

Tagish and Nares Cisco:

Elders Observations, Western Science and
Resiliency Within a Socio-Ecological System

MAY, 2019

Carcross/Tagish Renewable Resources Council





Tagish and Nares Cisco:

Elders Observations, Western Science and Resiliency Within a Socio-Ecological System



Contents

Background/Context2

What we know4

Social8

Resiliency and Community10

Conclusion11

References12

Photo credits:
Fritz Mueller Photography, Karlie Knight,
Don Toews, and Environmental Dynamics Inc.

Background/Context:

Least cisco are members of the whitefish family that are common in the Yukon's lakes and rivers. Within the Yukon's southern lakes, they are widely distributed and found in Marsh Lake, Tagish Lake, Bennett Lake, Little Atlin Lake, Tagish and Nares Rivers. The Carcross/Tagish First Nation people have a long relationship with these fish they call herring.

Cisco are a small fish, however, their place within the ecosystem is one of great importance. They are a major food source for the important lake trout and have a special role to play within the social structure of the Carcross/Tagish people. Cisco are of great importance to the whole Marsh, Bennett and Tagish aquatic ecosystems as one of the main prey for forage species.

The seasonal gathering and numbers of cisco along with the top predator, lake trout and other fish, birds and animals in the Nares and Tagish Rivers and related wetlands reflects the ecological importance for the entire Southern Lakes. Together, these social and ecological interrelationships are the main components of what is called a complex socio-ecological fishery system.

Elders have seen changes in the cisco over time and have raised concerns that the populations have declined substantially over the long term of more than 50 years. Their observations around the decline of cisco in the Nares and Tagish Rivers were the impetus for three years of research initiated by the Carcross/Tagish Renewable Resources Council. To gain a better and holistic understanding of the cisco, this research has included gathering traditional, local, and scientific knowledge.

Traditional values and practices emphasize the connection of all beings, animals and humans. All things are interrelated and part of the ecosystem or community. Rather than consider a management system with a focus on cisco in isolation; a socio-ecological system will be presented as a framework for bridging traditional values and western science. Looking at fish, wildlife, habitat and people through this socio-ecological lens, as a community, can build more resiliency around cisco given the drastic changes taking place today.

The habitat and behavior of cisco supports an intimate relationship with the people who are also a part of that community. Traditional stories teach that the existence of fish and animals throughout the land is a purposeful result of actions of powerful beings from long ago. The Game Mother story, set in Carcross, the heart

of cisco habitat, illustrates how Game Mother gave birth to all of the animals and taught them where and how to live. She also explained that they would need to give themselves to the humans so that they could survive; and that the humans would be thankful and respectful because of that gift (Henderson 2007).

The story of 'How Crow got Water', tells of how Crow manages to get some water, that had fish in it, and he proceeds to drop the water (with some fish), into different lakes, creeks and rivers as he flies above (Sidney 2007).

These stories allude to an understanding that all creatures and plants and water form part of an integrated ecosystem that was thoughtfully created. This relationship is well represented in the cisco research that was conducted.



THIS RESEARCH PROJECT WAS UNDERTAKEN IN LARGE PART TO ADDRESS THE LONGSTANDING CONCERNS OF ELDER ART JOHNS REGARDING THE LONG TERM DECLINE OF NARES RIVER CISCO POPULATIONS POTENTIALLY ASSOCIATED WITH A TAILINGS POND BREACH AT THE ARCTIC MINES SITE DURING THE 1960'S.

“

I remember when I was a kid, in Carcross there used to be so much herrings there. It was just black, because on that train bridge, we'd go on the train bridge and it was just like a black blanket right across, it was just thick. Really, really lots of herrings.”

Annie Auston, CTFN elder.



What we know:

Cisco used to come into the Tagish River and Natasheeni (Nares River at Carcross) in large numbers. Cisco were so plentiful at times that kids were only allowed to bring home a certain amount to eat. This was to make sure they would respect the cisco and not waste them.

The most common place to catch them was from the Carcross and Tagish bridges. More Elders recall fishing them from Carcross, however this could have been the result of where they were living when they were young rather than where the fish were. The elders all explained that multiple kids would be fishing at any given time, and that it would take only a short time to fill their buckets.

In order to begin to identify the number of fish, or current abundance of cisco in the Tagish and Nares systems, a sampling program was undertaken by biologists for three years using nets aimed at catching all sizes. In 2016, close to 500 cisco were captured which started the data set from which to look at their abundance, age, sex and size and in particular whether there was evidence of successful spawning and reproduction taking place. In 2017, the research continued with over 200 cisco captured in total over the spring/summer and fall. In 2018, close to 500 were captured again in two different locations.

“

We could fill a 2 pound lard pail in less than 5 minutes” Mark Wedge, CTFN elder.

These locations, narrows in watercourses, are popular places for a number of creatures. These places tend to be the easiest places to cross, so therefore, they often form a part of travel routes for animals and people. They also create places where fish are “funneled” as they move through the lake system, which facilitates gathering. They are often places where watercourses are joined. Since watercourses, were integral to travel in the area, they are also places where people gathered. These factors mean that Tagish River and Natasheeni are places where people and cisco naturally come together because of their natural travel routes bring them both there.

Areas that would largely remain ice-free were also very important for people and animals over the winter and spring. These are often at lake outlets and important habitats for all whitefish species, including cisco.

There was a general sense that cisco are still around, just not in the narrows in the same historic concentrations anymore. The cisco are seen in all lakes (especially Bennett and Tagish), sometimes at the south end of Bennett Lake, One Mile Rapids. The regular appearances in Bennett Lake seem more recent.

“

The trout that we've been catching, they got herring in their bellies. So they're finding them. And I see, you know when they ball up, herring ball you can see when there's no wind, there's ripples on the surface of the water, on the lake.”

Rick Halliday

This bears to question what may have changed in the environment of the narrows that makes it less of a place of congregation. The Elders have a number of theories of why there are fewer cisco today. These include: a 1960s tailings breach in a creek that flows into Bennett (at Tin Cup Creek); the Whitehorse dam, changes in the construction of the bridges (used to be wood; pilings were positioned differently and were closer to the water); and changes in water levels and temperatures.

Traditional and local knowledge indicates that cisco could be found in the narrows all year round, but that they were particularly abundant in the late summer as they seemed to be moving south into Tagish and Bennett Lakes. The large number of cisco would last about a week.

During this time of abundance, people remember catching cisco of all sizes and that some would have eggs. Mark Wedge described that, “some of them had eggs in them. Sometimes bright orange, and sometimes dark red. We would eat them.” Despite seemingly depleted numbers, the current sampling research also captured all sizes and age classes of cisco including ripe spawning fish and young of the year fry in both locations.

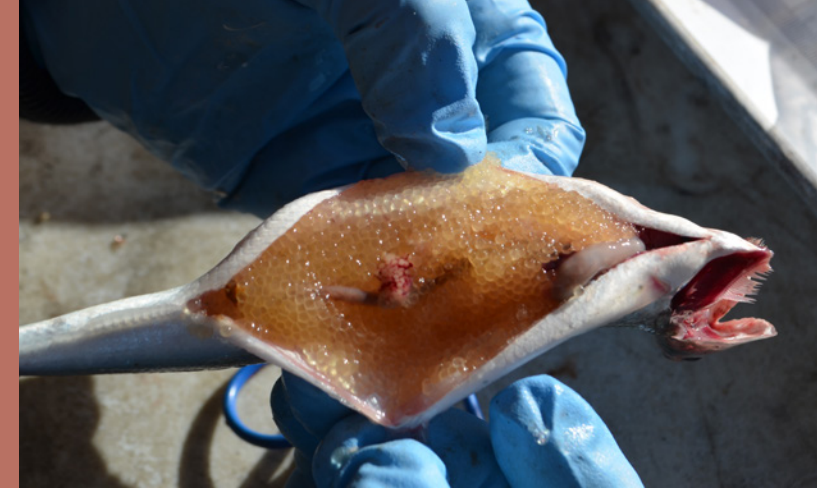
“

About 15 years ago I saw them at Christmas time. This was a surprise. We were never looking for them at Christmas time.”

Edna Helm, CTFN elder.



CISCO WERE MORE ABUNDANT AND DIVERSE AT TAGISH, IN TERMS OF AGE AND SIZE, AS WELL AS LOCATIONAL DISTRIBUTION OVER THE AREA AND SEASON.



Cisco were more abundant and diverse at Tagish, in terms of age and size, as well as locational distribution over the area and season. Over the three years of research, at both locations, least cisco ranging from 0 to 5 years of age were captured, with the majority in the range of 1 to 3 years old. This quick maturity and short lifespan for cisco, with only a few fish making it to 4, 5 or 6 six years is very interesting when thinking of their major predators lake trout and lake whitefish which grow and mature slowly reaching lifespans of 40 plus years. An older lake trout would witness approximately 10 generations of cisco on one life cycle. This illustrates the importance of healthy cisco populations and how it is important to look at the two species together and not separately.

Sampling in the Tagish River & Natasheeni (Nares River at Carcross) successfully captured spawning cisco in September of 2017 and 2018. All of these were ripe (i.e. running eggs or milt) with considerable portions captured in Natasheeni found to be spent (i.e. recently spawned). In Tagish, the locations where spawning cisco were captured were relatively shallow (<3m), along the river margin and in areas with a sand/gravel substrate free of plants. The most notable aggregation of spawning fish was along an inside bend of the Tagish river where a large gravel/sand bar extended out into the main channel; water depth ranged

from 2.1 to 2.9 m along the length of the set. During an interview, Art Johns mentions large aggregations near a little island in the Tagish River, “they accumulated on this first little island, we used to cut hay up there and that’s where I used to catch those little herring”, Art Johns, CTFN elder.

The field studies noted a movement of older cisco through the Tagish River during early summer; later in the summer, the captures in Tagish were dominated by younger cisco. The elders felt that the cisco captured in Tagish are the same fish as the ones in Natasheeni, that may explain the age differences as the fish perhaps move south as they progress through their life cycle. Generally, the research did not find much variation in the different genetic types of cisco between the Tagish and Carcross areas. This suggests the cisco moving through the Tagish River in early summer may be the same as those found in the Nares River later during the summer. However, there was some indication that genetic diversity at Carcross was lower than at Tagish.

HOWEVER, THERE WAS SOME INDICATION THAT GENETIC DIVERSITY AT CARCROSS WAS LOWER THAN AT TAGISH.

Social

As part of the community, or socio-ecological system, cisco interact with many other living things. The cisco are part of the food system of animals, birds, other fish and humans. Maturity data suggests that cisco in the Southern Lakes mature very quickly; nearly all 2 year olds were sexually mature and would spawn that year. A portion of the 1 year olds were also sexually mature suggesting that a portion of the population reproduces for the first time at the end of their second growing season. This low longevity and rapid rate of maturation supports their ecological role as a prey species.

The high reproductive capacity of cisco characterized by early maturity at 1-2 years of age and complete turnover of the population within 3 years allows for relatively high levels of mortality including harvest without risk to the population. Lake trout represent the other end of the spectrum with very low reproductive capacity characterized by slow growth and late sexual maturity at 10-12 years of age when they spawn for the first time, and then for another 20-30 years (living to an age of 30-40 years). This life history of lake trout makes them highly vulnerable to mortality and overharvest. Lake trout predation probably represents the single most important source of mortality for cisco. This interaction between predator and prey with completely different life histories is one that happens throughout their entire life cycle and their entire range.

Cisco have always been important socially and culturally to Carcross/Tagish First Nation people. Many have fond memories of jigging for cisco while the adults fished for lake trout. The kids would jig with a stick, string and treble hook (or multiple hooks on one line). The very young children were taught by the older kids. It was seen as a great time to being together the kids in the community, a time when kids could learn from their older cousins and siblings. When asked if he was taught by anyone to fish the herring, Jim James explained, "No, I watched everybody go over there and fish, hey? Cut a pole off about 6/8 feet or something and tie a string on the end, and jig hook, that's all they used."

The role of cisco as prey to other fish, particularly lake trout, was noted as the youth would be catching cisco from the bridges while the adults would be fishing the lake trout. Others noted that the birds would always be nearby. Regardless if it is a bird eating a small cisco fry or a large lake trout eating an adult cisco, their role is one of interconnectedness.

“

Mostly kids caught the herring, the adults would get trout. It was a joy to be out there.”

Les Johns, CTFN elder.



Cisco were prepared from fresh by frying or occasionally dried or canned. The kids found them very tasty. Very few were used for animal food. The kids would also sell them to the Mathew Watson Store in Carcross or the Tagish Trading Post in Tagish for bait.

There has been a noted decrease in cisco numbers. And there has also been a decrease in the fishing for cisco. The changes in fishing activities are likely the result of multiple factors including socio-cultural changes. The youth are participating less in fishing in general. Kids are engaged in different activities in the summer, while parents are working.

The bridges are higher, making fishing more challenging. Fishing off a bridge with people of various expertise and temperaments can result in strong fishing line getting tangled and discarded which is a threat to birds, animals and fish. The bridges are also made of different materials that don't collect as much algae as they did before. This could have been a source of food for cisco resulting in them schooling around the bridge and being observed by more people.



Adding in climatic changes, water level fluctuations, changes in water quality, increased number of docks, and boat traffic, there are many pressures facing all living beings in these rivers today. It is not necessarily surprising that there are visibly fewer cisco congregating and migrating through the narrows. The dramatic apparent decline in cisco at Nares River, based on traditional and local knowledge and the recent technical studies is notable and concerning.

THE DRAMATIC APPARENT DECLINE IN CISCO AT NARES RIVER, BASED ON TRADITIONAL AND LOCAL KNOWLEDGE AND THE RECENT TECHNICAL STUDIES IS NOTABLE AND CONCERNING.

Resiliency and Community:

The traditional knowledge highlighted the role of cisco in more than just the ecosystem. They played an important socio-cultural role; they are part of the community. Their abundance at certain times brought people together and taught lessons about respect and taking only what was needed; leaving some for the other fish and some to carry on their life cycle.

Considering cisco within a socio-ecological system addresses all aspects of a fishery and most importantly feature humans, social structures, and political processes as part of nature and not separate from it (see figure 1; adapted from Virapongse et al. 2016).

Not stated specifically in the figure above, however, present in the system are the above mentioned cultural, community, habitat and youth perspectives.

This approach honors the traditional values, but also provides insight into integration that will work towards ecological resiliency. Resiliency is the ability of an ecosystem to maintain key functions and processes in the face of stress or pressure, by resisting and then adapting to change (Holling, 1973). By integrating management practices that consider all aspects of the system, the cisco are more able to be resilient if one process becomes damaging.



Conclusion:

The Elders have highlighted the social and ecological importance of cisco in the Tagish and Nares Rivers. They have also observed changes in the number of cisco from past. We also know that the people, fish, wildlife and habitat in the Southern Lakes are facing a time of unprecedented change and increased pressure. Typical management systems are no longer adequate to deal with these changes and all the interrelationships and connections that science and traditional knowledge have identified in this report.

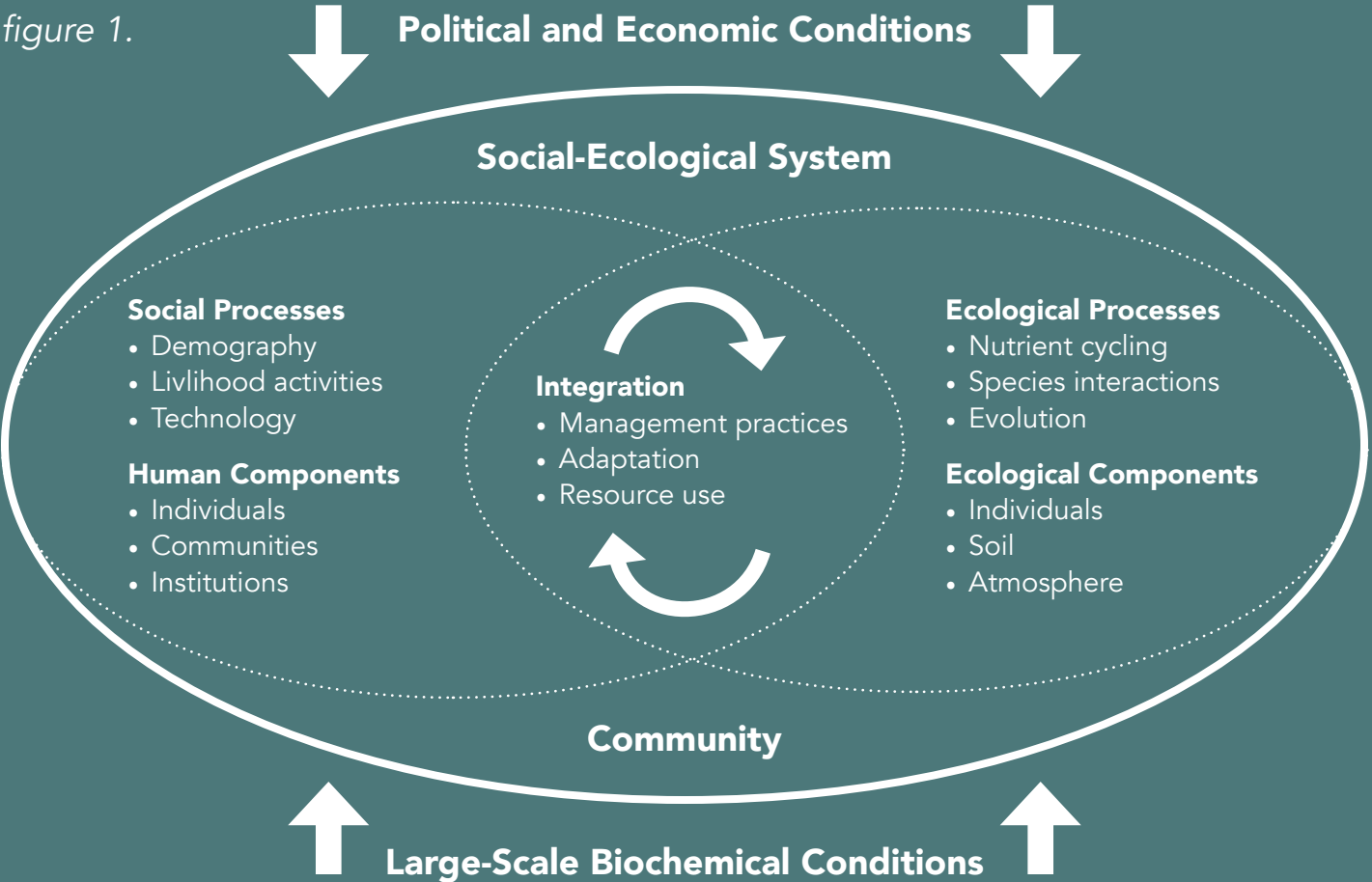
The three years of study by the C/TRRC, EDI and C/TFN have provided a set of baseline information around the cisco's age, sex, length, spawning areas, genetic characteristics and migration patterns. There is also an increasing amount of research and focus around the science of the Southern Lake's lake trout as the dominant predator in the ecosystem. which are is linked to cisco as the major prey species. The bodies of water in the Carcross/Tagish traditional territory are very large and all water

is connected, therefore, something that might be happening in other parts of the traditional territory might be influencing what has been observed in the Tagish and Nares Rivers.

The concept of ecological resiliency and the socio-ecological system provides a means for facilitating inter-relationships between traditional knowledge and western science. Looking holistically at fish, wildlife, habitat and people through the lens of socio-ecological systems can build the necessary resiliency required to maintain the stability of the ecosystem and the survival of keystone species like lake trout.

The work completed and presented here by the C/TRRC provides a starting point for understanding Tagish and Nares cisco. By continuing to explore cisco through the relationships with people, fish, wildlife and habitat we will paint a more robust picture that can lead to increased, and desperately required, resiliency.

figure 1.



References:

Auston, Annie. 2019. Interview regarding Cisco, April 9th. Interviewed by Jen Herkes and Seki Giardino.

EDI Environmental Dynamics Inc. (2017). Tagish River and Nares River Least Cisco Assessment, Prepared for the Carcross Tagish Renewable Resources Council. 51pp

EDI Environmental Dynamics Inc. (2017). Tagish River and Nares River Least Cisco Assessment (Year 2), Prepared for the Carcross Tagish Renewable Resources Council. 35pp

EDI Environmental Dynamics Inc. (2017). Tagish River and Nares River Least Cisco Assessment (Year 3), Prepared for the Carcross Tagish Renewable Resources Council. 35pp

Gual, L and Noorgard, R, (2008). Bridging Ecological and Social Systems Coevolution; A Review and Proposal. Ecological Economics. Vol. 69. p.707-717

Halliday, Rick. 2019. Interview concerning cisco, April 11th. Interviewed by Jen Herkes.

Helm, Edna. 2019. Interview concerning cisco, April 16th. Interviewed by Jen Herkes and Leslie Hamson.

Henderson, Patsy. 2007. Animal Mother Story. In My Old People's Stories: A Legacy for Yukon First Nations, Part II: Tagish Narrators. Yukon Tourism and Culture, Cultural Services Branch, Occasional Papers in Yukon History 5(2): 219-223.

Holling, C.S. (1973). Resilience and Stability of Ecological Systems. Institute of Resource Ecology, University of British Columbia, Vancouver, Canada 4. p.1-23.

James, Charlie. 2019. Interview concerning Cisco, April 8th. Interviewed by Jen Herkes.

James, Jim. 2019. Interview concerning cisco, April 12th. Interviewed by Jen Herkes.

Johns, Art. 2019. Interview concerning cisco, April 12th. Interviewed by Jen Herkes and Seki Giardino, Reta Johns present.

Johns, Les. 2019. Interview concerning cisco, April 15th. Interviewed by Jen Herkes and Seki Giardino, Mark Wedge present.

Knight, Karlie, (2018). Carcross/Tagish First Nation - Southern Lakes Least Cisco Research Project. Powerpoint Presentation.

Larsen, Matthew (2004). Basic Life History of Cisco (*Coregonus sardinella*) within Marsh and Tagish Lakes, Prepared for the Yukon Fish and Wildlife Enhancement Trust. 57pp

Sidney, Angela (2007). How Grow Got Water (Versions one and two). In My Old People's Stories: A Legacy for Yukon First Nations, Part II: Tagish Narrators. Yukon Tourism and Culture, Cultural Services Branch, Occasional Papers in Yukon History 5(2): 257-256.

Virapongse, A., Brooks, S.J., Metcalf, E.C., Zedalis, M., Gosz, J., Kliskey, A.D., & Alessa, L. (2016). A social-ecological systems approach for environmental management. Journal of environmental management, 178, 83-91.

Wedge, Mark. 2019. Interview concerning cisco, April 15th. Interviewed by Jen Herkes and Seki Giardino, Les Johns present.

Suggested Reference for this Publication:

Carcross/Tagish Renewable Resources Council, D. Zimmermann and J. Herkes (2019). Tagish and Nares Cisco: Elders Observations, Western Science and Resiliency Within a Socio-Ecological System.

