Climate Adaptation Strategies

An Intergenerational effort to combine Indigenous Knowledge and Western Science

A 2013-14 community report prepared for
Carcross/Tagish First Nation
by the Yukon River Inter-Tribal Watershed Council

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Gùnèlchīsh!

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Introduction

The YRITWC

The Yukon River Inter-Tribal Watershed Council (YRITWC) is an Indigenous grassroots organization, consisting of 70 First Nations and Tribes, dedicated to the protection and preservation of the Yukon River Watershed. The YRITWC accomplishes this by providing First Nations in Yukon and northern British Columbia and Tribes in Alaska with technical assistance. We facilitate the development and exchange of information, coordinate efforts between First Nations and Tribes, undertake research, and provide training, education and awareness programs to promote the health of the Watershed and its Indigenous peoples.

Our Mission

> "We, the Indigenous Tribes/First Nations from the headwaters to the mouth of the Yukon River, having been placed here by our Creator, do hereby agree to initiate and continue the clean up and preservation of the Yukon River for the protection of our own and future generations of our Tribes/First Nations and for the continuation of our traditional Native way of life."

Previous collaborations between the YRITWC and C/TFN

This report presents the results of the second project the YRITWC has successfully implemented together with Carcross/Tagish First Nation (C/TFN) through Health Canada's "Climate Change and Health Adaptation Program for Northern First Nations and Inuit Communities."

The first project, "Integrating Indigenous Knowledge and Public Health Concerns into a Community Contaminant and Climate Change Monitoring Program", was delivered in 2012-13. The project involved the YRITWC working with five First Nations (Tr'ondëk Hwëch'in, Kluane, White River, Selkirk and Carcross/Tagish) to identify various forms of environmental change and related public health challenges.

Over 100 people, including 33 Elders, participated in the first project: 61 community members were interviewed and 49 participated in focus groups. One of the consistent conclusions from each community called for a greater inclusion of youth to transfer traditional knowledge and help formulate climate change and heath adaptation strategies.

The five First Nations collectively identified 95 sites of concern for contamination. Each community specifically prioritized five sites that were suspected of degrading water quality due to climate change and human activities (mining, wastewater discharge, fuel delivery and storage, etc.). 65 surface water grab samples were collected and analyzed for a suite of indicator parameters selected to address to community concerns. Each of the partner First Nations emphasized the need to continue monitoring the sites for 3-5 years.

Current project overview

Over the course of the past year, the YRITWC has continued to work with the same five First Nations (Tr'ondëk Hwëch'in, Kluane, White River, Selkirk and Carcross/Tagish) to implement a second project through Health Canada's "Climate Change and Health Adaptation Program for Northern First Nations and Inuit Communities."

This year's project involves developing climate adaptation strategies based upon intergenerational Traditional Knowledge and cutting-edge western science. The project is titled, "Climate Adaptation Strategies: An Intergenerational Effort to Combine Indigenous Knowledge and Western Science" and has two primary objectives:

1. Continue monitoring sites of concern for contamination, and
2. Facilitate an intergenerational dialogue between youth and Elders on climate change adaptation planning to promote community health.

The following pages detail the implementation of our project, organized according to the objectives mentioned above.

Water quality in the traditional territory of C/TFN

What is "water quality?"

Water quality is really just a measure of the suitability of water for a particular use. Some water is great for drinking and is referred to as being "potable." Some water is not potable (not suitable for drinking) but might make healthy fish habitat or be great for watering your garden.

We cannot tell if a water sample is safe for drinking, or suitable for any other use, just by looking at it. We need to measure certain characteristics of the water, which might be physical, chemical or biological. We can divide the characteristics we are measuring into a few groups, which are discussed below.

Water quality standards

In order to decide whether water is suitable for a particular use or unsuitable for that use, we need water quality standards. Basically, we need to designate the use of a water body (river, creek, pond, lake, etc.) and use water quality criteria to protect that use and prevent contamination. "Designating the use" of a water body, means deciding if it is fit or safe for swimming, fishing, drinking, watering crops or some other function. "Water quality criteria" are numbers and other requirements that our samples have to meet in order to prove that the water is suitable for its use. In this report, we use the Canadian Guidelines for the Protection of Aquatic Life (CCME, 1987) to evaluate water quality in C/TFN's traditional territory.

Sites with suspected contamination

As part of the previous project, "Integrating Indigenous Knowledge and Public Health Concerns into a Community Contaminant and Climate Change Monitoring Program" (2012-13), the YRITWC facilitated a participatory mapping exercise with citizens of C/TFN. Participants identified, discussed, and mapped (using ArcGIS) sources of contamination and potential impacts on water resources. A total of 24 sites of concern were identified.

The YRITWC then coordinated a voting process whereby participants prioritized the sites of concern. Water samples were collected between August and October of 2012 from the five sites decided to be of highest priority:

1. Watson River at Mouth (wacfa1b)
2. Tagish River Below (tacfa2b)
3. Tagish Creek Below (tccfa1b)
4. Nares River (nacfa1b)
5. Wheaton River Below (whcfa1b)

The location of these sites is illustrated on the accompanying map of C/TFN's traditional territory (Figure 1) and descriptions of each of these sites can be found in Appendix A.

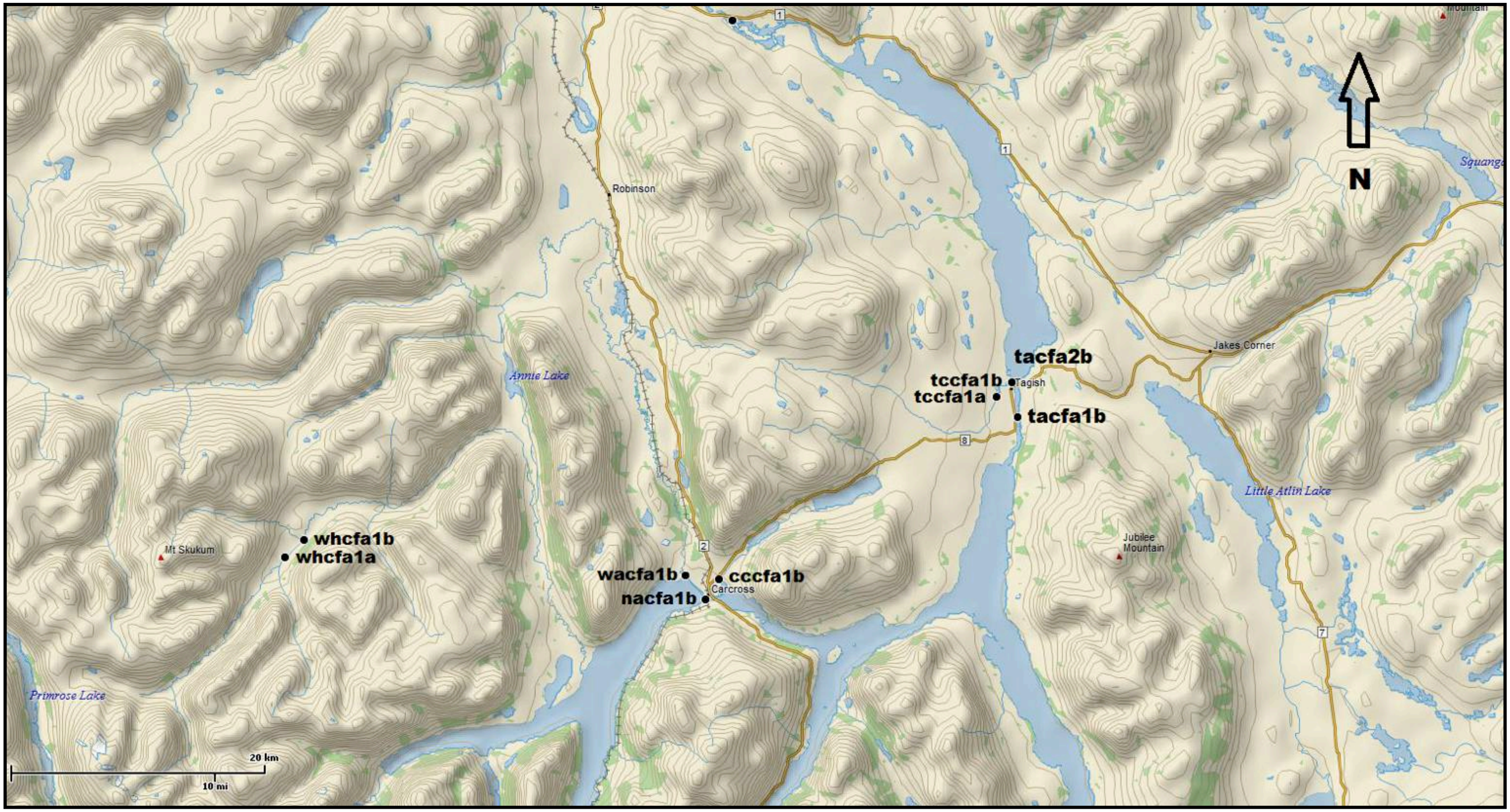
Water samples were again collected from these five sites in 2013. Table 1 presents the dates of sample collection for each of the sites.

Table 1: Dates of sample collection and class of contaminants analyzed

Sample Date	Site Name	Hydrocarbons	Metals	Bacteria	Nutrients
Sept. 4	Watson River at Mouth		x	x	x
	Tagish River Below	x	x	x	x
	Tagish Creek Below		x	x	x
Sept. 5	Nares River	x	x		
	Wheaton River Below		x		

The results of analysis of water samples collected in 2012 and 2013 are presented in Appendix B. The results are discussed in detail in the following sections (Field parameters and Laboratory parameters).

Figure 1: Map of C/TFN's Sampling Sites



Field parameters

Field parameters are the characteristics of water that we measure directly in the field when we go out and collect water samples. Field parameters include temperature, pH, dissolved oxygen, and conductance.

Temperature

Temperature tells us how hot or cold the water is. Temperature can affect the ability of water to conduct an electrical current, to hold oxygen and certain dissolved solids, and to undergo various reactions so it is very important to measure every time we take a sample. While temperatures can vary greatly (even within the day), consistently high water temperatures are detrimental to many fish species (including salmon, whitefish, and others).

pH

pH is a measure of how acidic or basic the water is. The range of pH values goes from zero to fourteen. Low values of pH indicate acidic waters whereas high values of pH indicate basic waters. The number seven is right in the middle so it is considered neutral. pH can affect the concentration of the other parameters that are dissolved in the water (particularly metals) so it is a very important indicator of water quality. The Canadian Guidelines for the Protection of Aquatic Life establish a range of acceptable pH values from 6.5-9.0 (CCME, 1987). No exceedances of the Canadian Guidelines for the Protection of Aquatic Life were found (Appendix B).

Dissolved oxygen

Even though you cannot see it, water contains a dissolved gas: oxygen. Oxygen gets into the water from the surrounding air and from plants that are undergoing photosynthesis. The oxygen dissolved in water is critical for aquatic life (fish and other organisms) living in it. If dissolved oxygen levels become too low, aquatic life could be stressed or even die. The Canadian Guidelines for the Protection of Aquatic Life state the following lowest acceptable dissolved oxygen concentrations (CCME, 1987):

- For cold water biota: early life stages = 9.5 mg/L
- For cold water biota: other life stages = 6.5 mg/L

Measurements of dissolved oxygen were found to be acceptable relative to the Canadian Guidelines for the Protection of Aquatic Life (Appendix B).

CONDUCTANCE

Conductance is a measure of how well water can conduct an electrical current. Water can conduct electrical currents because it contains dissolved charged particles called ions (discussed below). Conductance depends on the amount of solids dissolved in the water: pure water has a low conductance whereas seawater has a high conductance. When the conductance goes up or down, it is telling us something about the amount of dissolved solids in the water.

Laboratory parameters

Laboratory parameters are the characteristics of water that are measured in a laboratory using the samples collected earlier in the field. Laboratory parameters include major ions, nutrients, bacteria, metals, and hydrocarbons. Analysis of major ions, select nutrients, and select metals was conducted in 2012 at the United States Geological Survey (USGS) National Research Laboratory in Boulder, Colorado. Analysis of bacteria, nutrients, metals, and hydrocarbons was conducted in 2012 and 2013 at a private laboratory (ALS) in Whitehorse and Vancouver.

MAJOR IONS

Ions are dissolved particles that have charge; anions are negatively charged ions whereas cations are positively charged ions. *Major* ions represent the vast majority of what is dissolved in water and include bicarbonate, sulphate and chloride (the major anions) and calcium, magnesium, sodium and potassium (the major cations).

All water samples contain ions, which typically come from natural sources. The rocks and soil around the Yukon River watershed naturally contain abundant anions (mostly bicarbonate) and cations (mostly calcium). When water (from rainfall, snowmelt or any other source) comes into contact with rocks and soil, reactions take place and ions dissolve into the water. We measure these ions to understand how the water is reacting with its environment, to assess the quality of the water and to monitor for possible sources of contamination.

Samples collected from C/TFN's traditional territory were only analyzed for major ions in 2012. No exceedances of the Canadian Guidelines for the Protection of Aquatic Life were found (Appendix B).

Nutrients

A nutrient is a chemical that an organism needs to live and grow. Nutrients are essential for life but too many of them can degrade habitat for aquatic life and pollute drinking water. Too many nutrients in the water can cause algae to grow excessively and lower the dissolved oxygen in the water, which can impact fish and other aquatic life. This is called eutrophication. Natural sources of nutrients include soils and decaying plant materials (fallen leaves, grass, etc.). Sometimes nutrients dissolved in water come from human or animal wastes, fertilizers, or industrial wastewater.

There are three nitrogen-bearing nutrients that were analyzed in your water samples: nitrate, nitrate and ammonium. Total phosphorus, orthophosphate, and dissolved organic carbon (commonly referred to as "DOC") were also analyzed. DOC is a measure of many organic molecules that are dissolved in water. No exceedances of the Canadian Guidelines for the Protection of Aquatic Life were found (Appendix B).

Bacteria

Samples were collected for analysis of total coliforms and Escherichia coli (E. coli). The term "total coliforms" refers to a group of rod-shaped bacterial species commonly found in water, in soil, and on vegetation. It is common for raw or untreated water samples to contain total coliforms. Total coliforms are analyzed in standard tests of drinking water because their presence indicates contamination of a water supply by an outside source. Total coliforms were detected in all of the samples analyzed for this parameter (Appendix B). The presence of total coliforms is not a threat to aquatic life or recreational water use; however, water containing total coliforms should not be used as drinking water without appropriate, prior treatment.

Fecal coliform bacteria are a subset of total coliform bacteria that are generally, but not necessarily, fecal in origin (i.e., related to excrement). E. coli is a species of fecal coliform bacteria that is specific to fecal material of warm-blooded animals, including humans. The presence of E. coli in water samples therefore indicates recent fecal contamination and the potential presence of microorganisms (viruses, protozoa, other bacteria) capable of causing illness. Most strains of E. coli are harmless but certain strains (such as E. coli O157:H7) are pathogenic (able to cause disease). E. coli was detected in the Watson River and Tagish Creek in 2013 (Appendix B). This indicates recent fecal contamination and the potential presence of microorganisms capable of causing illness. Caution should be exercised when handling water from the Watson River and Tagish Creek. <u>Water from these sources should never be used as drinking water without appropriate, prior treatment.</u>

METALS

In both 2012 and 2013, we analyzed samples for a suite of 19 metals. The analysis was for “total metals”, which includes the metals content both dissolved in the water and present in the particulates suspended in the water. Analysis of select dissolved metals was also conducted in 2012. Metals dissolved and suspended in water are often naturally occurring; however, their concentration can be elevated by human-derived sources including mining, sewage effluent, landfill run-off, and, industrial waste.

In 2012 and 2013, the total aluminum concentration in the Watson River was found to exceed the Canadian Guideline for the Protection of Aquatic Life (Figure 2). The total aluminum concentration in the Wheaton River exceeded the guideline in 2013 but not in 2012 (Figure 2).

In 2012, the *dissolved* copper concentration in Nares River was found to slightly exceed the Canadian Guideline for the Protection of Aquatic Life (Figure 3). Note that the *total* copper concentration did not exceed the guideline in 2012 or 2013; this variation may be the result of different laboratory methods used by USGS and ALS (Appendix B).

The total iron concentration in the sample collected from the Wheaton River was found to slightly exceed the Canadian Guideline for the Protection of Aquatic Life in 2013 but was below the laboratory detection limit in 2012 (Figure 4).

The total lead concentration in the sample collected from the Wheaton River was found to equal the Canadian Guideline for the Protection of Aquatic Life in 2013 but was below the laboratory detection limit in 2012 (Figure 5).

In 2012, the dissolved zinc concentration in Choutla Creek was found to exceed the Canadian Guideline for the Protection of Aquatic Life (Figure 6). C/TFN sampled Choutla Creek in 2012 as an additional site to the 5 aforementioned sites that were prioritized by the community. A sample was not collected from Choutla Creek in 2013.

Aluminum, copper, iron, lead and zinc are commonly found in relatively low concentrations in surface waters. These elements tend to dissolve in water that is in contact with rocks and soils that naturally contain them. Continued monitoring of these sites is recommended to better understand the natural variation of these five metals in the region.

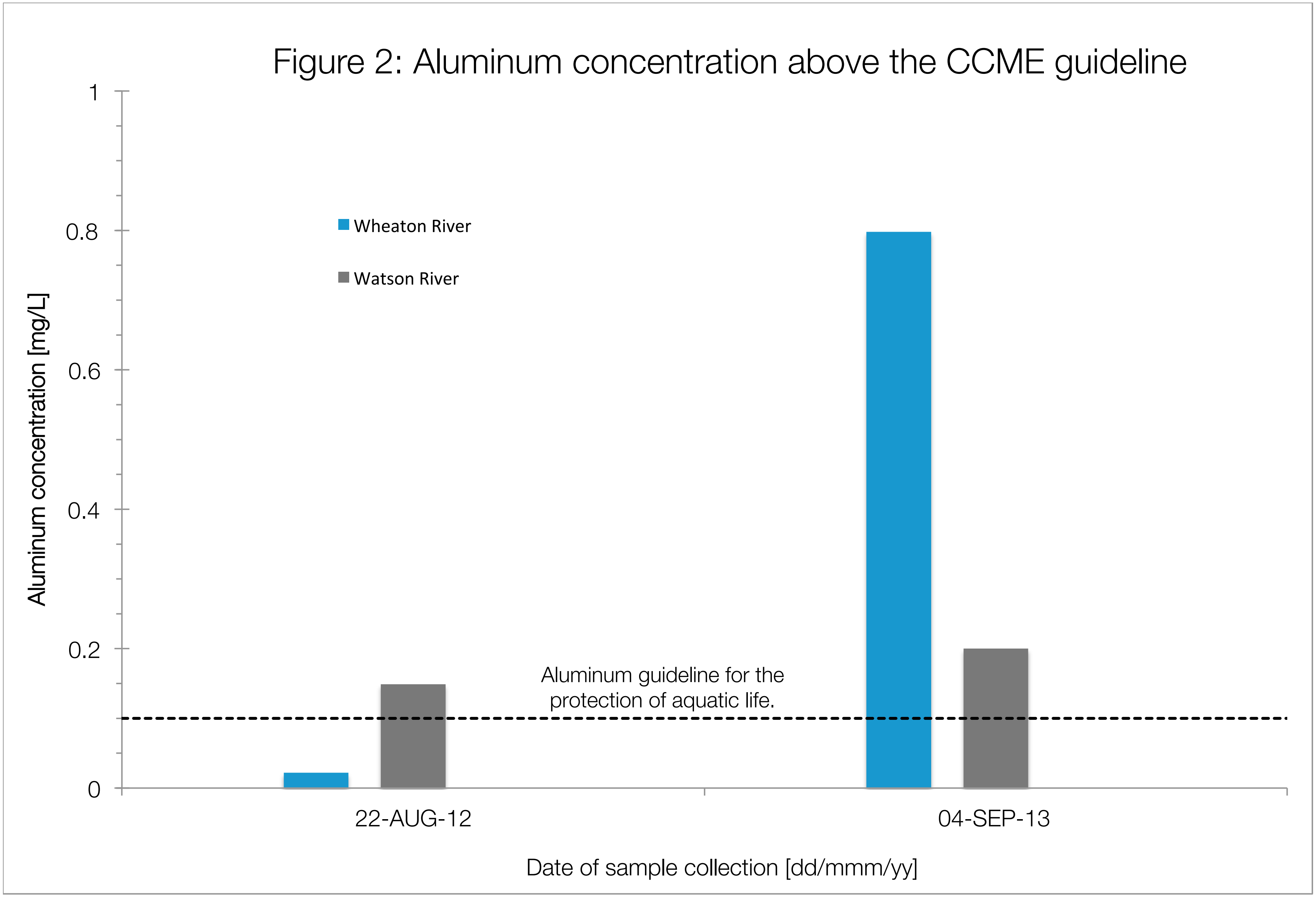


Figure 2: Aluminum concentration above the CCME guideline
1
0.8
0.6
0.4
0.2
0
Aluminum concentration [mg/L]
Wheaton River
Watson River
Aluminum guideline for the protection of aquatic life.
22-AUG-12
04-SEP-13
Date of sample collection [dd/mmm/yy]

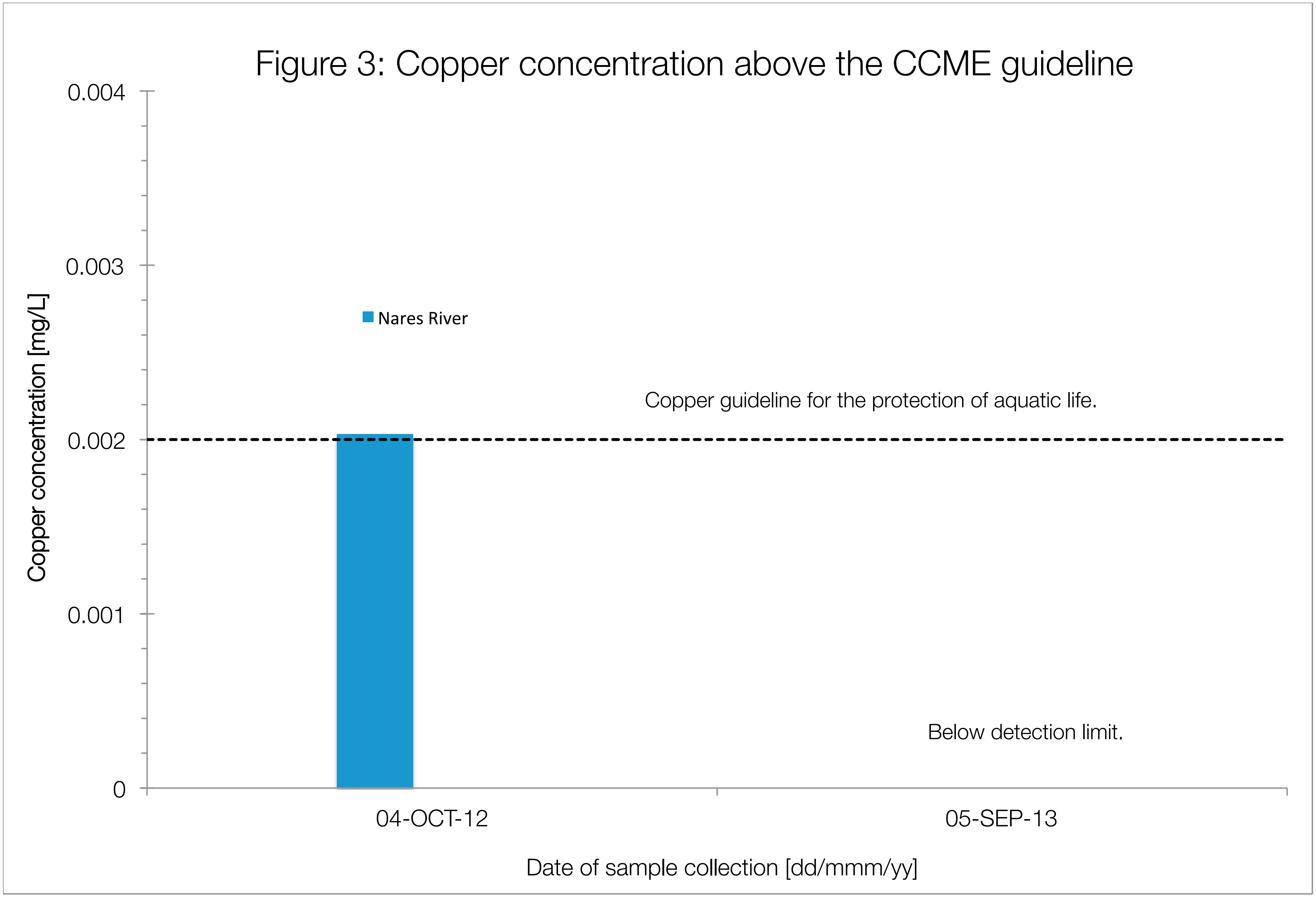
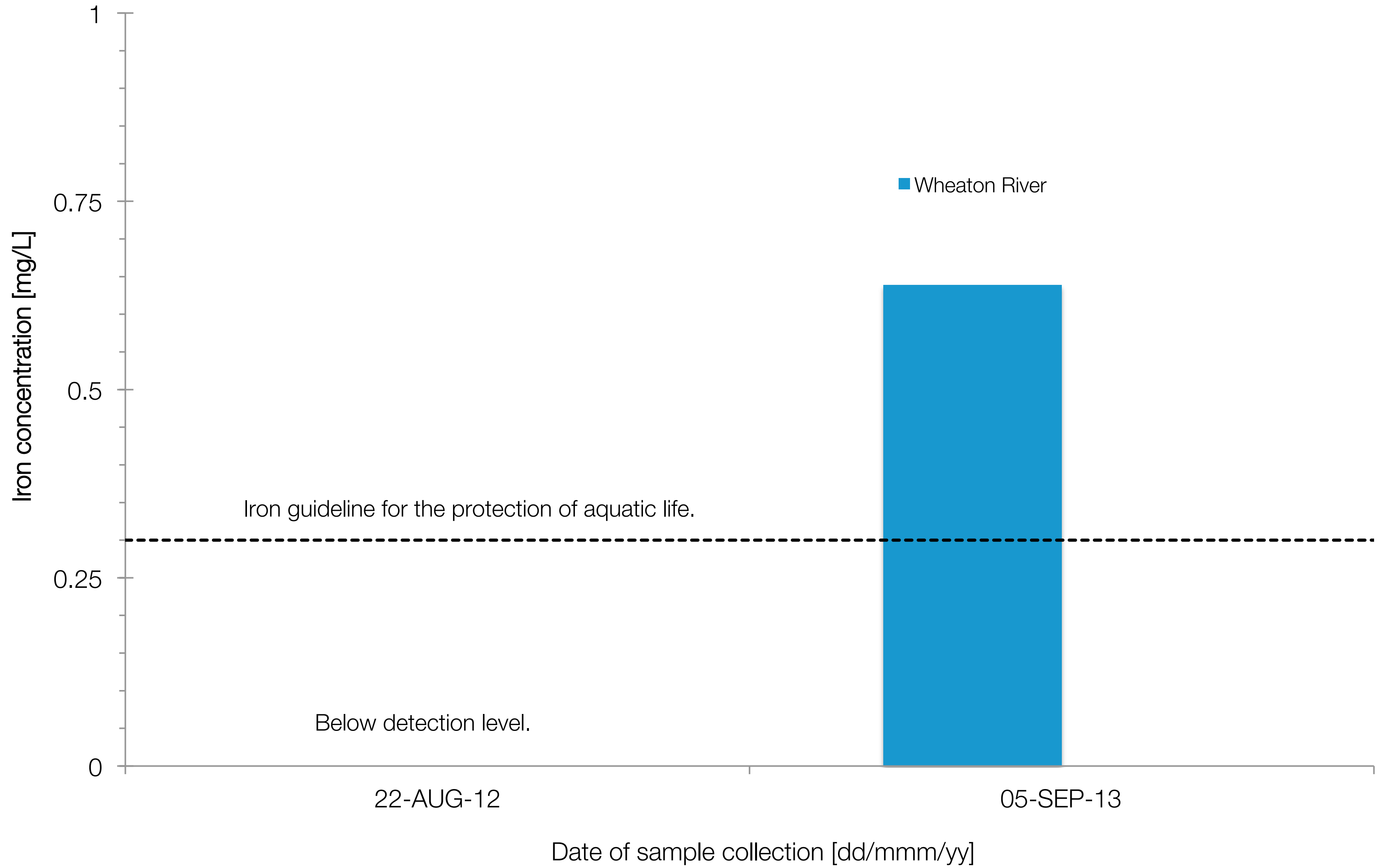


Figure 3: Copper concentration above the CCME guideline
0.004
0.003
0.002
0.001
0
Copper concentration [mg/L]
Nares River
Copper guideline for the protection of aquatic life.
Below detection limit.
04-OCT-12
05-SEP-13
Date of sample collection [dd/mmm/yy]

Figure 4: Iron concentrations above the CCME guideline



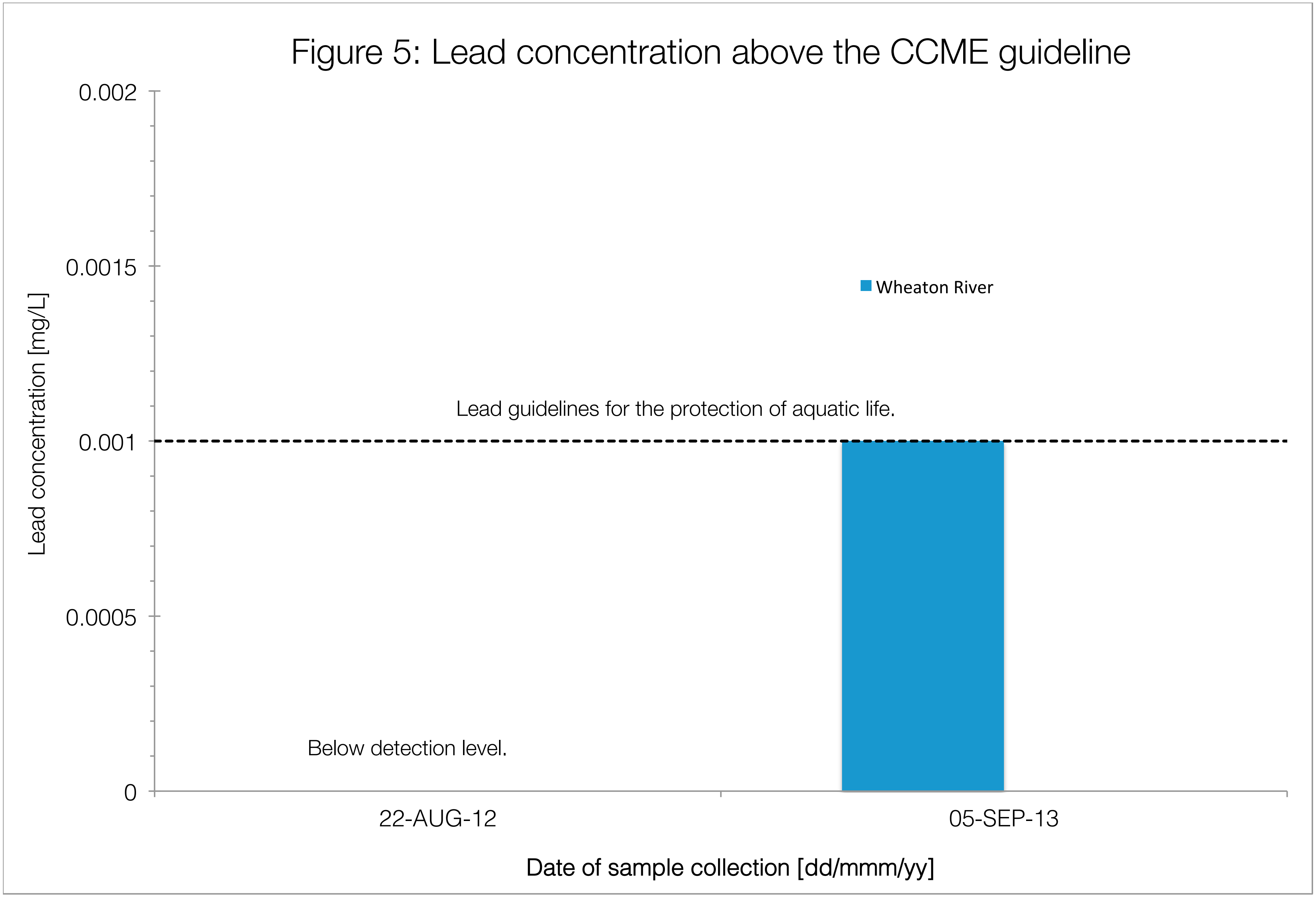


Figure 5: Lead concentration above the CCME guideline
0.002
0.0015
0.001
0.0005
0
Wheaton River
Lead guidelines for the protection of aquatic life.
Below detection level.
Lead concentration [mg/L]
22-AUG-12
05-SEP-13
Date of sample collection [dd/mmm/yy]

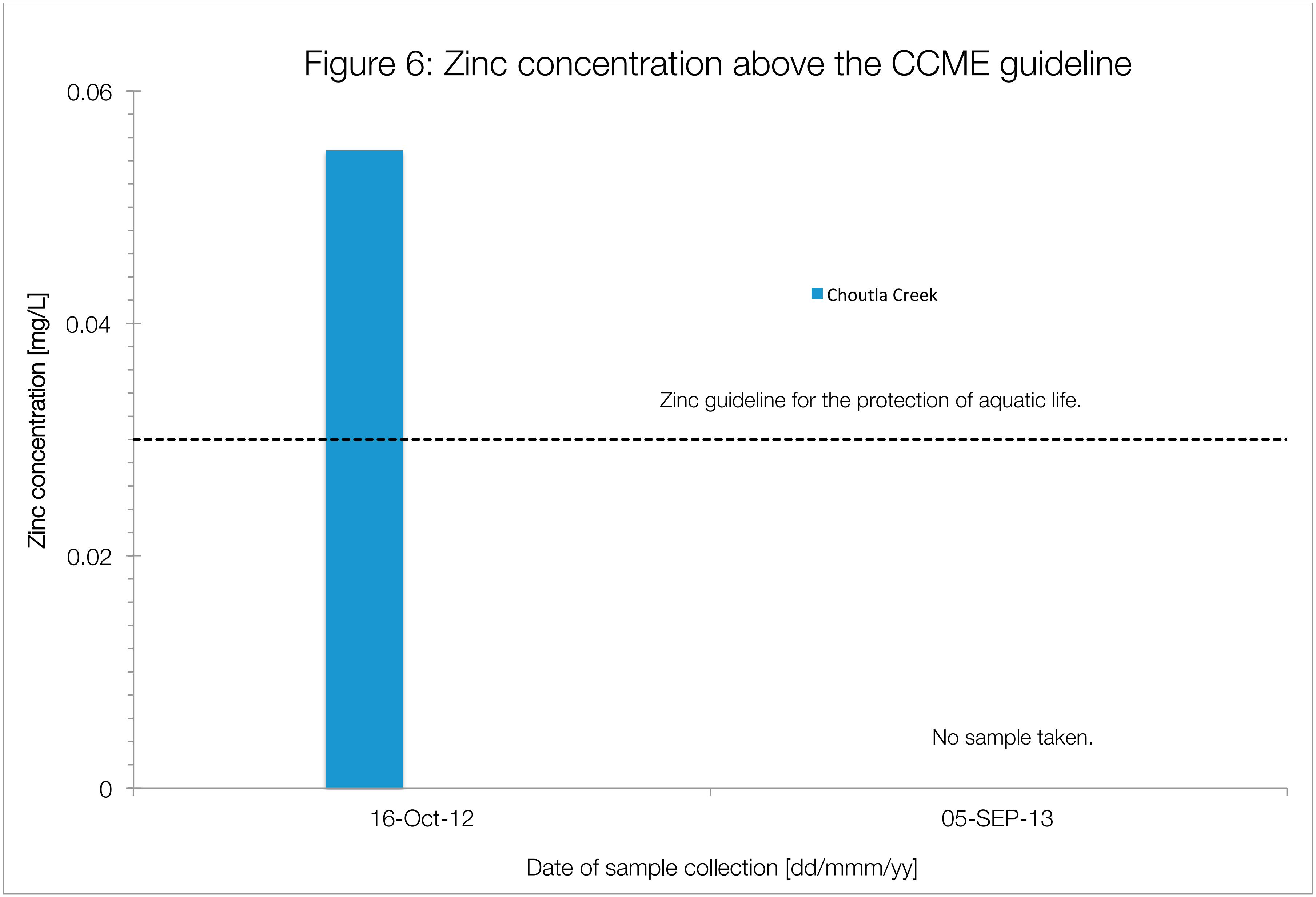


Figure 6: Zinc concentration above the CCME guideline
0.06
0.04
0.02
0
Zinc concentration [mg/L]
Choutla Creek
Zinc guideline for the protection of aquatic life.
No sample taken.
16-Oct-12
05-SEP-13
Date of sample collection [dd/mmm/yy]

PETROLEUM HYDROCARBONS

Petroleum is a complex mixture of many organic compounds consisting entirely of hydrogen and carbon, known as hydrocarbons. Some petroleum hydrocarbon (PHC) compounds have been shown to have greater toxicity than others. In both 2012 and 2013, we analyzed samples for two groups of discrete PHC compounds:

1. Volatile organic compounds (including benzene, toluene, ethylbenzene, xylene and styrene; collectively referred to as “BTEX + styrene”), and
2. Polycyclic aromatic hydrocarbons (PAH).

Similarly, we analyzed samples for five groups representing the summation of all PHC compounds within a certain carbon range:

1. Volatile hydrocarbons (VH),
2. Volatile petroleum hydrocarbons (VPH),
3. Extractable petroleum hydrocarbons (EPH),
4. Light extractable petroleum hydrocarbons (LEPH), and
5. Heavy extractable petroleum hydrocarbons (HEPH).

None of the PHC compounds analyzed in 2012 or 2013 was found to exceed the minimum detection limits of the laboratory (ALS; Appendix B).

Intergenerational dialogue

Background

During the first year of our project, we conducted focus groups and interviews to elicit concerns regarding the impacts of contaminants and climate change on water and public health with Elders and citizens from the participating First Nations. These participants identified many climatic and non-climatic changes, many of which are impacting livelihoods. They also identified the need to engage with youth to find ways to mitigate or adapt to the impacts these changes are having on their communities. So in the second year of this project we facilitated an intergenerational dialogue related to climate change between youth and Elders from the five participating First Nations.

The purpose of this dialogue was to create a platform for sharing intergenerational Traditional Knowledge (TK) regarding contaminants and climate change. TK has been defined as “a cumulative body of knowledge and beliefs handed down through generations by cultural transmission, about the relationship of living begins (including humans) with one another and with their environment” (Berkes 2008: 7). The sharing of TK is essential to the formation of mitigation and adaptation strategies and has been identified as a priority by our First Nations partners.

To help facilitate shared learning about TK between youth and Elders we developed a three-part workshop, which we ran with each of the five First Nations. First Nation Lands and Resources Managers identified youth interns that assisted with workshop development and execution in each of the First Nations. Youth interns worked with YRITWC staff and Lands and Resource managers to recruit workshop participants, resulting in a total of 61 individuals participating in the five workshops. Workshops included the following three components: youth PhotoVoice activity, intergenerational knowledge sharing, and youth interviews.

Workshop description

YOUTH PHOTOVOICE ACTIVITY

The workshop began by engaging the youth in a PhotoVoice activity. PhotoVoice is a method of sharing ideas through a combination of photographs and written descriptions. Photography provides a unique opportunity for individual expression and, when paired with a narrative explanation, can give a glimpse into someone else's view of the world. It is a way to share experiences and communicate thoughts. Beginning two weeks prior to the workshop date, cameras were made available at C/TFN's Lands office and our intern contacted youth workshop participants to help explain the PhotoVoice activity. As part of the activity, youth were asked to bring 3-5 digital photos representing how the effects of climate change have impacted the health of their community. In advance of the workshop, youth were asked to write a brief narrative explaining the significance of each photo. To help in creating their narrative, youth were asked to consider questions such as the following:

- What makes up your community?
- What kinds of environmental changes have you seen in your community?
- How have these changes affected your way of life?
- What do you think of when you hear the words "Climate Change"?

At the workshop, the digital photos taken by the youth were uploaded onto a laptop and projected using an LCD projector. The youth participants took turns discussing their photos and associated narratives. In an effort to capture the significance of the photos, the youth worked together to develop a short caption summarizing what the photo means to them. The YRITWC staff created a PowerPoint presentation of the photos and captions. A collection of these photos and captions were also made into a custom-made calendar for each participating First Nation.

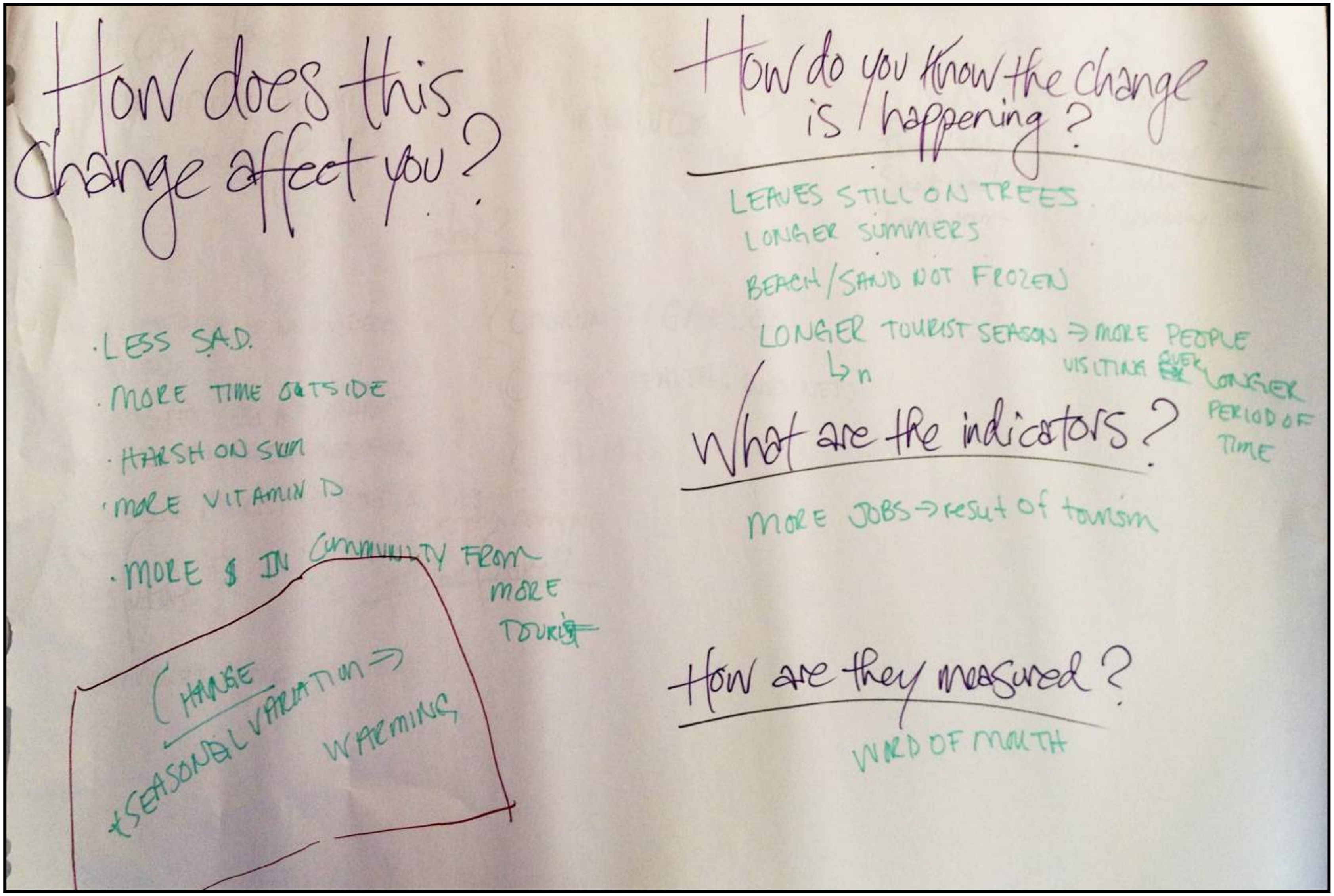
Intergenerational knowledge-sharing

During the second part of the workshop, we brought together Elders, youth and other interested community members for a luncheon to discuss strategies for addressing environmental and public health concerns. In an effort to build on the relationships and TK established in during year 1 of this project, we invited the same Elders to participate in the 2013 luncheons. During the luncheon, Elders talked to youth about their concerns regarding the environment and the impacts climate change has had on their community. Youth then presented the PowerPoint of their PhotoVoice activity to the Elders. Elders and youth then engaged in a guided-discussion facilitated by YRITWC and UAA staff related to the changes seen and potential strategies for adapting to them. Through this discussion, the participants were asked to help complete a table that contained the following questions by writing answers on sticky notes and sticking the notes to hanging flip chart paper:

- How does this change affect you?
- How do you know the change is happening?
- In what ways can the community adapt to the change now?
- How about in the future?
- Who needs to be involved?
- What timeline should be followed?

At the end of the workshop, the flip chart papers were collected. An example of raw data generated through this exercise can be seen in Figure 7. YRITWC staff recorded a summary of the ideas and strategies discussed.

Figure 7: Example of data generation methodology at C/TFN workshop



Youth Interviews

To provide youth with an opportunity to share additional thoughts, we asked them to participate in videotaped interviews. During the interviews, participants were asked:

- What are the three most important things you are taking away from today's workshop?
- What, if any, effects has climate change had on your community that you haven't had the chance to share yet today?
- What do you see as your role in solving environmental problems in your community?
- Do you have any additional thoughts you would like to share with us?

The results of these interviews will be compiled, edited and turned into a short video that will be returned to the community.

Carcross/Tagish First Nations Workshop

The Carcross/Tagish First Nations workshop was held on October 17, 2013 from 9:30 AM – 4:30 PM at the Capacity Development building in Carcross, Yukon. A total of 10 individuals participated in this workshop and included six youth, two Elders and two observers. The six youth participated in the PhotoVoice activity and produced a PowerPoint presentation that highlights the impacts climate change has had on their community through photos and associated narratives. These photos and narratives can be found in an accompanying calendar or by contacting the YRITWC. No names are associated with the quotes as directed by C/TFN's Traditional Knowledge Policy. Raw data collected during this project are available at C/TFN's Heritage Department.

As part of our analysis, we compiled the data generated through the workshop and were able to organize the data into the following three themes: Weather Variability, Wildlife, and Changing Hydrology. What follows is a summary of the discussion participants had related to these three themes.

Weather Variability

The first theme that emerged through the workshop concerned increased weather variability as a result of climate change. Participants discussed how changes in weather have resulted changes in seasonal weather patterns, more tourism opportunities and the potential for increased food security. Below is a summary of how participants see climate change affecting weather in their community:

- Warmer weather in summer and fall
- Delayed snowfall
- Variability in winter weather – sometimes it is really cold and sometimes it is warm
- Extreme wind
- Changes in daylight and the it not being as dark in the mornings
- Changes in snow levels
- Winters are both warmer and colder and the start of winter is delayed
- Less frost results in more leaves on the trees and opportunities for a longer growing season
- Spruce bark beetle killing trees
- Beach and lakes freeze later so more people are outside enjoying the beach
- Increased sun exposure has public health effects like an increase skin cancer but a decrease in SAD
- Spend more time outside
- Increased gardening opportunities
- Opportunities to increase local food security. Warmer temperatures and longer growing season means ability to grow more vegetables than in the past. There are also increased opportunities to create community gardens to support local food production.
- Warmer weather has resulted in more tourists and tourism is more opportunities for tourists
- Shifting economy
- Using sunscreen

WILDLIFE

Impacts of climate change on wildlife have been seen by the C/TFN. Workshop participants included a wide range of effects including: changes in migration patterns, decreased quantity and quality of some wildlife species for harvest, and changes in wildlife species present. According to workshop participants, climate change has had the following effects on wildlife species:

- Wildlife species like deer and wolves are increasing but caribou and bears are decreasing.

- Migration patterns of species like swans and ducks are changing.
- Less traditional fish species are available for harvest. For example, there is little to no salmon available. If you want to eat salmon you need to buy it from a vendor or get it from somewhere else.
- People are changing where they hunt and fish. Traditional hunting grounds are often not as good.
- People are starting to fish for different species. They are also getting less fish than they used to get.
- People are eating more fast food. This is causing health problems.
- People were not supposed to eat burbot because of the mercury in the river but much of the mercury has been removed so burbot can be eaten again.
- Some of the fish has deformities.
- There needs to be more laws and regulations in place to protect wildlife species.
- Remove dams so fish will return.

Changing Hydrology

Workshop participants noted that changing hydrology as a result of climate change impacts water systems, raises water levels, raises concerns about washouts, but also increases the length of the fishing season. Below is a summary of how workshop participants feel changing hydrology impacts the C/TFN community:

- Glacier melting has resulted in more run-off and increased water levels in the fall.
- Delayed freezing and higher water levels allow the marina to stay open later, which increases opportunities to fish.
- There are increased chances for road washouts and flooding.
- There are greater opportunities for hydroelectric power and other alternative energy sources.

Table 2: Summary of climate change impacts seen by C/TFN workshop participants

	Weather Variability	Wildlife	Changing Hydrology
Observation	• Warmer weather • Changes in daylight • Changes in snow levels • Winters are both warmer and colder • Less frost	• Changes in migration of patterns • Decreased presence of traditional fish species • Increased fish deformities • Moose are smaller • Less bears in town • More wolves in town	• Higher water in spring and fall • More run-off in fall • Glacial melting
Impacts	• Extended summer and fall • Spruce bark beetle killing trees • Lake freeze-up is later • Beach freezes later • More tourists = more money and more jobs • More leaves on trees • Longer growing season • More skin cancer • Less SAD	• Changes to traditional hunting and harvest practices • Reduction in number of fish harvested • Little to no salmon • Eating more fast food	• Marina stays open later • Increased opportunities to fish • Flooding • Road washout
Adaptations	• Spend more time outside • Increased gardening opportunities • Opportunities to increase local food security • Creating more opportunities for tourists • Shifting economy • Using sunscreen	• Changing hunting and fishing grounds • Buying some fish from vendors • Remove dams • Conduct meetings with youth and community members • Create laws to protect wildlife	• Fishing season extended • Opportunities for hydro power and other alternative energy

In addition to the summaries above, workshop participants noted the following things related to climate change:

- Although changes related to climate change are slow; they are significant enough that the youth can see them.
- Creating more opportunities within the community for sharing observations related to climate change is important.
- Tourism is increasing, which has resulted in increased infrastructure and jobs. While this may be good for the economy, traditional knowledge and practices need to be maintained.
- Changes in weather may be good for improving local food security. More efforts should be made to grow diverse foods.
- Investigate additional alternative energy practices.
- Consider fish ladders and/or dam removal to increase fish numbers.
- Include youth in decision-making processes.

In an effort to better summarize the data generated through the workshop, we further condensed the data into observations, impacts and adaptations associated with each of the three themes listed above as seen in Table 2.

QUOTES:

- *"It isn't that cold now so people are still on the beach…when it gets cold the beach is dead because people don't go outside."*
- *"The light has changed. It is not as dark now."*
- *"When thinking about what you do on the land, you need to talk to the old people. You need to hear the stories."*
- *"When little things happen, you need to sit down and think about what is going to come next."*
- *"They were warning pregnant women not to eat burbot [ling cod] because of the mercury. They have been able to reduce the mercury in the river…so you can eat burbot again but it has been a real problem."*
- *"There is less fish… they sell whole salmon for $5 a pound and most people say 'Hell No to that, that's insane!' but some people buy it because it is their only chance to get salmon."*
- *"The fish are smaller, especially grayling, so we need to catch more."*

- *“Herring fish used to be thick. You used to be able to get three out at once. It has declined so much that I don’t even think they came through this year.”*
- *“There needs to be more meetings like this to get people involved and to share ideas. We should have monthly meetings.”*
- *“The mining is bad for our people’s health. That’s why they pay them so much. It is bad for your health but you need to make money.”*
- *“It has come down to jobs versus the planet. The world is going for the jobs. People think we need jobs. But we don’t need those jobs that aren’t good for the planet.”*
- *“We should know the difference between traditional law and modern law. Traditional law says respect all of the land, all of the fish. But modern law is about how much money we should make...we need to remember and follow our traditional laws... you can’t mix traditional law and modern government. They are two different worlds.”*
- *“When you go outside and you go out on the water and go out on the beach, be thankful. There is no other place like this. We don’t want this place to turn into a cesspool. This should be about what you want. Don’t ask for permission. Say ‘this is who we are and this is what we want.”*

Next steps

The YRITWC developed and submitted a proposal for a third project through Health Canada's "Climate Change and Health Adaptation Program for Northern First Nations and Inuit Communities." We recently received notice from Health Canada that the project will be awarded funding!

The proposed third project is titled, "First Nation Climate Change Policy: a regional, Indigenous approach to climate change adaptation, health and water governance." The proposal included letters of support from C/TFN and the other four First Nations (White River, Kluane, Tr'ondëk Hwëch'in, and Selkirk) that have been working closely with the YRITWC. The proposed project will build on the two years of work the YRITWC and these First Nations have successfully completed. The primary objective of the project is to facilitate the development of a Water Action Plan outlining how First Nations and their traditional knowledge can take action to address their concerns regarding the impacts of climate change and contaminants on water and health, and

The proposed project would involve the YRITWC co-developing and hosting a workshop to unite these five First Nations to develop a Water Action Plan based on their concerns about the impacts of contaminants and climate change on water and health in their traditional territories. The action plan will address the need to implement the YRITWC's "Yukon River Watershed Plan" (which was approved at YRITWC's summit in Mayo in August 2013) and articulate the role of First Nations in the Yukon Government's "Yukon Water Strategy."

References

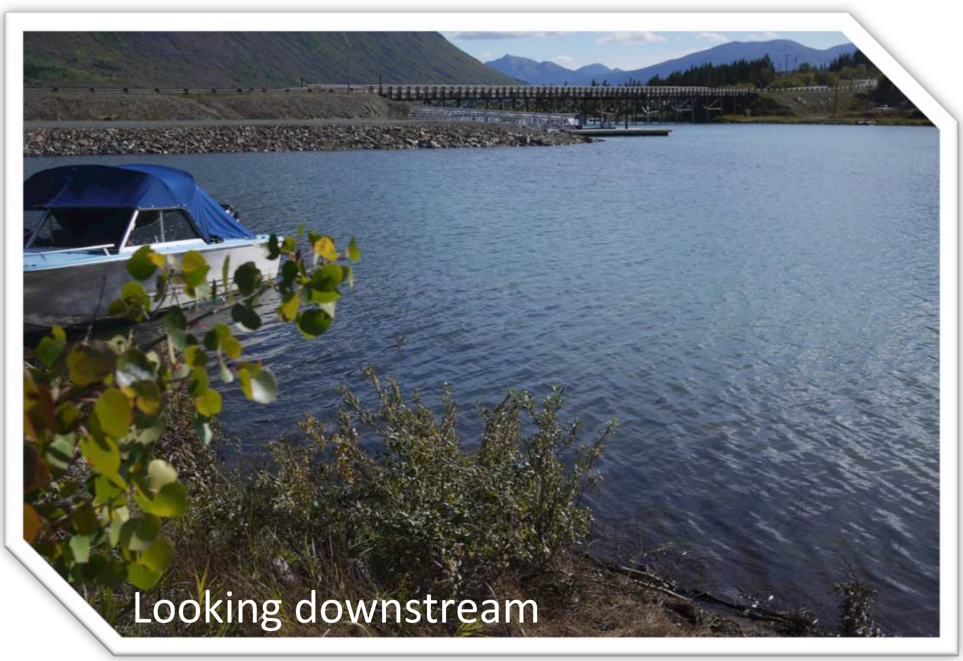
Canadian Council of Ministers of the Environment (CCME), 1987. Water Quality Guidelines for the Protection of Aquatic Life. Accessed online (http://st-ts.ccme.ca/): January 2014.

Berkes, Fikret. 2008. Sacred Ecology. Routledge.

Appendix A: Site descriptions

Traditional territory:	C/TFN
Water body:	Nares River
Site name:	nacfa1b
Coordinates:	N. 60.09.937° W. 134.42.060°
Contaminants of concern:	Hydrocarbons from a creosote pit
Date sampled:	Sept. 5, 2013

Looking upstream



Looking downstream

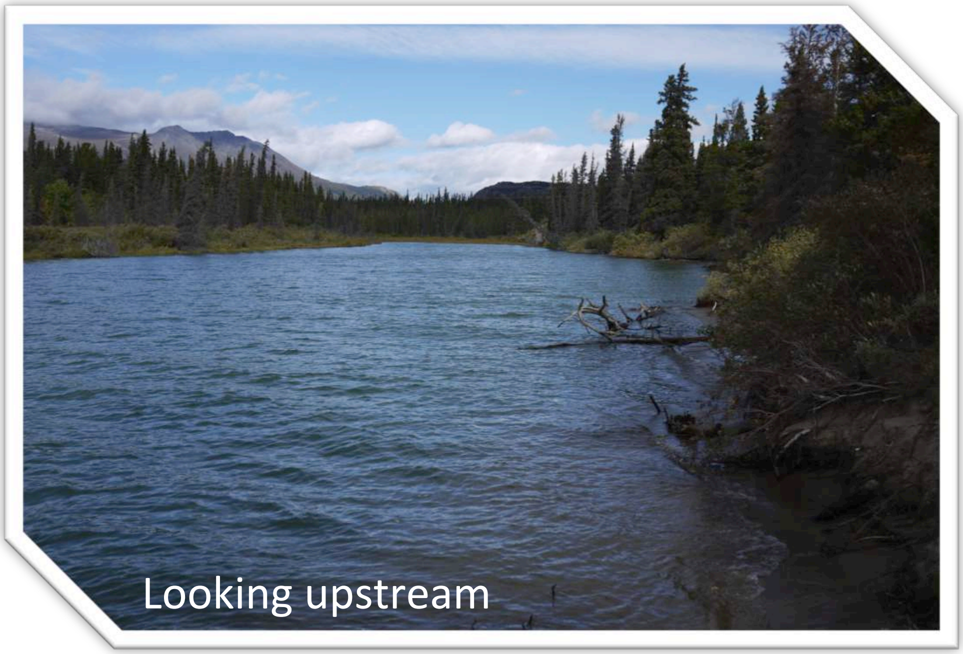
Traditional territory:	C/TFN
Water body:	Tagish Creek
Site name:	tccfa1b
Coordinates:	N. 60.31618° W. 134.27950°
Contaminants of concern:	Sewage from houses
Date sampled:	Sept. 4, 2013


Looking upstream

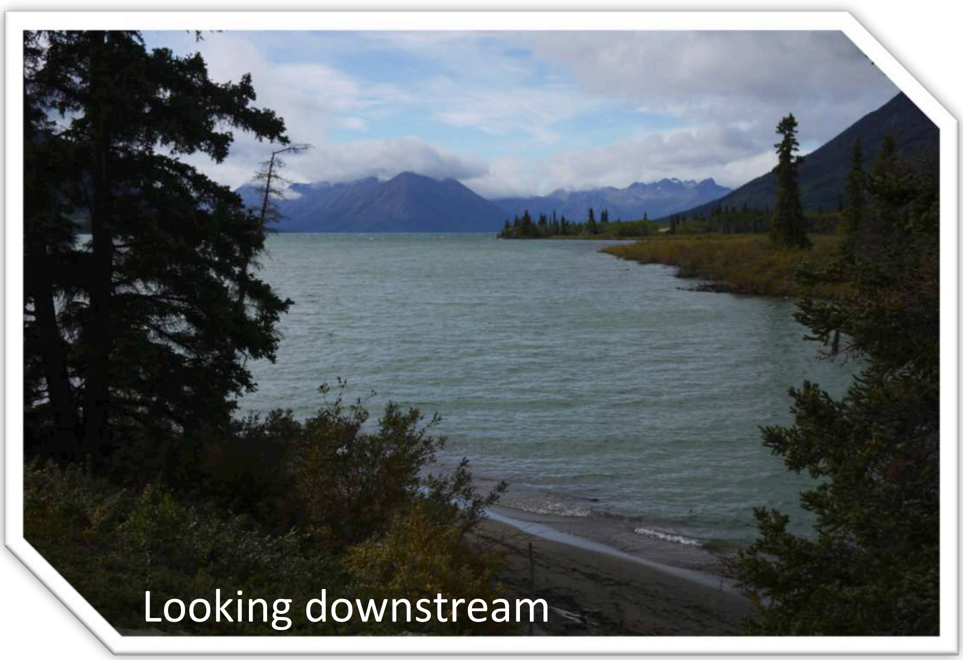

Looking downstream

Traditional territory:	C/TFN
Water body:	Tagish River
Site name:	tacfa2b
Coordinates:	N. 60.31730° W. 134.26527°
Contaminants of concern:	Hydrocarbons from a marina
Date sampled:	Sept. 4, 2013

Traditional territory:	C/TFN
Water body:	Watson River
Site name:	wacfa1b
Coordinates:	N. 60.18225° W. 134.73764°
Contaminants of concern:	Landfill seepage
Date sampled:	Sept. 4, 2013



Looking upstream



Looking downstream

Traditional territory:	C/TFN
Water body:	Wheaton River
Site name:	whcfa1b
Coordinates:	N. 60.12.389° W. 135.16.931°
Contaminants of concern:	Metals from mining activity
Date sampled:	Sept. 5, 2013


Looking upstream


Looking downstream

Appendix B: Water quality data

RESULTS OF ANALYSIS

Legend:		*Exceeds Guideline*		-	*Not analyzed*	"<x" or "n.d."	*Below detection level*	
Sample ID	**CCME**	whcfa1b	whcfa1b	whcfa1a	wacfa1b		cccfa1b	tacfa1b
Date Sampled	*Water Quality*	22-AUG-12	05-SEP-13	04-OCT-12	22-AUG-12	04-SEP-13	16-Oct-12	23-AUG-12
Time Sampled	*Guidelines*	11:50	14:05	11:45	16:30	11:36	13:45	13:20
ALS Sample ID	*for the Protection*	L1199751-1	L1359003-2	L1220016-2	L1199751-2	L1357901-1	UGSG	L1199751-3
Matrix	*of Aquatic Life*	Water	Water	Water	Water	Water	Water	Water
Field Parameters								
pH	6.5 - 9.0	7.62	7.6	7.72	7.4	8.08	8.13	8
Water temperature		7.2	8.78	8.3	12.5	11.18	3.6	13.1
Dissolved oxygen	6.5, 9.5	11.54	11.63	11.26	9.81	12.26	14.05	10.99
Specific conductance		81.2	91	65.4	194.0	107	-	85.8
Physical Tests								
Hardness (as CaCO3)		40.9	40.4	-	100	100		-
Hardness (as CaCO3)		46.1		37.8	109		145.10	38.80
Major Ions								
Alkalinity		34.5	-	-	93.5	-	139.9	40.0
Chloride (Cl)	640	0.4	-	-	1.3	-	0.7	0.4
Sulphate (SO4)		12.7	-	-	18.1	-	19.1	6.7
Calcium (Ca)		12.5	-	-	27.8	-	46.0	11.8
Magnesium (Mg)		1.1	-	-	4.7	-	7.3	2.2
Sodium (Na)		1.3	-	-	2.4	-	2.4	1.0
Potassium (K)		0.3	-	-	0.6	-	0.4	0.3
Nutrients								
Dissolved Organic Carbon (DOC)		1.08	-	-	1.78	-	4.73	1.28
Ammonium (NH4)		0.4	-	-	0.1	-	0.0	0.4
Nitrate and Nitrite (as N)		-	-	-	<0.0051	0.0074	-	<0.0051
Nitrate (as N)	13	-	-	-	<0.0050	0.0074	-	<0.0050
Nitrite (as N)	0.06	-	-	-	<0.0010	<0.0010	-	<0.0010
Orthophosphate-Dissolved (as P)		-	-	-	0.0172	<0.0010	-	<0.0010
Phosphorus (P)-Total	Guidance framework		-		0.0022	0.0068	-	<0.0020
Bacteriological Tests								
E. coli		-	-	-	<1	6	-	<1
Coliform Bacteria - Total		-	-	-	38	411	-	56

RESULTS OF ANALYSIS

Legend:		Exceeds Guideline	-	Not analyzed	"<x" or "n.d."	Below detection level

Sample ID	CCME	whcfa1b	whcfa1b	whcfa1a	wacfa1b		cccfa1b	tacfa1b
Date Sampled	*Water Quality*	22-AUG-12	05-SEP-13	04-OCT-12	22-AUG-12	04-SEP-13	16-Oct-12	23-AUG-12
Time Sampled	*Guidelines*	11:50	14:05	11:45	16:30	11:36	13:45	13:20
ALS Sample ID	*for the Protection*	L1199751-1	L1359003-2	L1220016-2	L1199751-2	L1357901-1	UGSG	L1199751-3
Matrix	*of Aquatic Life*	Water	Water	Water	Water	Water	Water	Water
Total Metals								
Aluminum (Al)-Total	Fxn of pH	0.022	0.798	0.055	0.149	0.200	-	-
Antimony (Sb)-Total		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-
Arsenic (As)-Total	0.005	0.00015	0.00022	0.00013	0.00097	0.00127	-	-
Barium (Ba)-Total		0.022	0.025	<0.020	0.041	0.040	-	-
Boron (B)-Total	1.5	<0.10	<0.10	<0.10	<0.10	<0.10	-	-
Cadmium (Cd)-Total	Fxn of hardness	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-
Calcium (Ca)-Total		16.3	14.1	13.5	34.6	32.4	-	-
Chromium (Cr)-Total		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	-	-
Copper (Cu)-Total	Fxn of hardness	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-
Iron (Fe)-Total	0.3	<0.030	0.639	0.058	0.258	0.290	-	-
Lead (Pb)-Total	Fxn of hardness	<0.00050	0.00100	<0.00050	<0.00050	<0.00050	-	-
Magnesium (Mg)-Total		1.33	1.25	0.96	5.42	4.78	-	-
Manganese (Mn)-Total		<0.0020	0.0205	0.0041	0.0179	0.0194	-	-
Mercury (Hg)-Total	0.026	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-
Potassium (K)-Total		0.43	0.76	0.61	1.05	1.06	-	-
Selenium (Se)-Total	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-
Sodium (Na)-Total		<2.0	<2.0	<2.0	3.2	2.8	-	-
Uranium (U)-Total	0.015	0.00143	0.00160	0.00260	0.00128	0.00120	-	-
Zinc (Zn)-Total	0.03	<0.050	<0.050	<0.050	<0.050	<0.050	-	-
Dissolved Metals								
Dissolved Metals Filtration Location		FIELD	-	-	FIELD	-	FIELD	FIELD
Aluminum (Al)-Dissolved	Fxn of pH	0.031	-	-	0.014	-	0.0027	0.0048
Antimony (Sb)-Dissolved		<0.00050	-	-	<0.00050	-	-	-
Arsenic (As)-Dissolved	0.005	0.00018	-	-	0.00092	-	-	-
Barium (Ba)-Dissolved		0.127	-	-	0.151	-	0.2439	0.0567
Boron (B)-Dissolved	1.5	<0.10	-	-	<0.10	-	-	-
Cadmium (Cd)-Dissolved	Fxn of hardness	<0.00020	-	-	<0.00020	-	-	-
Calcium (Ca)-Dissolved		14.6	-	-	32.5	-	46.0	11.8
Chromium (Cr)-Dissolved		<0.0020	-	-	<0.0020	-	-	-
Copper (Cu)-Dissolved	Fxn of hardness	<0.0010	-	-	<0.0010	-	n.d.	0.0004
Iron (Fe)-Dissolved	0.3	<0.030	-	-	0.038	-	0.012	0.007
Lead (Pb)-Dissolved	Fxn of hardness	<0.00050	-	-	<0.00050	-	-	-
Magnesium (Mg)-Dissolved		1.11	-	-	4.70	-	7.3	2.2
Manganese (Mn)-Dissolved		<0.0020	-	-	0.0058	-	0.0061	0.0004
Mercury (Hg)-Dissolved	0.026	<0.00020	-	-	<0.00020	-	-	-
Nickel (Ni)-Dissolved	Fxn of hardness	n.d.	-	-	n.d.	-	0.0011	0.0001
Potassium (K)-Dissolved		0.32	-	-	0.82	-	0.4	0.3
Selenium (Se)-Dissolved	0.001	<0.0010	-	-	<0.0010	-	-	-
Sodium (Na)-Dissolved		2.1	-	-	3.1	-	2.4	1.0
Uranium (U)-Dissolved	0.015	0.00087	-	-	0.00112	-	-	-
Zinc (Zn)-Dissolved	0.03	<0.050	-	-	<0.050	-	0.055	0.029

RESULTS OF ANALYSIS								
Legend:		*Exceeds Guideline*		-	*Not analyzed*	"<x" or "n.d."	*Below detection level*	
Sample ID	**CCME**	whcfa1b	whcfa1b	whcfa1a	wacfa1b		cccfa1b	tacfa1b
Date Sampled	*Water Quality*	22-AUG-12	05-SEP-13	04-OCT-12	22-AUG-12	04-SEP-13	16-Oct-12	23-AUG-12
Time Sampled	*Guidelines*	11:50	14:05	11:45	16:30	11:36	13:45	13:20
ALS Sample ID	*for the Protection*	L1199751-1	L1359003-2	L1220016-2	L1199751-2	L1357901-1	UGSG	L1199751-3
Matrix	*of Aquatic Life*	Water	Water	Water	Water	Water	Water	Water
Volatile Organic Compounds								
Benzene		-	-	-	-	-	-	<0.00050
Ethylbenzene		-	-	-	-	-	-	<0.00050
Methyl t-butyl ether (MTBE)		-	-	-	-	-	-	<0.00050
Styrene		-	-	-	-	-	-	<0.00050
Toluene		-	-	-	-	-	-	<0.00050
ortho-Xylene		-	-	-	-	-	-	<0.00050
meta- & para-Xylene		-	-	-	-	-	-	<0.00050
Xylenes		-	-	-	-	-	-	<0.00075
Surrogate: 4-Bromofluorobenzene (SS)		-	-	-	-	-	-	96.5
Surrogate: 1,4-Difluorobenzene (SS)		-	-	-	-	-	-	98.9
Hydrocarbons								
EPH10-19		-	-	-	-	-	-	-
EPH19-32		-	-	-	-	-	-	-
LEPH		-	-	-	-	-	-	-
HEPH		-	-	-	-	-	-	-
Volatile Hydrocarbons (VH6-10)		-	-	-	-	-	-	<0.10
VPH (C6-C10)		-	-	-	-	-	-	<0.10
Surrogate: 3,4-Dichlorotoluene (SS)		-	-	-	-	-	-	79.9
Polycyclic Aromatic Hydrocarbons								
Acenaphthene		-	-	-	-	-	-	-
Acenaphthylene		-	-	-	-	-	-	-
Acridine		-	-	-	-	-	-	-
Anthracene		-	-	-	-	-	-	-
Benz(a)anthracene		-	-	-	-	-	-	-
Benzo(a)pyrene		-	-	-	-	-	-	-
Benzo(b)fluoranthene		-	-	-	-	-	-	-
Benzo(g,h,i)perylene		-	-	-	-	-	-	-
Benzo(k)fluoranthene		-	-	-	-	-	-	-
Chrysene		-	-	-	-	-	-	-
Dibenz(a,h)anthracene		-	-	-	-	-	-	-
Fluoranthene		-	-	-	-	-	-	-
Fluorene		-	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene		-	-	-	-	-	-	-
Naphthalene		-	-	-	-	-	-	-
Phenanthrene		-	-	-	-	-	-	-
Pyrene		-	-	-	-	-	-	-
Quinoline		-	-	-	-	-	-	-
Surrogate: Acenaphthene d10		-	-	-	-	-	-	-
Surrogate: Acridine d9		-	-	-	-	-	-	-
Surrogate: Chrysene d12		-	-	-	-	-	-	-
Surrogate: Naphthalene d8		-	-	-	-	-	-	-
Surrogate: Phenanthrene d10		-	-	-	-	-	-	-

RESULTS OF ANALYSIS

Legend: *Exceeds Guideline* | - *Not analyzed* | "<x" or "n.d." *Below detection level*

Sample ID	**CCME**	tacfa2b		tccfa1a	tccfa1b		nacfa1b	
Date Sampled	*Water Quality*	23-AUG-12	04-SEP-13	23-AUG-12	23-AUG-12	04-SEP-13	04-OCT-12	05-SEP-13
Time Sampled	*Guidelines*	13:45	14:35	15:50	16:17	14:50	14:15	12:15
ALS Sample ID	*for the Protection*	L1199751-4	L1357901-2	L1199751-5	L1199751-6	L1357901-3	L1220016-4	L1359003-1
Matrix	*of Aquatic Life*	Water	Water	Water	Water	Water	Water	Water
Field Parameters								
pH	6.5 - 9.0	8.06	8.18	8.22	8.45	8.22	8.09	7.37
Water temperature		13.1	13.73	13.5	15.3	14.78	7.3	12.32
Dissolved oxygen	6.5, 9.5	10.85	12.52	10.76	11.0	12.73	9.92	11.66
Specific conductance		86.0	65	315.3	243.7	210	81.2	70
Physical Tests								
Hardness (as CaCO3)		44.3	41.9	-	104	159	39.0	49.7
Hardness (as CaCO3)		37.17						
Major Ions								
Alkalinity		43.1	-	-	99.6	-	37.2	-
Chloride (Cl)	640	0.2	-	-	0.2	-	1.4	-
Sulphate (SO4)		6.2	-	-	6.3	-	7.6	-
Calcium (Ca)		11.4	-	-	23.0	-	12.8	-
Magnesium (Mg)		2.1	-	-	5.4	-	1.8	-
Sodium (Na)		0.8	-	-	1.9	-	1.2	-
Potassium (K)		0.4	-	-	0.5	-	0.4	-
Nutrients								
Dissolved Organic Carbon (DOC)		1.27	-	-	2.57	-	1.40	-
Ammonium (NH4)		0.1	-	-	0.3	-	0.2	-
Nitrate and Nitrite (as N)		<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	-	-
Nitrate (as N)	13	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-
Nitrite (as N)	0.06	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		-
Phosphorus (P)-Total	Guidance framework	<0.0020	0.0022	0.0022	0.0027	0.0093	-	-
Bacteriological Tests								
E. coli		<1	<1	<1	<1	5	-	-
Coliform Bacteria - Total		59	276	101	>201	579	-	-

RESULTS OF ANALYSIS								
Legend:		*Exceeds Guideline*		-	*Not analyzed*	"<x" or "n.d."	*Below detection level*	
Sample ID	**CCME**	tacfa2b		tccfa1a	tccfa1b		nacfa1b	
Date Sampled	*Water Quality*	23-AUG-12	04-SEP-13	23-AUG-12	23-AUG-12	04-SEP-13	04-OCT-12	05-SEP-13
Time Sampled	*Guidelines*	13:45	14:35	15:50	16:17	14:50	14:15	12:15
ALS Sample ID	*for the Protection*	L1199751-4	L1357901-2	L1199751-5	L1199751-6	L1357901-3	L1220016-4	L1359003-1
Matrix	*of Aquatic Life*	Water	Water	Water	Water	Water	Water	Water
Total Metals								
Aluminum (Al)-Total	Fxn of pH	-	0.027	-	<0.010	<0.010	0.027	0.076
Antimony (Sb)-Total		-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total	0.005	-	0.00041	-	0.00072	0.00131	0.00039	0.00050
Barium (Ba)-Total		-	0.026	-	0.036	0.032	<0.020	0.024
Boron (B)-Total	1.5	-	<0.10	-	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	Fxn of hardness	-	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020
Calcium (Ca)-Total		-	13.1	-	31.3	46.8	12.8	16.0
Chromium (Cr)-Total		-	<0.0020	-	<0.0020	<0.0020	<0.0020	<0.0020
Copper (Cu)-Total	Fxn of hardness	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Iron (Fe)-Total	0.3	-	<0.030	-	<0.030	0.100	0.055	0.104
Lead (Pb)-Total	Fxn of hardness	-	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
Magnesium (Mg)-Total		-	2.21	-	6.21	10.2	1.70	2.35
Manganese (Mn)-Total		-	<0.0020	-	<0.0020	0.0135	0.0379	0.0067
Mercury (Hg)-Total	0.026	-	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020
Potassium (K)-Total		-	0.64	-	0.77	1.05	0.52	0.61
Selenium (Se)-Total	0.001	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Sodium (Na)-Total		-	<2.0	-	2.7	4.3	<2.0	<2.0
Uranium (U)-Total	0.015	-	0.00070	-	0.00080	0.00094	0.00106	0.00105
Zinc (Zn)-Total	0.03	-	<0.050	-	<0.050	<0.050	<0.050	<0.050
Dissolved Metals								
Dissolved Metals Filtration Location		FIELD	-	-	FIELD	-	FIELD	-
Aluminum (Al)-Dissolved	Fxn of pH	<0.010	-	-	0.0026	-	0.0036	-
Antimony (Sb)-Dissolved		<0.00050	-	-	-	-	-	-
Arsenic (As)-Dissolved	0.005	0.00038	-	-	-	-	-	-
Barium (Ba)-Dissolved		0.033	-	-	0.0254	-	0.0286	-
Boron (B)-Dissolved	1.5	<0.10	-	-	-	-	-	-
Cadmium (Cd)-Dissolved	Fxn of hardness	<0.00020	-	-	-	-	-	-
Calcium (Ca)-Dissolved		14.0	-	-	23.0	-	12.8	-
Chromium (Cr)-Dissolved		<0.0020	-	-	-	-	-	-
Copper (Cu)-Dissolved	Fxn of hardness	<0.0010	-	-	0.0008	-	0.0020	-
Iron (Fe)-Dissolved	0.3	<0.030	-	-	0.009	-	0.017	-
Lead (Pb)-Dissolved	Fxn of hardness	<0.00050	-	-	-	-	-	-
Magnesium (Mg)-Dissolved		2.25	-	-	5.4	-	1.8	-
Manganese (Mn)-Dissolved		<0.0020	-	-	0.0005	-	0.0470	-
Mercury (Hg)-Dissolved	0.026	<0.00020	-	-	-	-	-	-
Nickel (Ni)-Dissolved	Fxn of hardness	0.0001	-	-	n.d.	-	n.d.	-
Potassium (K)-Dissolved		0.64	-	-	0.5	-	0.4	-
Selenium (Se)-Dissolved	0.001	<0.0010	-	-	-	-	-	-
Sodium (Na)-Dissolved		<2.0	-	-	1.9	-	1.2	-
Uranium (U)-Dissolved	0.015	0.00069	-	-	-	-	-	-
Zinc (Zn)-Dissolved	0.03	<0.050	-	-	0.009	-	0.015	-

RESULTS OF ANALYSIS

Legend:		*Exceeds Guideline*		-	*Not analyzed*	"<x" or "n.d."	*Below detection level*	
Sample ID	**CCME**	tacfa2b		tccfa1a	tccfa1b		nacfa1b	
Date Sampled	*Water Quality*	23-AUG-12	04-SEP-13	23-AUG-12	23-AUG-12	04-SEP-13	04-OCT-12	05-SEP-13
Time Sampled	*Guidelines*	13:45	14:35	15:50	16:17	14:50	14:15	12:15
ALS Sample ID	*for the Protection*	L1199751-4	L1357901-2	L1199751-5	L1199751-6	L1357901-3	L1220016-4	L1359003-1
Matrix	*of Aquatic Life*	Water	Water	Water	Water	Water	Water	Water
Volatile Organic Compounds								
Benzene		<0.00050	<0.00050	-	-	-	<0.00050	<0.00050
Ethylbenzene		<0.00050	<0.00050	-	-	-	<0.00050	<0.00050
Methyl t-butyl ether (MTBE)		<0.00050	<0.00050	-	-	-	<0.00050	<0.00050
Styrene		<0.00050	<0.00050	-	-	-	<0.00050	<0.00050
Toluene		<0.00050	<0.00050	-	-	-	<0.00050	<0.00050
ortho-Xylene		<0.00050	<0.00050	-	-	-	<0.00050	<0.00050
meta- & para-Xylene		<0.00050	<0.00050	-	-	-	<0.00050	<0.00050
Xylenes		<0.00075	<0.00075	-	-	-	<0.00075	<0.00075
Surrogate: 4-Bromofluorobenzene (SS)		96.0	99.2	-	-	-	83.1	99.7
Surrogate: 1,4-Difluorobenzene (SS)		98.1	99.3	-	-	-	84.3	100.6
Hydrocarbons								
EPH10-19		-	<0.25	-	-	-	<0.25	<0.25
EPH19-32		-	<0.25	-	-	-	<0.25	<0.25
LEPH		-	<0.25	-	-	-	<0.25	<0.25
HEPH		-	<0.25	-	-	-	<0.25	<0.25
Volatile Hydrocarbons (VH6-10)		<0.10	<0.10	-	-	-	<0.10	<0.10
VPH (C6-C10)		<0.10	<0.10	-	-	-	<0.10	<0.10
Surrogate: 3,4-Dichlorotoluene (SS)		80.9	101.6	-	-	-	93.5	114.7
Polycyclic Aromatic Hydrocarbons								
Acenaphthene		-	<0.000050	-	-	-	<0.000050	<0.000050
Acenaphthylene		-	<0.000050	-	-	-	<0.000050	<0.000050
Acridine		-	<0.000050	-	-	-	<0.000050	<0.000050
Anthracene		-	<0.000050	-	-	-	<0.000050	<0.000050
Benz(a)anthracene		-	<0.000050	-	-	-	<0.000050	<0.000050
Benzo(a)pyrene		-	<0.000010	-	-	-	<0.000010	<0.000010
Benzo(b)fluoranthene		-	<0.000050	-	-	-	<0.000050	<0.000050
Benzo(g,h,i)perylene		-	<0.000050	-	-	-	<0.000050	<0.000050
Benzo(k)fluoranthene		-	<0.000050	-	-	-	<0.000050	<0.000050
Chrysene		-	<0.000050	-	-	-	<0.000050	<0.000050
Dibenz(a,h)anthracene		-	<0.000050	-	-	-	<0.000050	<0.000050
Fluoranthene		-	<0.000050	-	-	-	<0.000050	<0.000050
Fluorene		-	<0.000050	-	-	-	<0.000050	<0.000050
Indeno(1,2,3-c,d)pyrene		-	<0.000050	-	-	-	<0.000050	<0.000050
Naphthalene		-	<0.000050	-	-	-	<0.000050	<0.000050
Phenanthrene		-	<0.000050	-	-	-	<0.000050	<0.000050
Pyrene		-	<0.000050	-	-	-	<0.000050	<0.000050
Quinoline		-	<0.000050	-	-	-	<0.000050	<0.000050
Surrogate: Acenaphthene d10		-	103.6	-	-	-	88.9	96.6
Surrogate: Acridine d9		-	102.9	-	-	-	96.8	83.2
Surrogate: Chrysene d12		-	99.0	-	-	-	92.2	92.5
Surrogate: Naphthalene d8		-	102.1	-	-	-	87.9	95.4
Surrogate: Phenanthrene d10		-	103.1	-	-	-	95.2	96.0