nothing, but the eggs are not ready like they should be, too late in the season, they should be ready...they are just white, some are ready, some are white... - Deninu K'ue First Nation 2016 ATG Report

The fish in Great Slave Lake and Artillery Lake used to be the same. After the [Cosmos] satellite crash they changed. The stomach and liver changed. And the fish became very skinny. - Madeline Drybones 2016-17 LKDFN Report

Didn't used to have to check fish nets every day, now you have to check. Lots of elders were saying the water is getting warm so the fish is spawning right away. So we have to look at the net every day. Before, like way back, how long ago when we don't have to worry about the fish overnight. We could leave our nets for one night, maybe two nights. And now you can't, you go check it every day. This change has been observed since the 70s, about 1975. - 2017-18 SRRB Report

Some fish are different. Some have scars. One time we ate fish and it tasted different. One time I caught a fish and it had something inside its stomach. They were round. I threw that fish away. That was by Gilly's island. - PJD Hatchet Lake area, p. 30, 2018- 2019 Report

There are boils on fish. I caught some trout and it had boils. White fish never use to have boils but they do now. If fish have boils, they are thrown away. - AJ Hatchet Lake area, p. 30, 2018- 2019 Report

Some fish have big heads and are long and skinny. It never to look that way. I never seen growth on fish, just from scars. - TJ Hatchet Lake area, p. 30, 2018-2019 Report

It's more like dark red, that's a good liver. The fish is more lively when you catch it in the net. I seen them catch yesterday, when they checked net, I seen them when they gut them open, that's a good fish line. I will always go by the liver, then I know I'm eating the right fish. - Mikisew Cree First Nation area, p. 36, 2018-2019 Report

I've been fishing all my life. At one time, I caught a fish with 2 mouths. I gave it to Steve. That was years ago, about 5 years ago. 2 mouths. A fish. So now I can tell you if one is sick or deformed. Some fish I caught, they have lumps all over their body, red lumps. Those I don't bother with, destroy them. I don't even feed them to the dogs. Some of them, they are abnormal, they look like whitefish, but they have a big hump back. They look like those fish that eat people, piranhas. They look something like that, deformed fish. - Mikisew Cree First Nation area, p. 36, 2018-2019 Report

FISH POPULATION:

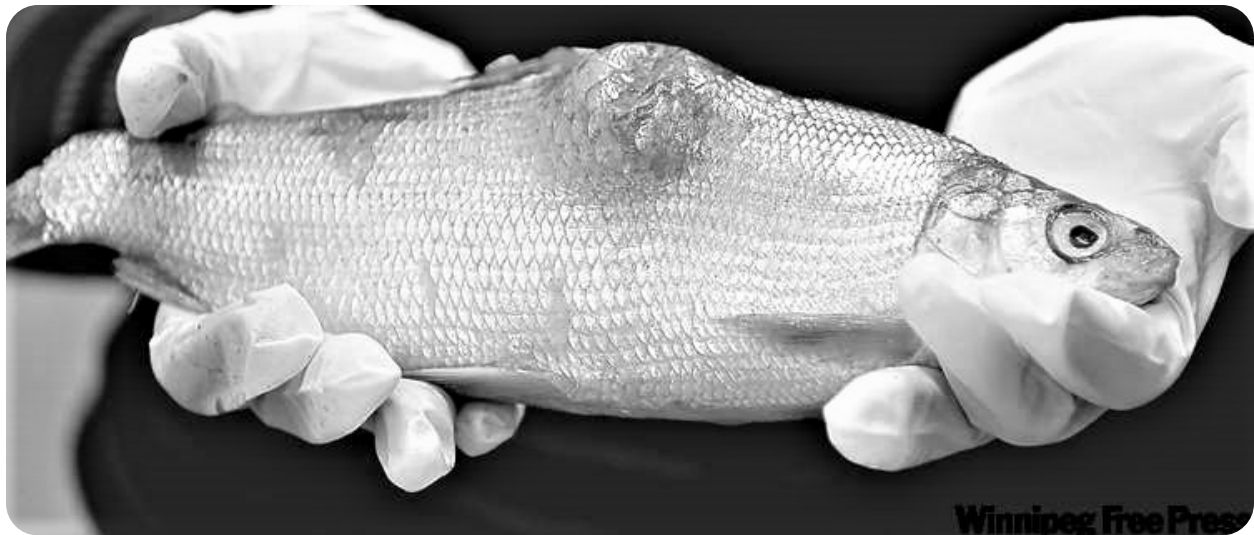
Overfishing...The number of fish seems to diminish the further downstream. In tributary rivers...it is common knowledge among local fishers that fish populations are in rapid decline...This change has been observed since the mid 1960's after the first dam was built on the Peace River. - Treaty 8 Tribal Association of BC Report

It was only once in a while. Long time ago, ... People used to catch a lot of salmon ... And then they were gone for 20 years nobody caught one, and then all of a sudden, ... somebody caught a salmon and said, 'hey this never happened before we never seen this before.' It was. [...] was always there [...] long ago. - William Storr, 2018, Inuvialuit, p.11, 2018-2019 Report

"There are more fish out east. Not as many people fish out there as much. There are less fish in the Slave River"; "Sometimes the fish can't move up creeks and small rivers along the Slave River to spawn because of low water." - Smith's Landing First Nation 2016-17 ATG Report

"Some harvesters are observing reduced harvest rates for Broad Whitefish and Burbot (Loche) harvested in the Mackenzie River Delta, as well as new observations of chum salmon in the area. This change has been observed more regularly in the past 5 years.. " - 2016 FJMC Report

[T]here's a number of places where people still harvest fish, and we're just not seeing the numbers we saw 25 years ago. Which brings us again to the decline in fish that were once there... [The decline is in] mostly all kinds of fish, because it's mostly due likely to climate change, and it could be toxicities in the water. - Dehcho K'ehodi Program participant, p. 36, 2016-2017 Report



Whitefish with a large tumour being studied at a lab in Alberta (2010)

Photo Credit: Ed Kaiser, Winnipeg Free Press, <https://www.winnipegfreepress.com/canada/letter-to-pm-demands-study-of-deformed-fish-near-oilsands-103119914.html>

However certain fish, bottom feeders, like suckers have gone missing. There are no more bottom feeders. That's in the Liard River. In the Mackenzie, there are no more bluefish or grayling....Now you could go fishing for a week and you won't even catch 1 – 2 grayling. They all disappeared. - Dehcho K'ehodi Program participant, p. 36, 2016-2017 Report

[W]e know for a fact that within the last five years there has been a change with the salmon. Where let's say fifteen years ago you would be lucky to harvest two to three salmon, but today we're harvesting five to ten so the numbers are going up, and we're learning a lot more about the salmon and how global warming and chemicals in the water might be affecting them. It helps to know what's going on out there in different seasons of the year, and we know this because like I said there's five to ten more salmon coming up our rivers than there was twenty years ago. - Dehcho K'ehodi Program participant, p. 37, 2016-2017 Report

Coney—we started getting Coneys around here now, last spring, a guy came over said he caught a Coney, you want some? I said yaaa, I'll have some Coney. - Lustel K'e Dene First Nation Elder, p. 56, 2016-2017 Report (coney is not usually seen in the area)

"My cousin before he passed away he used to set nets on the river and right by the mouth of that creek he used to catch lots of fish and I think two years before he passed on he hardly caught any... My cousin told me that just spring time only then there is lots of people fishing when the water is high but now nobody even bothers even though they fish they don't get nothing and they used to catch huge jackfish on that creek now there is no water up there so how can you, you catch fish because mainly we catch our jackfish from that creek." - Elaine Lamalice 2017-18 KFN Report

Optional Handout: Fish Health, Population, and Habitat (Additional Quotes)

FISH HEALTH AND HABITAT:

...We do see more parasites in the fish at Shingle...people notice more soft skin... like so soft you can't even cut the darn thing... Salmon I've never ever seen any parasites. Char, maybe the odd one, the odd like worm in there. Rarely in whitefish...Loche is got that ugly liver and eggs... -Michelle Gruben (2017-18 FJMC Report)

There are different fish now and deformed ones too. I have seen some fish with two heads too...About four years ago, Jules and myself set a net out on the lake, we caught a small trout and it's back was bent in a weird way and that is the second time I saw strange fish like that from the lake.... - Mercredi, 2017-18 Prince Albert Grand Council Report

...In the summer I make a living off fish, and I don't wanna be selling bad fish... without myself knowing it... I don't wanna sell fish to somebody and then have them get sick... You hear them talking about if they've got chemicals in them you know and people up the river don't even like. There's people up the river buy fish from down here. - Anonymous Participant, 2016-17 GRRB Report

...Loche ... started to get more ... bad liver, bad eggs, ... You gotta throw it all away cuz it's no good. But ...we see more parasites in the fish at Shingle..., ... kinda the same, whitefish and coney. But ... people notice ... I [don't know] if that's to do with the water or,... fish being drowned in your net ... [...] ... so soft you can't even cut [it]..., I would just either chuck that fish or [...] roast it or something... And ... the loche ...[have].. more parasites at Shingle Salmon I've never ever seen any parasites. Char, maybe... the odd ... worm ... a little white worm. Rarely in... whitefish... loche ... [has] that ugly liver and eggs and herring has got more. - Michelle Gruben, 2018, Inuvialuit, p.11, 2018-2019 Report

... weather get[s] hot we have to steadily look at [the] net. And even ... fish got soft because the water was too hot [...] And then when [there's] no fish,... when it's too hot. The elders said ... they go to the bottom ... to keep cool. - Emma Kay, 2018, Gwich'in area, p. 15, 2018-2019 Report

FISH POPULATION:

Grayling in the Mackenzie - no source mentioned, p. 36, 2016-2017 Report

- Another participant described that grayling would make the Mackenzie River at Fort Simpson in the 1960s "boil with their activity as they jumped for bugs to eat."
- In those days, people fished grayling frequently from the Deh Cho, using horseflies and grasshoppers for bait. "You could fill up a bucket in an hour with graylings," he said, "now you are lucky if you get one."

- In accordance with other observations, the drastic decline in grayling along the Mackenzie happened in the 1970s, "they all just seemed to disappear. Maybe they went up the creeks. Grayling were always plentiful but not anymore.

There are increasing reports of fishers catching salmon in the Yellowknife area:

Salmon—I caught salmon this fall. About 30 years ago when my dad was still trapping we caught some salmon and this summer again we caught them ... on the Slave River. - Deninu Kue First Nation elder, p. 56, 2016-2017 Report

I think you leave it up to nature, but I think... we need to do more monitoring and I guess that... the beaver and I think too the biggest factor because they dammed the little creeks for all the fish we used to get, you know our fish used to come and they feed on all those little creeks and then all those little creeks are dammed now so there's no, you know no minnows and stuff that they go there to feed on there so I think that's probably a good reason for a number of fish we catch to be down. - William Storr, 2016-17 FJMC Report

DATE _____

4. How do Indigenous people in this community notice and keep track of this change (what are the indicators of changing fish health and habitat - there are lots!)?

5. How has this change impacted daily life in this community?

6. In what ways does this community adapt to these changes?

7. What could this community do to ensure they can continue to have healthy livelihoods in the future?

8. If you could speak with one of these people, what would you ask them in order to learn more?