Haida Marine Traditional Knowledge Summary: *iinang* - Herring

Prepared to support development of the Haida Gwaii Herring Rebuilding Plan

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Introduction

This report is focused on Haida marine traditional knowledge about *iinang*[1], herring, and was prepared by the Council of the Haida Nation Marine Planning Program to support development of the Haida Gwaii Herring Rebuilding Plan. The Rebuilding Plan is being developed by the Herring Technical Working Group. The Technical Working Group is made up of staff of the Council of the Haida Nation (CHN), Department of Fisheries and Oceans (DFO) and Parks Canada.

Traditional ecological knowledge is defined as:

> *…a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment (Berkes 1999:8).*

Our use of the term "traditional knowledge" is intended to capture the elements of Berkes' definition, while also capturing a cultural distinction between the Indigenous and settler populations of Haida Gwaii. It focuses on marine and maritime species, and the marine environment. We have not limited the knowledge to "ecological" because we are also documenting cultural, historical, economic, political and societal information as it pertains to the marine environment. Due to the inherent importance of marine resources to Haidas, it is difficult to separate ecological knowledge from other topics and broader observations about society and economy, a reflection of social-ecological interconnectedness.

The Gwaii Haanas Gina 'Waadluxan KilGuhlGa Land-Sea-People Management Plan (Gwaii Haanas AMB, 2018) identifies a target of incorporating Haida traditional knowledge "into decision-making processes for Archipelago Management Board (AMB) identified fisheries (e.g., Pacific herring) by 2020 - and for all fisheries in Gwaii Haanas by 2023." (Obj.4.2 Target.1). We explore later how knowledge summarized in this report can be incorporated into herring assessments and decisions. These include:

- Inform reference points for fisheries management, e.g. ecological, economic, sociocultural
- Improve understanding of herring biology, life history, and ecology
- Understand spatial dynamics of stocks i.e. finer stock structure and socioeconomic outcomes
- Understand effects of fisheries e.g., spawn on kelp vs sac roe fishery, ecosystem interactions, gear and technology
- Document ecosystem changes e.g., climate and predator changes
- Support and inform co-management decision-making and reconciliation processes

The report relies heavily on the Haida Marine Traditional Knowledge Study reports that were completed in 2011, and includes new insights from Haida participants who participated in herring knowledge interviews in 2016 as part of the Ocean Tipping Points project. We have presented information in sections relating to important places, ecological observations, fisheries management, and social and cultural aspects of fisheries that can be incorporated into specific sections of the Haida Gwaii Herring Rebuilding Plan.

[1] Unless otherwise stated, the Xaayda kil *Haida language* in this report is in the Skidegate Haida Dialect.

Methods

Information in this report was compiled from a variety of sources. David Ellis gathered information about knowledge and use of marine resources by Skidegate Haida in the 1970s (Ellis and Wilson 1981; Jones and Lefeaux-Valentine 1991; Jones 1999). Russ Jones conducted interviews with 7 Haida men about herring in 1998 (Jones 2000; Jones 2007; HMTK Study participants et al. 2011). The Haida Marine Traditional Knowledge (HMTK) study was conducted between 2007 and 2009 and involved interviews with 54 Haidas regarding their knowledge and use of the marine environment around Haida Gwaii. Information was documented on marine charts, transcribed from audio and video recordings, and entered into a spatial database. Participants provided information on approximately 150 marine and maritime species. The results include ecological topics (such as species abundance, trends, health, habitat), cultural topics (such as Haida place names, stories, legends, significant sites), and common Haida marine activities and resource use patterns. The study was conducted in two phases with the second phase intended to fill knowledge gaps for focal species for marine planning including a chapter on herring. The HMTK study interviews are summarized in three published HMTK summary reports. Volume 3 (p. 41-75) contains a separate chapter on herring.

Melissa Poe and Daniel McNeill conducted 35 interviews in 2016 with 24 Haida men and 11 Haida women about cultural use, knowledge, harvest, environmental changes, governance and well-being benefits of herring for the Gwaii Haanas Archipelago Management Board. The 2016 effort was part of the Ocean Tipping Points project to better understand human dimensions of a changing marine environment. The interviews led by Poe and McNeill are combined with 4 pilot interviews that were conducted by Gidansda Guujaaw in 2016 for the same effort. A few individuals who were interviewed in 2016 had previously participated in the HMTK or earlier interviews. The people who participated in the 2016 herring knowledge interviews include Skidegate and Masset Haida with diverse perspectives rooted in their experiences varying from traditional food fishing, commercial fishing in the spawn on kelp and gillnet and seine fisheries, marine resource managers, a boat builder, Haida leadership, and language and cultural experts. Analysis and a brief summary of the social and cultural attributes of herring to Haida are included in this report.

Limitations: The information presented here should not be considered complete, but is only an indication of some of the Haida marine traditional knowledge that has been recorded about herring and other species, as a means of informing management of the marine environment, and further study and research. Despite the fact that a substantial amount of information has been documented during the course of various studies, it is important to recognize that this review in no way represents the totality of Haida knowledge in regards to marine species and the marine environment.

Results

Haida Traditional Use

linang is the Haida word for herring and means "plentiful". Traditionally, whole herring (Clupea harengus pallasi), k’aaw *herring spawn on kelp* and herring spawn on branches or other substrates are harvested. Haida would use whole herring either for bait, food or oil.

Herring congregate in the spring to spawn in certain areas of the coast.

One Haida, James Young, recalled his father —who was trained as a young man to carry on Haida oral history— describing one use of herring as oil in Skidegate Inlet in the far-distant past (Jones 2000):

> *I'll start off with before we got oolichan grease. Before they [the Haida] went over to the mainland. Before canoes. Herring was really thick in here. Outside South Bay [in Skidegate Inlet] there was great big herring there. You could use that herring for oil, its oil content, because we had no oolichan grease. You could get the oil out of there. You just put it up on a stick. You cut it open. I guess you gut it too. They were great big herring the size of humps. Then you put it by the fire and there's a container below it. The head up and the tail down and it just drips right into the container. (James Young, 1998)*

This size of herring (humps or pink salmon are 2-3 lbs.) is rare today —the maximum reported size of herring is 38.0 cm (Hart 1973)— but big herring have been reported in unfished populations in other areas of B.C.

One of the Haida origin stories tells of Gandlaay Jaada *Creek Woman* who gave Haida fish, and Diane Brown learned that Haida got herring from Creek Woman (Diane Brown, 2016).

Another old story told that the supernatural being, Skil Jaada *Luck or Wealth Woman*, brought herring to Skidegate Inlet so that Haida would never have to worry about having enough food.

> *There's a lot of older people during the time that I was gathering with my dad that talked about the abundance and different things that they used to have. And the old stories—…old George Young, he's connected into my mother's mother in that family group —he captured Lady Luck, we call her, Skil Jaada. The only way you catch her is put your hands behind your back like this. And then the other thing he had, he had found the baby of Skil Jaada and wouldn't give up the baby to her unless he got a wish granted to him—is the way they described it. And he wanted the herring to arrive in Skidegate inlet so that people would never have to worry about it as a food anymore. So she granted him the wish and later they say the herring arrived in Skidegate Inlet like the sound of a great wind — 'cause they are flipping, flipping, flipping, and they made that sound. And people never had to worry about that. That's what the old people used to tell me about the abundance we used to have.* ("Captain Gold" Richard Wilson, 2016)

A Haida archeological site near Charlotte was described as being "*loaded with herring bones, like I went there a few times and they were showing me, there was just thousands of little, tiny herring vertebrae*" (Colin Richardson, 2016), indicating that herring fish have long been historically important to Haida. This observation is also confirmed in archeological studies documenting the importance and consistent use of herring in Haida Gwaii and other locations throughout the Northwest Coast region for millennia (McKechnie et.al., 2014).

Another origin story, Xuuya Kaagang.ngas *Raven who kept walking*, includes an account of how the Haida learned to gather k'aaw on hemlock branches (Enrico 1991: 83):

> *Afterwards, after he (Raven) had walked around for a while again, they say he came upon the Herring People dancing in a house. Even the sky above it was trembling [with the din]. He glanced inside and the Herring People spawned*

> *on his whiskers. He ate the roe. It tasted awful. They say he threw away his whiskers.[2] Then he pushed in a branch which he broke off. He pulled it out. The roe was thick on it and he ate it. It was delicious. He invented this [manner of getting roe], they say.*

A story told by the chief of Tanu, and recorded by John Swanton in 1901, tells about herring fishing with nets (Enrico 1991: 173):

> *HlGaxiid town [an old village located at First Beach in Skidegate] was in existence they say. They say that sometimes the townspeople used to go out fishing for herring with nets. Sometimes they used to catch a porpoise in the net.*

The Haida used stinging nettle and fireweed fibre to make cordage and nets (Turner 2004: 59-60, 158).

Herring spawn was sometimes picked from other substrate such as eelgrass and eaten on the spot. Herring would also be collected on hemlock branches.

> *Although I have never gone out and gathered it, you know, some people would go and stick a little hemlock tree in the sand or gravel there and let the herring spawn on it.* (John Bennett, 2016)

Herring were also caught using a herring rake, a light pole six to eight feet in length with sharpened nails driven through one end, and used for halibut and black cod bait. The method was described by Reynold Russ.

> *… the way they got the herring was on what they call a rake. It was … cedar, it was light and it was cut in a way that it was oval-shaped. And the thickest part would be … about that wide—maybe an inch and a half—but they put nails on it, real sharp nails about that long… like a comb… with a bunch of nails on it. And when you are going after herring, you're going after herring on a rowboat and somebody is rowing, and going from one school to another—this is over at Cohoe Point. And … the person with the rake would be on the bow, and they'd be dipping the rake… and the rake would fill right up with herring and they'd just dump it on the stern … that's the way they got the herring. And it used to be lots of fun. Like I used to row and grandfather would rake in the herring. And he'd do that every night or right after … if the tide was right and the herring come up, they'd quit hand-trolling and go after the herring. And that's the way you got the herring.* (Reynold Russ, 2007)

Herring were used as bait for many other fisheries, including, halibut, salmon, cod and dogfish:

> *… back in those days nobody used store gear. We had to learn how to bait herrings. Everybody was using only herrings… my brother, he become the best one … he caught more springs than any old people down there. So I learned how to do it from him. We used to go… beach-combing and look for those bamboo trees—chunks of it here and there. We used to pick out a good*

[2] According to Enrico, Xuuya sk'aajii *Raven whiskers* is the Haida name for a seaweed species Demarestia intermedia.

> *one and cut it in the length he wants. Then he'd slice it in little sticks. So … when he baits the herring up, he pushed the heads up like that, and pushed that stick through it. It stays like that. That … makes it look like a live fish. You couldn't beat him on herring. He was the best fisherman on the hand-trolling. After he died I got a good lesson from him, how to bait those things and I remembered how he did it. I tried it one day—and I throw it over and was pulling it to myself—it wouldn't act like the way his used to act (chuckling). Then I remembered he put a stick in there. So I got sticks for it and once I got the sticks through there then they swim just the way his used to go. I caught a lot of spring salmon …* (Stephen Brown, 2009)

Larger herring used for food could be smoked, sundried or, in later years, even pickled.

> *… if the herring was too big, grandfather, all the guys would put it aside and they would … fillet it, take the bone out and put it in the smokehouse to smoke it. … I can't remember who it was but they were pickling a lot of the herring even after they took the … backbone out.* (Reynold Russ, 2007)

Collecting k'aaw was a seasonal activity that often involved travel to fishing camps, as Ernie Wilson recalled from the 1930s:

> *We used to go there [K'iid or Burnaby Narrows] for drying k'aaw in April. There used to be about, oh, I'd say about eight, ten families there, they used to have houses. Oh, April is a poor time to try and dry k'aaw. Don't matter what you are doing, if you hear somebody let out a scream, drop everything, run like heck for the beach where you got it stretched out. Pick them up and bring them to a drying shed. Oh, boy. That was work. Everybody helps, nobody is excluded. When it's good they did fairly good. Only for 22 cents a pound. Dried up stuff. They used to sell it to Japanese right at Jedway. I don't think there is even any sign of the houses that used to be there. We used to come back in May, just to get ready for going to North Island, for trolling time too. And then from North Island they'd go across to Skeena. Dried, take it across and trade with the Indians over there for oolichans and oolichan grease and soapberries.* (Ernie Wilson, 1998)

If weather permitted, k'aaw was sun-dried on a gravel beach. If the weather was poor it could be dried indoors. Dried fronds were traditionally tied into bundles of about ten and stored in bent-wood boxes. Dried k'aaw was susceptible to insect damage and turned brown and lost flavour. It was eaten dried or soaked in fresh water, then dipped in boiling water or fried. It is often eaten with eulachon oil or taaw.

Herring spawn-on-kelp was a common item that the Haida used for trade with the Tsimshian and Nisga'a people. For example, the Hudson's Bay journals records the following from August 1853:

> *The Kit-i-was (Cumshewa people) traded a large quantity of dry Halibut, Herring Spawn & Sea Weed with the Chimsheans 'inside the Fort'. (Galois 1999: 8)*

Kit-i-was was the Tsimshian name for the Cumshewa people.

In the 1880s, Indian Reserve Commissioner Peter O'Reilly recorded that the principal industry of the people of Moresby Island:

> *… is that of fishing. Dried halibut and herring spawn are bartered with the Tsimpsean Indians for oolichan grease; dog fish oil is always a marketable commodity. (Galois 1997: 8).*

In 1952, Robert Stewart from Kincolith on the Nass talked to Marius Barbeau about trade between the Haida and Nisga'a:

> *Now there are some oolichans on the Oxtall River at the mouth of the Skeena, but these are not rich and are an inferior fish. There was none on the Queen Charlotte Islands. So the Haida came and traded with nisga with herring spawn (dried) and dried halibut. Who also traded with the other tsaemsiyan tribes. And even the wutsta (Bella Bella) came to the Nass to trade for grease and dried oolichans.(Galois 1997: 22)*

Trading traditions continue into the modern era. For example, in a 2016 interview, Mick Morrison recounted,

> *Well we used to trade—I traded myself with the Gitxsans and the Tsimshians, Nisga'a. We would get moose meat, we'd get eulachons, we get eulachon grease, get huckleberries and stuff. So the Gitxsans have these mountain huckleberries, hey? They look like blueberries, but we'd trade for those too. And pretty much everything that people gather, was a trading item, hey? […] They loved the roe on kelp. We'd have so much of it that it was good for us—we didn't have to worry about going hunting for moose, or mule deer, or elk—we'd get it all from them—caribou, things like that.* (Mick Morrison, 2016*)*

Fishing methods have included wild k'aaw harvest, open ponding where kelp is picked from local areas and strung from floats or logs in places where herring spawn, or closed ponding where herring is impounded in ponds. Closed and open ponding methods are sometimes used simultaneously.

Haida Participation in Commercial Fisheries

Haida participated in commercial fisheries that developed for herring. The herring fisheries are separated historically into three time periods: dry salt, reduction and roe.

The dry salt market started in the early 1900s to meet the demand of Asian Markets. One of the oldest Haida operated a towboat bringing herring in from the west coast to a plant in Queen Charlotte City in the 1920s.The reduction fishery occurred primarily from the 1930s to late 1960s and produced fish meal and oil for animal feed and fertilizer. The roe fishery period extended from 1971 to present.

The first reduction landings in Haida Gwaii occurred at a plant at Pacofi that operated from 1938 to 1943 (Tester 1945). It was rebuilt following a fire and reopened from 1945-49 (Dalzell 1968: 300). Landings from Pacofi were significant (e.g., 7,800 tons in 1939-40 and 6,350 tons in 1940-41 according to Tester 1945: 20) but small compared to B.C. landings, at the time — about 90,000 t per year. The bulk of the catch was taken from January to March each year by two to

three seine boats. Jack Pollard from Skidegate worked at Pacofi and recalled that about 7 out of the 20 workers were Haida. Percy Williams recalled visiting Pacofi when he was about 10 years of age:

> *We used to stop in there when it was operating. I used to be fascinated at what they could do. I could see herring go in one end and the meal coming out the other. Fascinating. Seeing, what would you call it, automation. Seeing that in motion. All the herring going up in conveyor belts, and going into the plant, and going into reduction. I don't know how they did it but I remember Uncle Charlie taking the finished product at the end and putting it in bags. Yuuch, the smell.* (Percy Williams, 1998)

James Young described how difficult it was for an Indigenous person to get a job on a herring boat during that period:

> *The fleet tied up in Charlotte, must have been weekend. This was in the mid-50s, 1953, 54. There was no such thing as an Indian fishing on any of the boats in the herring fleet. They invite me aboard the boat, a couple of my friends from (Prince) Rupert on a packer … they'd tell me about the seine boats. They themselves couldn't get on one, they said. If an uncle was there as a crewman on a boat, when he died his nephew takes his place, or his father, or his son takes his place. There was no room for Indians on those seine boats at all in the herring fishery, nothing. I thought I could get on one of them boats. They were telling me we can't get on ourselves.* (James Young, 1998)

A few Haida were involved in commercial bait ponds that supplied halibut fishermen at locations such as Skidegate Inlet, Burnaby Island and Langara Island.

> *Well I started herring ponds out here when I first got my boat. Because we started that … herring operation. And then Roy started doing it after us. *So that was mainly for … halibut bait … fresh herring. So we used to catch a lot of halibut because the herring was, you know, fresh. Usually they buy frozen stuff that's been frozen for I don't know how long! It doesn't catch like fresh herring. … The whole coast used to come in here to get herring from us.* (Dempsey Collinson, 2007)

Bait ponds continued in Haida Gwaii until they became uneconomic for operators about 1990 with the introduction of halibut individual quotas in which the halibut season went from a short derby style opening to being open year round.

As described elsewhere the reduction fishery rapidly changed to a coastwide fishery that came to Haida Gwaii in 1951. High exploitation rates led to collapse of herring stocks coastwide and the closure of the fishery in 1968.

In the early 1970s, DFO considered the stocks had recovered enough to reopen the herring fishery for a new lucrative roe fishery focused on Japanese markets. Herring were harvested using seine or gillnet gear. The egg sacs of the female herring were removed during processing and the remainder continued to be reduced to fish meal and oil. A few Haida were involved in experimenting with the herring roe market in the early days.

> *Actually Clifford [Jones] was the first one to start selling that roe fishery. He used to come around and get some herring off us, cut the roe out and he'd process it and ship it to Hiawatha in Vancouver… like a halibut boat would come in for a ton of herring? And you can't judge it perfect. Sometimes you have half one barrel left over. So I'd cut the roe out, process it and I'd salt it—it's all ready to ship to Japan. I shipped it to Hiawatha in Vancouver… and he used to pay me 85 cents a pound … already processed. All he had to do was change the address and ship it to Japan.* (Roy Jones Sr., 1998)

As well, a new commercial herring spawn-on-kelp fishery began — regulated cautiously, using fishing quotas and limited entry — also focused on the Japanese market. This was due in part to the initiative of a few Skidegate Haida who had experience operating herring bait ponds, as described by two Haida fishermen:

> *… we had to experiment quite a bit … I know so much … about the herring now. I try to set as late as I possibly can and when I put them in the pond they'll spawn right away. Whereas we used to just put them in when they were still immature. Hopefully we have it down to a knowledge and then we don't hurt the herring, eh. They're in perfect health when we let them loose after they spawn. They've got a six, seven year lifetime. So that's what we do. If you look after them then they come back to spawn again next year.* (Dempsey Collinson, 1998)

> *… it happened … by accident, that we started the roe on kelp in our bait pond. See I was fishing herring and we fished … near the kelp because the herring comes into the kelp? And I caught a bunch of kelp; it got stuck in the net. While I was dumping the herring into the pond the kelp floated in. It was floating free in the pond? The herring start spawning on it. So I told the boys, 'Here's a good chance to get our own food. Look at all the herring spawning on that kelp.' So Ernie Wilson … tied a big bunch of kelp, throw [it] in the corner of our pond. He got all what he wanted. So we start stringing them. So we strung a couple of strings in our pond; we had all we wanted to eat.* (Roy Jones Sr., 1998)

> *[Dempsey] and Roy just seen a commercial fishery out of this, and when they first started out doing it, it was a learning process too at the same time. But they made it work and they did pretty good at it, and turned it into an operation and the next thing you know, there was money seen in it so it just grew … Back then it was bait ponds too. And then they just tried it, putting kelp in it, and putting more herring in there, and it took off.* (Conrad Collinson, son of Dempsey Collinson, 2016)

Herring are released from the ponds after the spawn-on-kelp is harvested. Many survive and may return to spawn year after year. Many operators experimented with open ponding where the herring are guided to spawn on kelp that is suspended from lines and floats along the shore.

Other techniques were honed by Haida SOK harvesters through fishing experimentation, including for example the size and color of the net (black or white), the kinds of knots used in nets, the speed of the tow, the depth and area of the pond, density of fish in a pond, picking the right kelp, the amount of kelp lines to lay, kelp rotations within the pond, weighting and pursing techniques, the number of days to keep herring impounded, how long to leave the pond set up

after harvest, and many other technical details, some that varied by boat operation and family. These refinements were made to improve quality, herring survival and health, predator exclusion, and other benefits; for example, by increasing oxygen and water flow in ponds, reducing crowding and scaling, and selecting spawn thickness on kelp, among other variations.

> *As we got better at doing the herring—I am speaking for us, our family—we kind of starting towing slower and stuff like that. And give the herring more slack, so they are not scaling and everything, and then you got no dead ones in the bottom of the pond. And after they do their thing in a pond, you just let them go and sometimes they will go to the shore and let go there too, right after you release them… The ones that never spawned in the pond, would get the rest of them going again.* (Conrad Collinson, 2016)

> *We started looking at all aspects on the herring and the k'aaw and how we could make it sustainable for 13 licenses for many years to come. Because me being young, all the older guys can see that I was interested in that, and I would be the next generation taking it over. So they started looking at how we could make it more sustainable: picking the right kelp, don't overharvest kelp. […] You know the old saying that you've heard the old fishermen all the time, "D.F.O. only works 8 hours a day, we work 24/7 work around them." […] we were just trying to refine the system—change our pond web to different colors so they don't spawn on it so much, the more product we get on there, and try and figure out how we can keep our mortality rates by not keeping the herring too long, or too grouped up in a pond so they don't kill themselves off or get squished and stuff like that, right?* (Sascha Jones, 2016)

> *What we did was lots of guys did—used black web, all the time…and then Chubb started experimenting, when he took over his license, he started using white pond web. And that seemed to—not much, they wouldn't spawn on it. I don't know why. I am not too sure—we only did it for a couple, three years and then you know we were just starting to get that data all together and trying to figure it out and we just figured that the whiteness—they didn't want to spawn on it, 'cause they didn't think it was kelp. You know, that they would spawn on other eggs to make layers right—but they could see the darkness, so I think that's what it was. […] And it would show on our kelp that we put in the pond 'cause we got. The product was huge—like we are talking like you are holding—like you were going to take a bite out of a burger, that's how big some of those eggs were on either side of the kelp right? So he had like fourteen to twenty layers of eggs on there.[…] And it was just an experimental thing, and it seemed to be working.[…] The eggs would spawn on there [the black web] and it wouldn't allow for a lot of water movement through…so that's why they would get a lot of mortality rate. So the fish would almost suffocate because they are breathing their own scales and other stuff […and not good] water flow through them, right—made sure they had water in the pond, but as the more layers that they had on there, it would almost suffocate them. So when we had the whiter web, the mortality rate was really, really low. Like we probably could have had a five gallon pail out of the bottom of the ponds when we were done, 'cause we had so much water movement through there right?* (Sascha Jones, 2016)

Haida Stewardship

As described in Jones (2000), individual Haida lineages controlled such resource harvesting areas as salmon spawning streams, berry picking areas, halibut fishing grounds, hunting grounds for seal or sea otter, or shorelines where whales might wash up (Niblack 1973: 335). Herring spawning grounds would be similarly controlled. This would have limited resource exploitation and promoted local stewardship of resources. As well, quantities taken of herring spawn would also have had natural limits, based on such things as the amount that Haida could have used fresh, the finite labor available for processing, and weather conditions conducive to drying product. Since mainly eggs were collected, live herring were unharmed and could return the following year to spawn again.

Herring management practices are based around the principle of Yahguudang (X̲aayda kil *Skidegate Haida Dialect*) or Yakguudang (X̲aad kil *Massett Haida Dialect*) which translates as respect.[3] An example of this practice is not disturbing herring and waiting to start the harvest a couple days after spawning.

> *… people used to go to Burnaby Narrows too. There used to be lots of k'aaw there. And when they start to spawn they don't allow anyone to row out that they excite the herring. They quit then. So they just leave it alone for a couple of days.* (Jack Pollard, 1998)

Describing himself as a "k'aaw cop" for the Skidegate Band Council (charged with a Guardian-type monitoring role), Colin Richardson recalled:

> *We used to set out buoys, we put a No-Go Zone, we'd set buoys out to make a boundary so people couldn't come in there and interfere in that natural process and possibly cause the herring—because if you bother them when they are spawning, it doesn't take much to cause them to stop spawning. And so we were very sensitive to that.* (Colin Richardson, 2016)

Another example is not harvesting an entire school of herring to help maintain local spawning populations.

> *We always knew that we never, ever wanted to do that because you want to leave some to spawn wild … you don't want to deplete the stocks by consuming them all.* (Ed Russ, 2008).

Many people that were interviewed expressed joy and excitement when traveling to spring fishing camps. K'aawdang *harvesting herring roe* is described as a cooperative effort and an integral part of life.

> *… everybody would just go out … everybody worked together, helped each others. That's the way it was. Old people were ... that way. [We would] salt it for the winter or dry it. Sundried mostly, hey? When the weather's nice. Then we put it away for the winter.* (Dempsey Collinson, 1998)

[3] The Haida Gwaii Marine Plan (2015) describes the principle of Yahguudang (X̲aayda kil *Skidegate Haida Dialect*) or Yakguudang (X̲aad kil *Massett Haida Dialect*) as "Respect for each other and all living things is rooted in our culture. We take only what we need, we give thanks, and we acknowledge those who behave accordingly."

> *… I like herring fishing. That's the best thing I like in my life, fishing herring. Without sonar. With just the sounder—that's what I like. That's because it's a challenge; you don't know whether you're going to get it because you've got no sonar to tell you where the fish is. You just got to chance it. That's real fishing. Now you got sonar and … you can tell exactly how much fish is in that school. If you want to take the whole works, you can take the whole works with a net, or else if you just want part of that school, you just take part of the school which you can see on the sonar. … Yeah, too easy. I like it when it's a struggle. It's a big challenge to get herring.* (Roy Jones Sr., 2007)

Unlike the reduction fishery, the development of ponding operations by the Haida were aligned with these values. It was observed that herring are released after spawning and most can return to spawn in future years.

> *…like they say, the [roe] herring fishery is 150% mortality because they not only kill …the swimming herring … they also kill the future stocks... and that's why they always say that the roe on kelp is …the most sustainable fishery that there is. Because they use the fish, take the eggs, but they let the fish go again to reproduce again. (Ed Russ, Jul. 2008).*

Haida Ethics and Values

The CHN's Haida Marine Work Group identified Haida ethics and values (CHN 2007) to guide marine planning. These were included with slight modifications in the Haida Gwaii Marine Plan (MaPP 2015), Gwaii Haanas Gina 'Waadluxan KilGulGa Land-Sea-People Management Plan (2018), and SGaan Kinghlas – Bowie Seamount Management Plan (2019). The Haida Gwaii Marine Plan identified six Haida ethics and values as follows:

> *Yahguudang or Yakguudang – Respect. Respect for each other and all living things is rooted in our culture. We take only what we need, we give thanks, and we acknowledge those who behave accordingly.*
>
> *'Laa guu ga kanhllns – Responsibility. We accept the responsibility passed on by our ancestors to manage and care for our sea and land. We will ensure that our heritage is passed onto future generations.*
>
> *Gina 'waadluxan gud ad kwaagiida – Interconnectedness – Everything depends on everything else. The principle of interconnectedness is fundamental to integrated planning and management. This comprehensive approach considers the relationships between species and habitats, and accounts for short-term, long-term and cumulative effects of human activities on the environment. Interrelationships are accounted for across spatial and temporal scales and across agencies and jurisdictions.*
>
> *Giid tll'juus. Balance – The world is as sharp as the edge of a knife. Balance is needed in our interactions with the natural world. If we aren't careful in everything we do, we can easily reach a point of no return. Our practices and those of others must be sustainable.*
>
> *Gina k'aadang.nga gii uu tl' k'anguudang – Seeking Wise Counsel. Our elders teach us about traditional ways and how to work in harmony. Like the forests,*

> *the roots of our people are intertwined. Together we consider new ideas and information in keeping with our culture, values and laws.*
>
> *Isda ad diigii isda – Giving and Receiving. Reciprocity is a respected practice in our culture, essential in our interactions with each other and the natural world. We continually give thanks to the natural world for the gifts that we receive. (MaPP 2015)*

These ethics and values guide Haida herring practices that are further described in subsequent sections.

Socio-Cultural Importance of Herring Fisheries

Herring is a cultural keystone species. Herring is not only vital to the marine food web, but is also at the center of Haida cultural-ecological relationships (see also Okamoto and Poe, et al. 2019, supplemental information). Herring plays a fundamental role in Haida cultural identity, foods, ceremonial use, and other socio-cultural values. Through traditional knowledge interviews with Haida participants, we summarize a variety of important socio-cultural attributes of herring and k'aaw, including:

- Cultural continuity as part of a living Haida culture
- Food dimensions including household security and nutrition, sharing and feasts
- Family and social relationships associated with the fishery, processing, sharing and feasting
- Traditional knowledge including intergenerational transfer
- Ceremonial use and spiritual importance
- Opportunity to enjoy and experience connections to places and the marine environment
- Governance including Haida rights, customary laws, distribution of benefits and co-management.

In the sections below, we delve deeper into each of the above attributes drawing from the Haida traditional knowledge interviews to demonstrate the ways that herring and k'aaw hold central cultural and social importance to Haida.

We mention but don't go into as much detail about two additional topics:

- Commercial fishing including livelihoods and economic benefits
- Access to herring, k'aaw and their ecosystems including physical (including boats, time), environmental, spatial and temporal dimensions, and management/policy.

Further detail can be found in a separate report, "A Socio-Economic Summary of Haida Gwaii iinang Fisheries" prepared to support development of the Haida Gwaii herring rebuilding plan.

Cultural Continuity as Part of a Living Haida Culture

The ability to harvest, access and use herring and k'aaw is important to maintaining cultural continuity and living Haida culture. Identity is a sense of individual self and community, e.g., "herring is part of the essence of who you are" as Barbara Wilson (2016 interview) emphasizes. In a marine ecosystem context, identity can include a sense of connection to marine life and to the practice of harvesting as a way of life, for example as expressed in the statement, "I am a

fisherman." Heritage refers to generational connections to culture and place, which can include, but is not limited to oral traditions and family stories; customary practices, knowledge, and language; and archeological and historical sites. Through interviews, k'aaw is intricately tied to Haida identity and heritage. As living Haida culture, identity and heritage associated with k'aaw and herring are dynamic and can be continued through on-going relationships, engagements, and practice.

> *You can see that people do reach back to their childhood, or wanting to feel Haida and to really understand what it means to be Haida, and to feel whole as a person. Gathering the food, dealing with the food, getting the family [together]— that's a huge part of it. It's not just the food part, but a huge part is healing as a community. And that healing component, as people who didn't—who lost opportunities or don't have it—start to reclaim their identity and reclaim who they are now by learning themselves and then sharing. […] That's probably one of the most effective ways for our communities to continue to heal and grow, and to feel Haida.* (Jason Alsop, 2016)

> *How do you live, how do you survive if you are denied the very essence of what makes you who you are? And that includes k'aaw or the herring spawn on kelp, and it also includes the herring, and it includes the salmon, and the clams—everything, everything that we ate or continue to eat now*. (Barbara Wilson, 2016)

Traditional Fishery: Food, Nutrition and Security, Sharing and Feasting, Trade and Barter

Herring spawn on kelp is an important food in the Haida seasonal round. It's one of the first foods of the Spring. Marked by changing seasons and ocean food webs, k'aaw is thought to feed the spirit. It brings nutrients and adds to the subsistence foods that Haida harvest. It is "Haida food," that is, culturally-important food and a key source of nutrition.

> *[Herring] has always been a food of the Haida, it's been an important food. And we prepare it many different ways. And going to get herring is an experience that takes us onto the ocean, and it puts us in touch with nature by getting the herring—it's quite an experience, you have to be there to know it. The first taste of k'aaw, there's nothing like that.* (Barbara "Babs" Stevens, 2016)

> *It's one of those soul food things […] And when it didn't happen, it was so sad, but when it does it has the potential to bring the community together and strengthen our community. It's just one of those events, right, it's an event.* (Judson Brown, 2016)

It's not only the herring and their roe, but also the kelp that make up the food value of k'aaw: "*The kelp is part of the healthy part of what we eat too. It's not just the eggs—the eggs are protein, but the kelp is the sort of vegetable that goes along with it."* (Cindy Boyko, 2016)

Practicing the traditional food fishery has largely been a family-centered harvest activity, but increasingly, the opportunity to harvest and access k'aaw has been a community event such as ones that were sponsored by the Skidegate Band Council or the Council of the Haida Nation.

There were several years when, for example, the Skidegate Band Council hired Conrad Collinson and a crew of Haida fisherman to harvest k'aaw for the community. In that way, there are livelihood benefits to select fishermen, increased opportunities to monitor conditions in key spawning sites and to connect with those places, as well as community food benefits. These sponsored harvests distributed food to Haida households for whom it may be the only way to access k'aaw, and the sponsored harvests also create occasions for community celebrations and feasts:

> *My picture of perfection would be that the Skidegate Band Council would be able to harvest enough for the whole community—and if it spawns in the inlet here, and then those people who love to go and do that experience get the chance to do that.* (Barbara "Babs" Stevens, 2016)

Sharing similar enthusiasm, Diane Brown reflected on how important feasts that are centered on k'aaw are for the community: "*Two years ago, the community, we had a k'aaw feast here*." She continued:

> *It was pure joy, it was the most wonderful feast I have ever attended, we had two things: we had potatoes, butter, and k'aaw. And the rec hall was packed, and you could eat until you busted.* (Diane Brown, 2016)

Giving k'aaw during feasts and potlatches, and as food gifts, was described as an important cultural value. In particular, the importance of bringing k'aaw to family, elders and community members in Old Massett is an important way for distributing access to this traditional food:

> *The last time I went and picked k'aaw, I think I got 7 buckets—and I gave 6 of them away. … Allan Davidson's dad had a potlatch. I gave him a bucket, when Allan Davidson had his feast up. I try to, it was my brothers up north, I really try my best to make sure they got k'aaw. I can remember bringing a k'aaw to the Haida language program up in Massett. And I really try hard to gift k'aaw.* (Colin Richardson, 2016)

Potlatches have played many important roles for Haida and the inclusion of herring is part of the wealth and cultural work done therein; speaking historically Captain Gold commented:

> *That's the reason why you have a potlatch is because you have the abundance of the marine resources. The marine resources are your form of money, and your form of wealth, and also your gift giving during the potlatch. So if you have—like I remember Kingsway Rock, just near Thurston Harbor—one lady down there lost her son in a drowning accident, and the owner of the territory would be Chief Skedans. So he had to pay blood money to this woman, and he decided to give her Kingsway Rock—Kingsway Rock is a real high-density seagull nesting site, so the eggs would become some kind of money. So those things like that are what we used to view as money—puffin beaks, you know—and then territories, if you had the population, you also defend your territory and your claim, and expand if you had to. Because sometimes you have a growing population—you need more resources, you don't want to keep buying from the next-door neighbor, so you may end up in a fight to gain more territory. So that needs more resources, more marine, more areas where the herring would be, where the halibut, would be abalone, all those resources. They become your wealth. All important for the potlatch. Like Poole Inlet—oh my goodness, used to be a huge*

> *village—now eroding away, there's very little left.* ("Captain Gold" Richard Wilson, 2016)

Traditional harvesting and commercial SOK fishing are often combined. For instance, spawn on kelp fishermen were accustomed to bringing some k'aaw trimmings home for food. When product quality fell below market standards and if there were "peelers" and uneven tips and edges after assembling good market-quality product, the trimmings would not be wasted but instead get used by fishermen to help as food for themselves and family at home. While it wasn't as preferred as wild k'aaw, this type of product was still considered good to eat:

> *We never ever threw stuff that was good enough to eat away—all the trimmings on deck too. Everyone that was down there would come around and get the trimmings off the deck.* (Conrad Collinson, 2016)

Trade networks have been important through the years for Haida, both within Haida Gwaii between families, including for example between Skidegate and Old Massett in particular, it has been a key way for Haida families in Old Massett to get k'aaw. The access to k'aaw was described as improved after the road was built.

> *We always had k'aaw and stuff, and people from Skidegate, their friends and relatives from there that would give them dried k'aaw and stuff like that. I have eaten that as a child, and you know, still eat it if I can get it. And I think the access is actually getting a lot better now with the road being put in. The road never got put in until, I believe it was somewhere around 1958, '58-'59... There used to be a road between Port and Skidegate, I believe, but in order to get between here and Port, you had to take a boat to Port—you couldn't drive to Port. So after that you could drive all the way to Charlotte.* (John Bennett, 2016)

There has also historically been trade networks between Haida and other Nations on the mainland. Reflecting on her memories of these trade practices, Betty Richardson recounted:

> *We used to send the herring on kelp to my husband's sisters. My husband had a sister in Port Edward, and one in Rupert. And you know, we would send them k'aaw whenever it came.* (Betty Richardson, 2016)

> *It's still our traditional and inherent right, we traded right—done it for thousands of years whether it was the abalone or anything like that—any kind of product [including spawn on kelp]."* (Sascha Jones, 2016)

Sascha Jones went on to describe the trade interactions with the Nisga'a and other Nations on the mainland, who sought k'aaw or halibut from Haida Gwaii in exchange for elk, moose or eulachon.

Family and Social Relationships

Harvesting and processing k'aaw, and then sharing it through feasts and gifting, are among the important social benefits of herring to Haida families and close social relationships. It isn't just the benefit of food as nutrition, but also the social and community aspects of coming together, and demonstrating Haida values. Being generous and caring for each other, bringing k'aaw to elders and sharing in the community was described in a 2016 interview with Colin Richardson

as the “Haida way.” In the words of other interviewees, the importance of k’aaw harvesting and foods to family and social relationships is further described:

> *It’s just getting out there and harvesting with your family,… it brings a community together … the whole community gets excited and people love eating k’aaw … if there’s a spawn, everyone gets excited and comes together and celebrates, and you come together out on the water, you come together on the land when you are drying it, processing it. And then you get to share it, sharing fresh seafood is pretty important I think.* (Judson Brown, 2016)

> *K’aaw just sort of brought everyone together […] it was always a sense of community and looking after each other and sharing, and people just felt happy. And I have thought a lot about it over the years. It’s not just about the product itself, it’s about—‘cause that’s how we are meant to be, caring about each other. [K’aaw brings] us together and allow[s] us to feel generous and care […] When that happens it’s a sense of rightness. […] There’s just something about that k’aaw that brings you to community and everyone shares, and it’s a time of renewal every spring.* (Cindy Boyko, 2016)

Traditionally, it was primarily women who harvested k’aaw using row boats going to kelp beds not far from home. Diane Brown described learning that her ancestors pre-contact all had their own smaller food gathering canoes and at that time, the women would use these to go get k’aaw. The role of women as the primary k’aaw harvesters continued during her childhood and early adult years:

> *I used to watch the other women, and it was all women that gathered. They had their boats and they would go out to the island, the spots out here.* (Diane Brown, 2016)

> *… I would just go and pick k’aaw with the other women. There was… no men that picked when I first started in say ’66… I did it for commercial purpose; we got say a dollar a pound for it, one time, and a dollar-twenty-five it went up to. It was hard work. You pulled by hand, rowed out, and then you had to dry it on the beach—spread it out on the beach and wait for the sun …* (Diane Brown, 2008)

Everyone would play a role in harvesting and processing the spawn of kelp. Many of the adults who we interviewed recalled learning about k’aaw from their mothers, aunties and grandmothers. Not simply acquiring traditional harvesting knowledge, these times also held significance in strengthening family bonds, especially between children and their mothers and other women in their families.

> *I have a wonderful memory of k’aaw –it’s one of my most favorite memories of childhood—was helping my mother as a little girl, take her k’aaw from the rowboat to the beach. When my brother—my brother is a year younger than me, and even as little children I can remember when it started to rain and we knew our mother’s k’aaw was on the beach. We would leave whatever we were doing, wherever we were playing, and if we felt the rain, we would run to the beach and gather our mother’s k’aaw and pile it on a log for her to make sure it didn’t get wet. But it’s such a fond memory, the minute she landed on the beach, we would be waiting for her, helping her pack the k’aaw up on our little arms and it’s actually quite an emotional memory too. Remembering how hard*

> *our women worked, and how much we loved the k'aaw and loved to work on it with our mothers. We packed the k'aaw up on our little arms and pile it on logs to drip dry. And our mother would call us and would be praising us and telling us how tough and wonderful we are for helping her. And that is my fondest memories of gathering k'aaw and how precious our k'aaw is to us and how much we love it.* (Isabel Brillon, 2016)

These social relationships were especially important for women's friendships as they engaged in traditional k'aaw harvests:

> *I have always gone with my best friend, Diane Brown* Gwaganad*, and also with another one of my best friends, Willard Wilson.* (Barbara "Babs" Stevens, 2016)

Sharing a similar reflection, Diane Brown remarked, *"it was just the joy of going out and being with all the women, the talking and laughter that would go on."* (2016 interview)

In recent decades, k'aaw harvests have been increasingly practiced primarily by Haida men, particularly for those involved in the SOK commercial fishery. This may have changed over time as a photo from 1897 showed harvesting as a family activity (B.C. Provincial Museum PN355 Newcombe). Fishing for SOK takes place in various bays and inlets throughout Haida Gwaii, and access to J-licenses and a power boat, and having the time to get out to the fishing grounds are important enabling aspects of carrying out the fishery. While many social changes have taken place in k'aaw fisheries and Haida life over the years, including gender-based changes, the significance of social ties across generations and among crew and family members remains. Similar social experiences and childhood memories were expressed by Haida men:

> *My earliest memories of the herring is probably going out with my dad when I was nine years old, or something like that. Going down to South Moresby to do up ponds and whatnot. I was doing that my whole life […] I started going down, '85 I started as a crew man […] my brothers and other crews that were down there doing the herring [pond fishery.]* (Conrad Collinson, 2016)

> *[Bringing my boys out harvesting k'aaw is] something I value—my parents did for me—and hopefully they can look back and appreciate being on the land harvesting their own food.* (Judson Brown, 2016)

> *We all just go to my uncle's house and he's got totes and we get all the stuff ready and then cut it up and then divide it up—but everybody helps right? All my sisters come and my cousins and everyone just chips in——whoever is around and then they take away what they need …you know enough for them.* (Jason Alsop, 2016)

Traditional Knowledge Including Intergenerational Transfer

In addition to social relationships and strengthening family bonds, generational and traditional knowledge has been passed down within families during childhood, as many of the comments in the previous section convey. Traditional knowledge involves teachings and guidance on topics such as harvest and processing techniques; reading the ecosystem for indicators of timing and location, as well as ecological relationships between herring and other marine life; learning about best quality and preparation; and Haida ethics and protocols. Knowledge is gained

through stories, as well as observation and practice. It's a kind of learning that doesn't really happen in schools, notes Sascha Jones (2016), but around the dinner table, and on the water, sitting with the elders and listening to them. Informal caretakers and more formal guardians, such as those in the Watchman program, play important roles in monitoring and observing what takes place on the water, and in teaching protocols such as when is the right time and place to harvest k'aaw. Among the traditional knowledge topics is learning conservation protocols and Haida ethics. Learning to be respectful. One harvester spoke about the learning process and the Haida technological innovation of k'aaw grapple hooks:

> *We learned—I guess just by listening to the other women and to the other gatherers—the best time to go out, which would be at low tide. And seemed to be when the tide turned—it would churn up the heaviest ones on the bottom, so that you could get them. But before that there was the—and thanks to Dick Bellis, he created these hooks—where you could throw them way down at the bottom as far as they'd go, and you could get those bottom ones that had the thickest k'aaw on them—up.* (Barbara "Babs" Stevens, 2016)

During her time in the Watchmen Program, Barb Wilson described teaching about Haida ethics:

> *I would talk to them about respect and gathering and things like that … [Our ancestors] would have known that you can't overuse something and expect it to survive. It's about resilience, it's about respect, and it's about sharing and caring.* (Barbara Wilson, 2016)

Continuing, she spoke about the importance of stewardship and respectful practices:

> *We have to really think about what's important and for me what's important is a clean, healthy world that can provide for the next thousand years and beyond of my descendants, so they can know what it's like to get k'aaw. Hopefully it won't be just a word then. But they will be able to eat k'aaw and dig clams and steam mussels and eat octopus and eat salmon. How does all that get passed on? It gets passed on by being respectful, it gets taken care of or made right by changing the way we view things as commodities—they are not commodities—if they are commodities, we are commodities.* (Barbara Wilson, 2016)

Reflecting on how a respectful harvest should be practiced by not interrupting a spawn event, Diane Brown remarked on the lessons she learned from her grandmothers, grandfather, and her mother:

> *Well nothing would ever harm the fish, like I said if we knew they were pregnant and around there, nobody went near them. You respected what was going on there. And when they got near the kelp they spawned on the kelp, and we never went near it for four days, and then once the milk went away, you can take. … Anything that disrupts the natural order of things is sort of like a sacrilege, 'cause we call those things, … Gund iina, I believe, it's sacred. Or it's taboo to do that, "-inda," it's sort of taboo to kill all the females.* (Diane Brown, 2016)

Ceremonial Use and Spiritual Importance

K'aaw (as food, the practice of harvesting and gifting, and its relationship to the marine environment) plays a role in Haida spiritual life and in ceremonies.

> *It is a spiritual experience, to go out on the ocean and to be at one with the ocean and the food and the herring. And the silence of it all when you are done—sitting there. I am sure fishermen feel that when they go fishing out the west coast or wherever they go fishing.* (Barbara "Babs" Stevens, 2016)

A supply of k'aaw is often kept or procured for ceremonies such as potlatches, we learn from Rollie Williams (2016). And Roberta Olson confirms that k'aaw "is at every feast—there's always a big bowl of boiled k'aaw." (Roberta Olson, 2016). Its importance was summed up as follows:

> *[The supernatural laws] all pertain to the k'aaw, "Respect it," "Don't take too much," but something is amiss. Taking too much, not respecting, they were gifts for us to survive and we are getting too greedy and selling it.* (Diane Brown, 2016)

Connections to Important Places and the Marine Environment

Herring and the practice of harvesting provide opportunities for Haida to connect to the ocean, traditional harvesting places, and marine life of Haida Gwaii.

> *Going to get herring is an experience that takes us onto the ocean, and it puts us in touch with nature by getting the herring.* (Barbara 'Babs' Stevens, 2016)

> *And that importance, you can't put a dollar value on that really, and it's showing how important [herring] are now, just by observing how much life is out there now. Like in my twenty years in Gwaii Haanas, I have never seen as many whales, I have never seen as many dolphins, the amount of eagles you see. […] I think it's because the herring stocks are at a level now that it keeps all of these species that rely on them around.* (Judson Brown, 2016)

Not only the marine food webs, but k'aaw traditional activities are also tied to associated resources on land, such as cedar. Speaking about her mom, Pat Gellerman shared,

> *… she'd go out and get cedar to tie up the k'aaw [into] little bundles, sitting out in the cold at night and all this cedar bark is in water and she'd, take pieces off and tie up her k'aaw.* (Pat Gellerman, 2016)

The health of the land and sea is interconnected; and being connected with a healthy ocean and the cultural values of k'aaw is part of Haida well-being.

> *If we look at how we feel when things are askew, and then think of the earth and think of all parts of it, then how do we want to feel? We want to feel whole. How do we make ourselves feel whole? By making sure we are eating the right foods, and the right foods in our case are the foods that our ancestors ate. And how do we get that food? By making sure our creeks and our oceans and our lands are in good shape.* (Barbara Wilson, 2016)

Herring Distribution and Important Places

Herring are distributed through Haida Gwaii, with key spawning areas on all coasts. Herring spawning and harvesting locations in Haida Gwaii mentioned in interviews are shown in Figures 1 and 2 and further described below.

Northern Haida Gwaii

Northern Haida Gwaii has some of the earliest and latest spawns. Herring spawning starts in Naden Harbour in February and Massett Inlet in June. Herring are commonly found from Cape Knox, around North Island/Langara Island stretching to Klashwun Point and further to the East of Virago Sound. Spawning occurs at Virago Sound (the mouth of Naden Harbour) and moves inwards. Willie Davies noted that herring and needle fish were active in this area from June through September (HMTK 2011).

Herring spawn in eelgrass in Naden Harbour between February and May. Henry Hageman noted spawning inside Naden along the shoreline around Stanley Creek as well.

> *…they spawn up in Naden here, the Stanley Creek area. Up in this area. When we were seal hunting, in the '60s, we shot seals in there and we got them and I guess they would go through the spawning areas because all their face would be covered with k'aaw. Their whiskers were all full of it. And their nose.* (Henry Hageman, May 2007)

> *There is herring that does go in Naden, and because of the changing climate and that, I don't know when they are going in now. I think this year, I think the eulachons are a month early over on the mainland. And before the herring used to go in in February or something like that, into Naden.* (John Bennett, 2016)

In Massett Inlet, spawning would take place near Ain and Awun Rivers, Juskatla Inlet, Dinan Bay, Cub Island, and Buckley Bay.

> *[Herring] spawn up the inlet … they're a small fish; they'll be getting them down here probably the end of next month. And they spawn up in Buckley Bay. That would be over around in here. They spawn on that eel grass, eh? There's a little herring in the inlet now; we seen some this morning but they're only about this big… the birds and seals were chasing them up and feeding on them.* (Henry Hageman, 2007)

> *Last year I got herring off my sockeye net. Herring eggs, so we just took them off. […] they spawn on the net. […] Shannon Bay was right full of herring and then they came around the point to Awun and up in the bay was all full of herring. […The quality is good food,] it's just a little bit brown from the fresh water. [… It's around June and] if you had kelp up there, it would have got good product I think, but I wonder how the fresh water would be? […] and who cares if it's brown, it's just to eat.* (Arnie Anderson, 2016)

Robin Brown mentioned that the herring spawn in Masset inlet later than most places, typically in July. Oliver Bell spoke about halibut movements in relation to herring:

> *… summer you get a little more halibut… You get more along the shores here in the inlet because the herring come in in June—June, July—right up to the head of Masset Inlet, around by Awun Bay… where the herring is. So that's when you start catching more halibut along the shores in the inlet... They follow it in; they eat them.* (Oliver Bell, 2008)

Skidegate Inlet

Skidegate Inlet was an important area for k'aaw harvest as it was so close to the village. Roy Jones Sr. described typical movement of the spawn and how locations throughout the inlet would change week by week (HMTK 2011). Spawn would be on both kelp and eelgrass.

> *There used to be so much herring spawn out here. The first one would be Sgaay.yas, all around Sgaay.yas, then it would move to Indian Head and spawn all around the whole Indian Head, and then the Museum Point, would spawn there, then it would move from there to like Skidegate Landing Point, and from Skidegate Landing Point to BC Tel Point, and then it would move over to like Alliford Bay and then… Maude Island, X̲aayna…* (Diane Brown, 2007)

Herring spawns in Skidegate Inlet have dramatically decreased since the reduction fishery began and has not fully recovered after 50 years.

> *… there was such an abundance of [k'aaw] at the time, right out here, at the islands. But the past few years there hasn't been much … since that reduction wiped us out here, there was hardly any herring after that. But that's what we used to do out here—get enough roe on kelp for the winter, right out here … Everybody went out and loaded up.* (Dempsey Collinson, 1998)

Echoing the significance of Skidegate Inlet, Conrad Collinson in 2016 emphasized his father Dempsey Collinson's observations that prior to the reduction fishery, "*the best herring on the whole B.C. coast was right here in Skidegate Inlet."*

Some blame grey whales, that began stopping in the inlet in the late 1970s and early 1980s, for more recent declines:

> *It [the spawn in Skidegate Inlet] used to be so thick. Every week it spawned different places ... It used to start spawning in April, May, June, July, still the odd little spawn: That's how many months we used to get spawn. And damn near every week it spawns in different places. ... There isn't enough herring around now. The whales eat the roe. As soon as it starts spawning, even one day spawning, the whales are in there kicking up the roe and then they siphon it out.* (Roy Jones Sr, 1998)

> *Towards the end of my k'aaw picking days, the whales started coming around [in Skidegate Inlet], and they'd never come around before. And they started making the sand go onto the k'aaw, so that was bad.* (Barbara 'Babs' Stevens, 2016,)

One of the interviewees identified that herring also spawn lightly north of Skidegate Inlet.

> *But the herring are smart; they just spawn a little bit along right from Tlell—we used to hunt seals up there… when they're chasing the herring, and it used to spawn a bit all along the beach, right from Tlell all the way up the inlet, right to Charlotte. And they still do that; they just spawn a bit on the eelgrass. That's Mother's Nature's way of making them survive, I guess. So the Indians don't get it. … Yeah, that was in the sixties when we used to hunt seals up there.* (Percy Williams, 1998)

Hecate North

South of Skidegate Inlet, Cumshewa Inlet was a major area that supported a commercial herring fishery.

> *Conglomerate [Point] all the ways out to McCoy Cove used to be almost all blue. This was blue all the time for spawn* … (Captain Gold, 2009)

He also noted that herring used to spawn in Beattie Anchorage prior to installation of log booms. Abundance of herring in Cumshewa in recent decades has been very low.

Selwyn Inlet was described as having some of the largest herring on the island. Herring spawn often extends from Traynor Creek to Louise Narrows, supporting traditional k'aaw harvesting. Arnold Pearson, a Haida fisherman who participated in a roe herring gillnet fishery in Cumshewa Inlet, said that he caught there the largest herring that he had ever seen (Personal Communication with Russ Jones about 1998).

The reduction plant at Pacofi lay just south of Selwyn Inlet.

Gwaii Haanas

Burnaby Narrows had high herring productivity, particularly Scudder Point, which was mentioned by many people who were interviewed.

> *…the main thing we used to go [to Burnaby Narrows] for was the roe on kelp. They'd dry it and then…my mum and I used to salt it; [there was] no deep freeze yet*… (Roy Jones Sr., 2007)

> *They spawn all over—this whole island, all along here, all over here, all through Skincuttle Inlet, and they spawn up here, all along this area [just south of Lyell Island]. There's so much herring, they spawn anywhere. At Scudder Point they spawn, right out here, they spawn all along this shore here—right around the island. There's so much herring around; they're all fished out now.* (Roy Jones Sr., 2007)

> *That Scudder Point, [herring] were so thick, they even spawned on rocks. It'd get real thick on rocks. [You could] … just peel it off the rocks …* (Roy Jones Sr., 2007)

> *If we are truly going to measure this, we need to go back to way back when the stocks were healthy. And that needs to be our baseline of information. There's stories of Scudder Point for instance, where the old people used to*

> *say that after the spawning was over the eggs on the beach were as high as a human walking on the beach*. (Colin Richardson, 2016)

Many Haidas would stay in seasonal camps to gather k'aaw in Burnaby Narrows.

> *…there used to be a small village [at Burnaby Narrows]. Everybody had their own cabins there and we used to go there to get k'aaw, halibut, you know. They used to dry the halibut, dry the k'aaw, or salt it. And spend the whole month of April and May down there. Or even earlier than that, it spawns quite a bit earlier than it does around here.* (Harvey Williams, Apr. 2007)

Important spawning areas mentioned around Burnaby Narrows include Island Bay, Kat Island and Skaat Harbour. Haida spawn-on-kelp operators would typically set up ponding operations in Juan Perez later in March. One of the spawn on kelp operators describes the pre-spawn aggregations:

> *… in Juan Perez they hang out in huge schools … Mid-March to the end of March. Huge schools—I don't know where they all go. … More than what you see spawning. For sure … unless they all hold there. Some go up to Sewell, and some go … down to Skincuttle … when you go out there… there is a lot of fish. [You see similar concentrations] in Skincuttle… out around the mine there. There's always lots of fish there. Early. But they disappear[ed] too.* (Vince Pearson, 1998)

Early spawning sites include Louscoone Inlet at the end of February/beginning of March. Spawns also occur in in Carpenter Bay and Collison Bay.

In that same region, near Ninstints (or Anthony Island) in southwestern Gwaii Haanas, killer whales started coming in.

> *I never noticed the whales before, and then a couple years ago when we went down into down around the corner, —what is it called just up from Anthony Island in there?—we did a survey. But there was killer whales around, so they didn't dive. There was two killer whales and some sea lions in there.* (Arnie Anderson, 2016)

West Coast

Herring spawn in many small inlets on the west coast. Rennell Sound in particular had a high abundance of herring at one time.

> *There used to be a lot of herring there. See k'aaw drift up on the beaches; it used to be just piled up on the beach, like that. A foot or two high, piled up on the beach and way up the head… the eggs, yeah, the k'aaw. Even Dawson Harbour used to have a fairly good spawn. And that doesn't happen very much anymore. And Skidegate Narrows—on this side of Skidegate Narrows—there used to be spawn there. We used to get k'aaw there but not anymore… that was in March—late March or early April.* (Percy Williams, 1998)

Speaking about the west side herring population, near Seal Inlet, Conrad Collinson described his last time fishing in that location around 2009:

> *It was pretty healthy, especially down in Port Louie […] I would set in there, and you get small fish and big fish mixed. We didn't get the real thick product out of it—and you know that's from fishing it too—you get different batches hanging out together after the stocks get smaller. [Juveniles] hanging out with the big ones. We operated in there and Port Chanel—Port Chanel's got a run in there too, and that one was pretty healthy—I was getting on good sets, made quite a few sets in there. And we filled three ponds, because I was helping out Clint Pearson.* (Conrad Collinson, 2016)

The HMTK study (2011) reported that the amount of herring on the west coast has been impacted by fishing. Where there once was a lot of herring at Cone Head, Marble Island and Hunter Point, fewer schools were being observed.

Past Herring and Predator Abundance

Several Haida described changes in herring spawns and predator abundance in Burnaby Narrows and Skidegate Inlet. These types of observations are valuable in trying to recreate a picture of ecosystems before the onset of industrial fishing:

> *But I know that there were millions of tons of fish, because when they started moving through Burnaby Narrows it sounded like a big rainfall or something, at nighttime going through the Narrows. And then the sealions and the killer whales right with them too. Hear the sealions roaring all night going through the Narrows after the herring. When we go looking for k'aaw in the spring there's not nearly as much spawn [now]. And a few sealions, maybe 20 or 30 sealions passing through. But seals getting abundant every year. All along the beach here there are seals everywhere out here when the herring come into the inlet* (Percy Williams, 1998)

> *There used to be a lot of sealion. Even k'aalw – cormorants. There used to be lots on both Islands (near Skidegate village). In the evenings you'd hear them. You'd hear them plainly. You don't see them now. No feed for them. No herring. Grey cod and tommy cods, they're edible but they're not there now. Soles, that's gradually disappearing too. We used to go out there and get lots, rowing, just outside of Balance Rock. I've tried it a number of times in the past lately.* (Ernie Wilson, 1998)

As described in Jones (2000), changes in killer whale, sealion, seal and seabird distribution may be either local effects or signs of long term trends. Grey whales, for example, began appearing in Skidegate Inlet in the late 1970s after decades of absence, while the decline in grey cod in Skidegate Inlet — major stocks of grey cod (Pacific cod, *Gadus macrocephalus*) occur in Hecate Strait — is likely related to stock depletion in trawl fisheries.

Ecological Observations

Arrival of herring was announced by many other species, making them somewhat predictable. Many other fisheries took place at the same time as harvesting k'aaw or herring.

> *… [you get] lings, snappers, everything. You see everybody that did the roe on kelp down here, and guys that came down would all food-gather around here for their bottom fish … [it] usually … starts getting thick around the herring time, too. Halibut too, they move in… I think the spawns and everything drag them in. They get that smell… little halibut move in there. I imagine when the herring are spawning on the bottom … they do a lot of spawning in the deep too… and I think that's when the halibut get them … when they're letting go in the deep. The halibut just sit there and wait… feast on them.* (Conrad Collinson, Oct. 2008)

Sea lions, dolphins, whales and many other sea mammals are drawn into the area during herring aggregation and spawning,

> *So one time I was asking my mum why they named Second Beach Kay. You know them rocks on this side? Along the highway? They used to be just covered with sea lions all the time—that's before the highway was put in—especially at this time of year when the herring start to come in, the sea lions used to come in and they used to just stay on the rocks there, where it's nice and handy to go in after the herring.* (Harvey Williams, 2007)

> *Lots of dolphins. Lots of dolphins. … You start seeing splashes out on the horizon there and they're coming fast, too. Next thing you know they're right next to the boat. They pick up the vibrations, eh, off of the boat, and then they just jump off your bow and everything. But they're feeding on the herring too…* (Conrad Collinson, 2008)

> *…especially in the roe on kelp…we started running into whales, I'd say in '98. And sometimes when we're through and we're heading south with our product, out in Hecate Strait …you could see whales as far as the eye could see. But not in the inlets; they were …out in the Hecate Strait. And I don't know if they eventually ended up in the inlets, but … that would be in the end of March, the early part of April … I would imagine [they were] feeding. I imagine … if the herring were in that volume in the inlets, they were probably out in the ocean also…* (Gary Russ, 2007)

However, with the significant declines in the stocks, the number of predators has decreased as well.

> *There used to be a lot of sea lions, even the… k'yaaluu, cormorants. Yeah. There used to be lots on both islands. In the evening you would hear them—oohwoowoo, ohwoowoo—you could hear them plain as that. You don't see them now. No feed for them.* (Ernie Wilson, 1998)

Ernie Wilson spoke about changes in the spring salmon behaviour.

> *… the spring salmon just come in—not very many—just come in to feed. Mostly they hang out out here; occasionally it seems some come in and just feed when there used to be herrings in the inlet. Yeah, now that there's no herrings you don't find no salmon in the inlet.* (Ernie Wilson, Aug. 2008)

Seabirds are another indicator of herring presence and activity. Percy Williams observed that seabird nesting in Alliford Bay coincides with the timing of herring coming in to Skidegate Inlet

(HMTK 2011). Fishermen know to look for seagulls, cormorants and many other species when fishing herring.

> *I remember seeing…you know, so many birds. Uncle Rufus, he'd see all the birds and say, 'You can't fool the birds.' When it came to the herring, eh? Then you'd see the whole shoreline would be white with the males' milt … miles of shoreline would appear white, like someone dumped cans of cream in there, and lots of it…* (Monte Stewart-Burton, 2007)

> *That's what a lot of the old guys taught me right? Look at your birds, look at your wildlife. […] Seagulls just attack on the surface, they might go down ten feet in the water to get the fish or whatever, but there's other birds that will dive a hundred feet. You know when the herring are moving in, you see them—you are coming into an area and you see a group of birds that are swimming along diving. […] Those are the things that just stick in my head and I still use those today. You know when we start going out fishing, we start scouring the water and looking for birds, "Oh look there's birds over here, a bird over there, oh yeah…yeah, yeah, there's groups over there. Let's go try that."* (Sascha Jones, 2016)

Other important ecological observations made while harvesting for the SOK and k'aaw food fishery, include changes to kelp. In some recent years, the kelp quality or abundance was poor owing to ocean conditions or predators such as urchin.

> *Kelp…kelp and herring have been the biggest thing lately […] but last year I missed out just 'cause of the kelp wasn't a good year. It was just bum, rotten, spawned on too late […]. Urchins and stuff like that picked off those areas […]. In certain areas that you'd go back to, it's not growing. It's real sporadic. But there's certain areas that do produce kelp but you got to be right on the spot or else the weather will rip it up.* (Sascha Jones, 2016)

Many Haida are convinced that fishery managers don't really understand the impact of the herring fishery on other species, as described by James Young:

> *I think it takes so long for the herring to come back. And there's a lot of fish that eat that herring for survival. They don't think of that. There's spring salmon, cod, the whales. It is all food for them too. It's their food chain.* (James Young, 1998)

Evidence for Herring Stocklets

A number of participants reflected on differences between herring populations in Haida Gwaii. Prior to stock declines in the 1960s, many participants noted that there where morphological differences between different stocks of herring which would spawn in different areas at different times. Large herring were known to be at Louscoone, Selwyn, Cumshewa and Skidegate Inlet. Several noted that even in times of abundance, herring in Naden Harbour tend to be smaller. Several participants noted herring's homing behaviour to spawning grounds. Haida people are concerned about the impact of the fishery on small herring stocks that spawn in Skidegate Inlet, Selwyn Inlet, some parts of the West Coast and other areas. For example, Percy Williams, commented:

> *They're just like salmon, I think. They may travel a long way when they are not spawning. But I feel strongly that they go back to the same area to spawn, where they were born. But fisheries [DFO]think otherwise. They manage the whole area like they spread out and spawn in that whole area. We all know that they just spawn a little bit here and a little bit there. Wipe out these and it's gone.* (Percy Williams, 1998)

Haida also note that in the same location, there can be more than one spawn event from different groups of herring.

> *That last year there, we went to Jedway and they finished spawning, and we get there and it's spawning again. And then Fisheries said, "Oh we went by and it quit spawning." So they went back again and it was spawning again when they went there. It spawned three times. [Perhaps different groups of herring…] and they don't spawn at the same time.* (Arnie Anderson, 2016)

Selwyn Inlet was noted by Conrad Collinson to have two different groups, with separate spawn times and sizes, one in February and one in late March/early April:

> *Totally two different batches—that early one was getting big, I ended up getting it one year—it was just before they shut the islands down. […] We ran into some herring and dad was jigging them up and sounding on a great-big school and they were all real fat and full.* (Conrad Collinson, 2016)

Application of Haida Traditional Knowledge to Herring Management

Spiritual Law and Haida Ethics: Respect and Responsibility

Traditional knowledge embedded in Haida stories and oral histories provides important information not only about technological details and environmental conditions and changes, but also about ethical principles that guide management including co-management of the marine environment. Diane Brown participated in an interview in 2016 and in preparation for our interview, she described being in prayer, and asking her ancestors for guidance. She recounted an origin story that her Uncle Sol told her, and James Young, who was told by his father, a trained Haida storyteller. The story she shared is as follows:

> *It seems we came once before, and man was made out of air, the legend goes, and disappeared. We came the second time and it was made out of clay, and we disappeared, and this—what we are all here now—we came out of the ocean. We used to live in the underworld, and we came up from the ocean this time. In various spots on Haida Gwaii—these are special spots, because our ancestors came out there*. (Diane Brown, 2016)

Diane Brown went on to state that:

> *… each Haida person has a responsibility and that responsibility is to take care of Haida Gwaii. And it's quite evident in many of us has done that, we've done whatever it takes to protect—like Gwaii Haanas. It was our ancestors that set those down—the laws of respecting everything, the laws of not taking too much.* (Diane Brown, 2016)

These ethical principles described earlier provide a Haida vision for managing herring and other natural resources.

> *It's our responsibility to look after these areas, the water and the land. No one knows it like we did or do—you know, maybe we've lost some of it, but we've been here a long time. We're not just talking to have our little share of it, you know, we are talking to protect it for the future too.* (Cindy Boyko, 2016)

Remarking on the need for the Haida Nation to have a guardian to monitor k'aaw harvests and respect traditional laws, Colin Richardson (2016) emphasized: as "*a Haida Nation, we still need to maintain these ancient laws*."

In addition to general responsibilities to caretake, interview participants described specific considerations for herring and k'aaw. Among these include: respect the timing of the spawn and the importance of not interrupting reproduction to sustain herring populations; to not take more than one needs and in particular avoid over-fishing; protect key areas and close them to fishing or create buffers; to monitor and manage local stocks of herring; to limit fishing until there is robust recovery; to distinguish between the different kinds of herring fishing and their varied impacts and benefit flows; and to account for ecological factors within an ecosystem-based management context.

Commenting on the importance of not interfering with spawning activity and awakening the traditional knowledge to wait a few days before harvesting k'aaw, one person stated:

> *We used to have very strict rules around that nobody was allowed to hang around the spawn because if they did that with boats, it would stop the spawn. Now the first thing I see fishing boats do—because I just live up the hill here—is the first thing they do is rush over to where it's milty and start disturbing it.* (Barbara 'Babs' Stevens, 2016)

Barbary Wilson indicated that another principle of Haida Law is Tll yahda *to make things right*. She noted:

> *We have to change the way we think about [herring], we have to change the way we manage them, and that means we have to look at how, in the old days—prior to commercializing everything—these things were looked after*. (Barbara Wilson, 2016)

Overfishing

During the 1950s a large mobile fleet was fishing, locating schools with hydroacoustic depth sounders and using mercury lights to attract fish at night. Over and over, Haida elders described the night fleet as looking like a "city of lights" on the water. Ernie Wilson and Roy Jones Sr. recalled the fishery in Skidegate Inlet:

> *We used to get some (k'aaw) right in here. Until they had no quota in the Inlet, fished it out a couple of times and then [clap] no more fish in the inlet. Just been lacking off and on ever since, after they really cleaned it out. Ah, at nighttime, wintertime, you'd see it, like a big city out there, all these big seine boats with their lights. Just tons and tons, taking fish out, taking herrings out of here. It never really came back after they cleaned it out. [Fishing was] with a*

> *big seine, a real deep seine. Big boats, double-deckers. That was what was doing all the fishing. Yeah, there was no limit here at all so it didn't take long for them to clean it [out]. Ever since then it's never been the same.* (Ernie Wilson, 1998)

> *There was plenty of herring in here [Skidegate Inlet] then. They had that big fishery one year and the herring got kind of scarce. They used it for fertilizer. Just imagine all them good herring they used for fertilizer. There was millions of boats out here, taking loads of herring out of here. That is what really killed the stock. They didn't even stop them.* (Roy Jones Sr., 1998)

Overfishing and impacts to herring population and SOK food fishing were also observed in other locations of Haida Gwaii, resulting from both the gillnet fishery as well as seining.

> *When we first started down there, the gillnetting was going on at the same time, so once we would get close to Section Cove—and there's a boundary there, you know, with the noise from that—the spawning quit for a while. But sometimes it worked for us—that gillnets just pushed the herring right into Section Cove and just fill it up to be away from that noise. […] Section Cove and then Scudder Point—right around Scudder into Poole Inlet, that's where the opening usually happened hey, and then it would be all in the reef and everything—if they had the weather for that. If not, they would go in by the narrows, and then just boundary it off at Section Island there so that's pretty close to our operation too. But I don't know, back then the stocks were a little bit decent, hey? And I think the stocks just got hammered a little too hard and, especially that last year before they shut it down. We had a protest going down there to try and stop the seining from fishing; but they fished anyway. And just because there was a protest, it went like 1500-1700 tons over the cut off. After that, we went down there, like we were shut down too, and we went down there to just get some kelp because we were stationed at the mainland—went down there to get some kelp, and oh, it was just dead everywhere. […] I was doing probably about 7 food fish operations, Skidegate Band, and one for Haida Nation, and being down there alone with just myself and my gear. We still had to look around for herring, it wasn't like it used to be. A lot of the spots that they did come, like into Poole Inlet and into Section Cove, they just didn't happen there. You would be sitting there waiting and I just gave up on that spot—and up by the narrows there, Burnaby Narrows, that was starting to show a bit of herring so we ended up operating in Island Bay for three years or something like that, on that small, little run in there. […] I think that was 14 years ago or something that the commercial operations stopped down there, so I haven't seen a very drastic change since then.[…] Spot spawns is what we call it, hey? You know, that's what I see down there now.* (Conrad Collinson, 2016)

James Young described his concerns with the reduction fishery:

> *But there should have been quotas set. Even when I was running boats, they should have closed Jedway. I don't see why they kept opening it, opening it. Because in the reduction days, the amount of herring that's in there [now] is nothing compared to that. When the herring came in there they got wiped out right away. It is a wonder there is anything left down there. There were too many complaints about reduction. It would be different thing if they were using it for food or something. Just taking the oil content. Dumping all the mass up in the reduction for plant food or something.* (James Young, 1998)

A Haida spawn on kelp operator described the herring fishery on the west coast in 1994 before it was closed the following year:

> *… one year before the closure [in 1995]… they fished every fish out of Rennell Sound and Inskip… to get their 1000 tons. And they didn't even get their 1000 tons. They quit at 800 tons because they couldn't find any more fish. … The fishermen finally shut it down themselves; the Fisheries didn't. They just finally knew that … if they catch every fish… they're not going to come back*. (Vince Pearson, 1998)

Other strategies include protecting key areas, reducing quotas, allowing appropriate recovery time and limits on ponding operations (HMTK Study 2011: 74-75). The common view among the Haida people is that the herring stocks have not recovered from the previous commercial fisheries.

> *I would think it would be a many year wait to get the stocks really replenished.* (Barbara 'Babs' Stevens, 2016)

> *Our future of our children is more important than making money in a couple years and putting it right back to the same, or worse—not have any. Because that's the last of the areas—where there's big spawn, is Skincuttle and Burnaby Narrows, and Section Cove area—that's the last area. It used to happen south and that all got fished out, so, you don't see spawns down there anymore. Plus the west coast, that too, there was quite a bit of spawn back in the day. And that's not that long ago too, it doesn't take much to—well it's been 14 years since they closed it, and you don't see a great big return yet. Skidegate Inlet is finally starting to build up.* (Conrad Collinson, 2016)

Addressing how herring is recovering (or not) throughout Haida Gwaii, and having consistent multi-year returns such that herring populations are above current harvest thresholds were seen as important measures for considering future openings:

> *Where it's just like there is herring everywhere. It's consistently massive spawns, consistently seeing herring throughout the year. There's big salmon all over the place year round, eagles are hanging around, the gulls are around year round—like everything is just thriving, then you know it's in a good place.* (Judson Brown, 2016)

The need for extra precautions in managing any future commercial herring harvests was seen important to sustain the populations of herring, as well, it is recognized as critical for the whole food web linked to herring.

> *Herring is pretty well, like a main food source for most fish, so they shouldn't really have any fishery on it, 'til they know more.* (Arnie Anderson, 2016)

> *The herring itself is a vital part to the food chain, hey? And it's pretty complex cycles, when they come in shore [they bring] halibut, the birds, and the mammals, and the entire ecosystem relies on it.* (Mick Morrison, 2016)

> *Herring is a keystone species. Everything that lives in the water has some benefit from herring. Everything that's in the ocean, on the floor has some benefit from herring being there, and that's including people and all things on the land.* (Barbara Wilson, 2016)

Managing for the ecosystem is part of a holistic vision. This includes, for example, kelp and any future commercial kelp harvests, since kelp is habitat for herring and other species, not to mention it is an integral component of k'aaw.

> *Everything ties together. We got to be thinking about the big picture. Thinking about things holistically, you can't just separate kelp from spawn on kelp.* (Cindy Boyko, 2016)

> *Herring in my mind are the staple. If the herring go, the whole thing is going to collapse. They are absolutely crucial to the wellbeing of all those other resources that depend on them—whether they are humans, or sea lions, or spring salmon, or whatever it is—if we can't save that herring, we are in serious trouble.* (Colin Richardson, 2016)

Finer Spatial Management

Management strategies developed by Fisheries and Ocean's Canada haven't accounted for Haida knowledge and the herring stock structure. A management strategy suggested through the work done in the HMTK studies, is to manage herring by their local stocks, instead of large geographic areas. Spatially refined management puts attention on key areas of herring activity and could be supported by monitoring and protection of local stocks of herring when needed. As stated below, many Haida assert that herring populations in different areas are distinct stocks and disagree with the federal approach of managing in large aggregated geographic units (HMTK study 2011: 74).

> *… herring comes back to certain areas to spawn… so what the Fisheries … were telling the fishermen is that they would preserve this stock over here and let the fisheries go into one area. And the fishermen would clean up… that whole bay, and the herring went back to that particular bay to spawn, and the Fisheries would open that area, and the fishermen would clean out that herring … and no herring would go back there … then they would move on to another area and do the same thing. Put a whole bunch of boats into a small area and they would clean up… the herring that's supposed to return to spawn*. (Reynold Russ, 2007)

"Captain Gold" Richard Wilson (2016) considered the possibility that the smaller size herring spawn fewer eggs than the larger herring of the past, and observed, "*They were great, big guys, now they are fire crackers so to speak—where they are smaller. The adult ones that are spawning, but the big ones use to spawn. Holy cow, they were big."*

Some areas that were identified as needing some level of protection for herring included Selwyn Inlet, the area from Burnaby Narrows to Skincuttle Inlet and some areas on the West Coast (HMTK 2011: 75).

Accounting for Differences Between K'aaw and Other Fisheries

As described in Jones (2000: 218), ecosystem justice concepts also can be used to assess the relative impact of different fishery sectors and gear types (see Pitcher et al 2000). The roe fishery takes the bulk of the catch and imposes the highest fishing mortality on the stocks. The herring spawn-on-kelp fishery is less consumptive and poses less risk because most of the herring impounded for the fishery are released alive and survive to spawn the following year (Shelton et al. 2014). Several Haida fishers described the differences between these fisheries:

> *The [Haida SOK] fishermen knew back then that they had to try and control it somehow. Because they knew that the herring fishery—the sets that would come in—they would just wipe out. Then the herring guys would say, "Oh it's the roe on kelpers, because you are taking the eggs," and stuff like that. And we are like, "no, you are taking the herring and the eggs." So that there would be a little bit of tension between the two, right? We would just take little groups, put them in the pond, they would spawn, and we'd open it up and let them swim away and our mortality rates weren't that much, as compared to other guys were. And the herring fishery would come in and they would take 140 ton per boat, sets, "Bang, Bang, Bang" plug them full, and you'd see five, six of them in a row taking off, and not matter what the weather is, go and get it done. And they'd bang out sets until they filled their boats right? So they were taking the herring and the eggs, so they are not allowing them to come back and regenerate.* (Sascha Jones, 2016)

> *…they [seine and gillnet] take the live females and just take them for their roe sacs. That has to stop ... Not only are you killing all of those females, but the millions and millions of eggs that they would have laid. And not only that, they are taking the males too, right? They just come in and gillnet everything. They say they are targeting the females. … That's the worst one to target, number one. Yeah, and same with the … seine. They just see a batch of herring, they scoop it all up and then they do what with it? … that's too important to just take out of the ecosystem. So I think those two fisheries have to go, they are just too destructive to the populations … They [the commercial spawn on kelp] release–I don't know what the percentage is– but they do release the majority of the fish that are in the ponds, and I think those can stay, because it's more renewable. You know, you are making the herring spawn, and then you open the pens and let them go.* (Judson Brown, 2016)

In addition, herring spawn-on-kelp has a higher value per ton of herring used. Although the commercial spawn-on-kelp fishery is given preference in allocation over the roe fishery when stocks are low, it is also the more seriously affected if the fishery has to be closed. The Haida traditional fishery also suffers when stocks are low, but has continued with a small fishery when other uses were prohibited. Harvest policies have an unequal impact on different fishery sectors, because roe fishers can easily move to other areas when stock levels are low, while spawn-on-kelp fishers (both Haida traditional and commercial) are more intimately tied to local stocks and places. See Okamoto et al. 2019 for a preliminary analysis of potential trade-offs when costs are distributed unequally among fishers.

Haida fishermen also drew distinctions between the closed-pond and open-pond spawn on kelp systems. The observed differences included efficiency in marketable product, quality and taste preferences for Haida food fisheries, and observations of herring mortality and spawn success, and interactions between herring and predators among both systems.

> *[In Selwyn Inlet, we] evolved into doing whiskey lines […] That's like a cork line system. And then you had your becket lines and then you would just submerge your kelp and you just had it tied on a long lead line–your cork line. We used to use those or logs? I guess first it started out with logs, we kind of used them as our floatation device. After a while, it was easier to pack around your own cork line rather than looking for a log. Sometimes they weren't always available. […] We just weighed down the kelp and have it on the becket line, sink it down to a good depth from there, the herring would spawn on it on there. [Like an open-pond], and I liked the open-pond, because, the open-pond you didn't have any mortality.* (Mick Morrison, 2016)

Ecological Factors

Haida traditional knowledge observations are valuable in trying to re-create a picture of ecosystems before the onset of industrial fishing (Jones 2000: 205). Current herring management systems don't account for the impact of herring depletion on other species in the ecosystem (Jones 2000: 216). In addition to supporting development of the rebuilding plan for Haida Gwaii herring, this knowledge has potential to inform the Ecosystem-Based Management Framework that is currently under development for Gwaii Haanas in accordance with targets in the Gwaii Haanas Land Sea People Management Plan.

Haida know the ecosystem as it was before the onset of heavy, directed, herring fishing. They believe herring spawns were much larger and predators, such as seabirds, sea lions, and killer whales, more abundant before the directed herring fishery began. Up to the present, management goals have ignored other species and been unclear about the desired state of herring stocks other than to see that fishing stops below a designated cut-off or limit reference point. A useful approach for rebuilding Haida Gwaii fisheries would be one of "learning from the past to plan for the future" – and rebuilding goals incorporate historical information and traditional knowledge.

> *[In the next twenty-five years,] I would love to see it like my parents saw it in Burnaby Narrows, where they could stand on the rocks and just get a rake and rake through like schools and schools of herring and just shake them off. I would love to see that whole area just plugged of herring again, just to witness that, and to see what kind of life is following that, phew, would be so amazing.* (Judson Brown, 2016)

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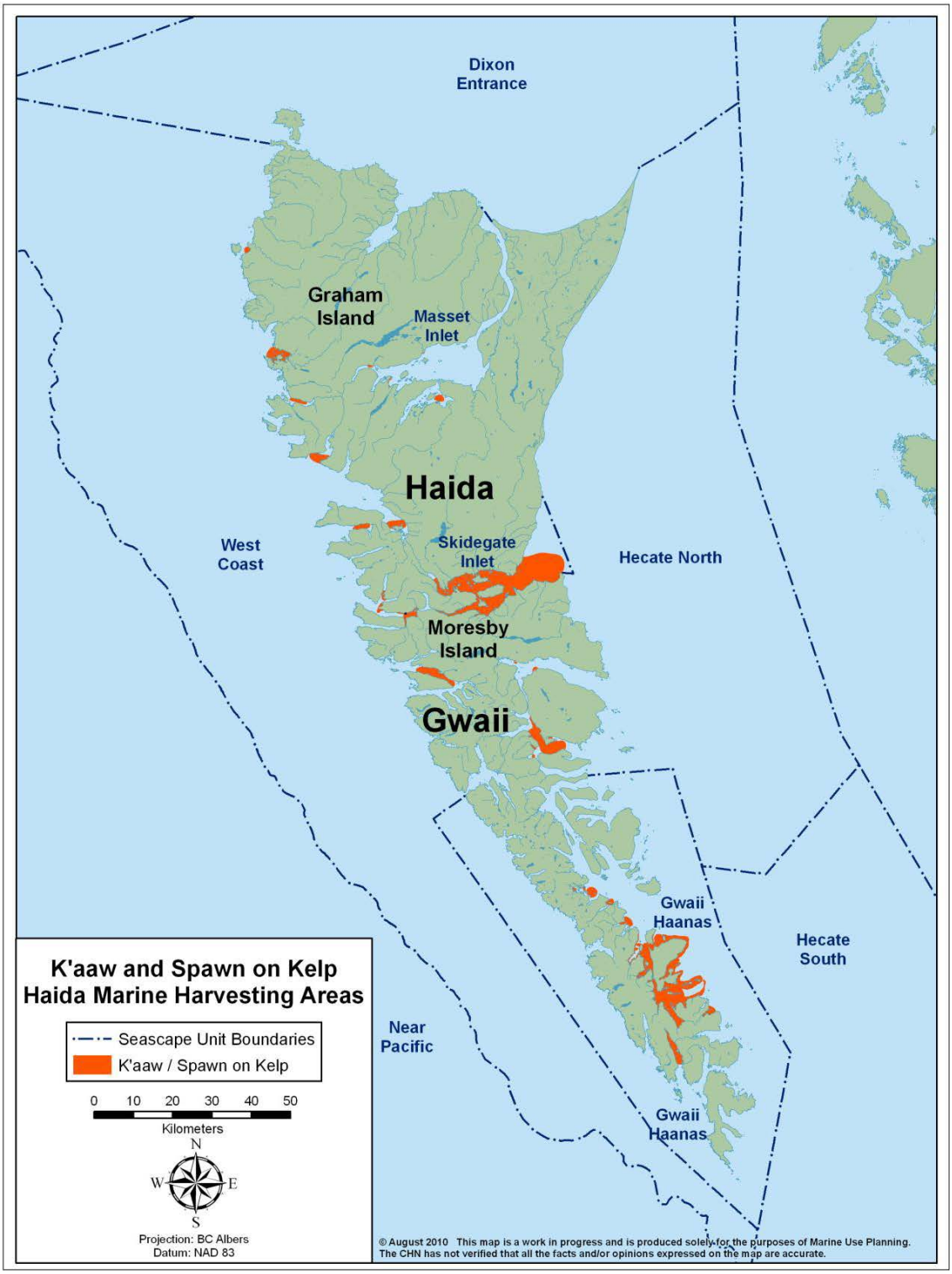

Figure 1: Wild k'aaw and SOK harvesting locations documented during the HMTK interviews (Source: HMTK 2011).

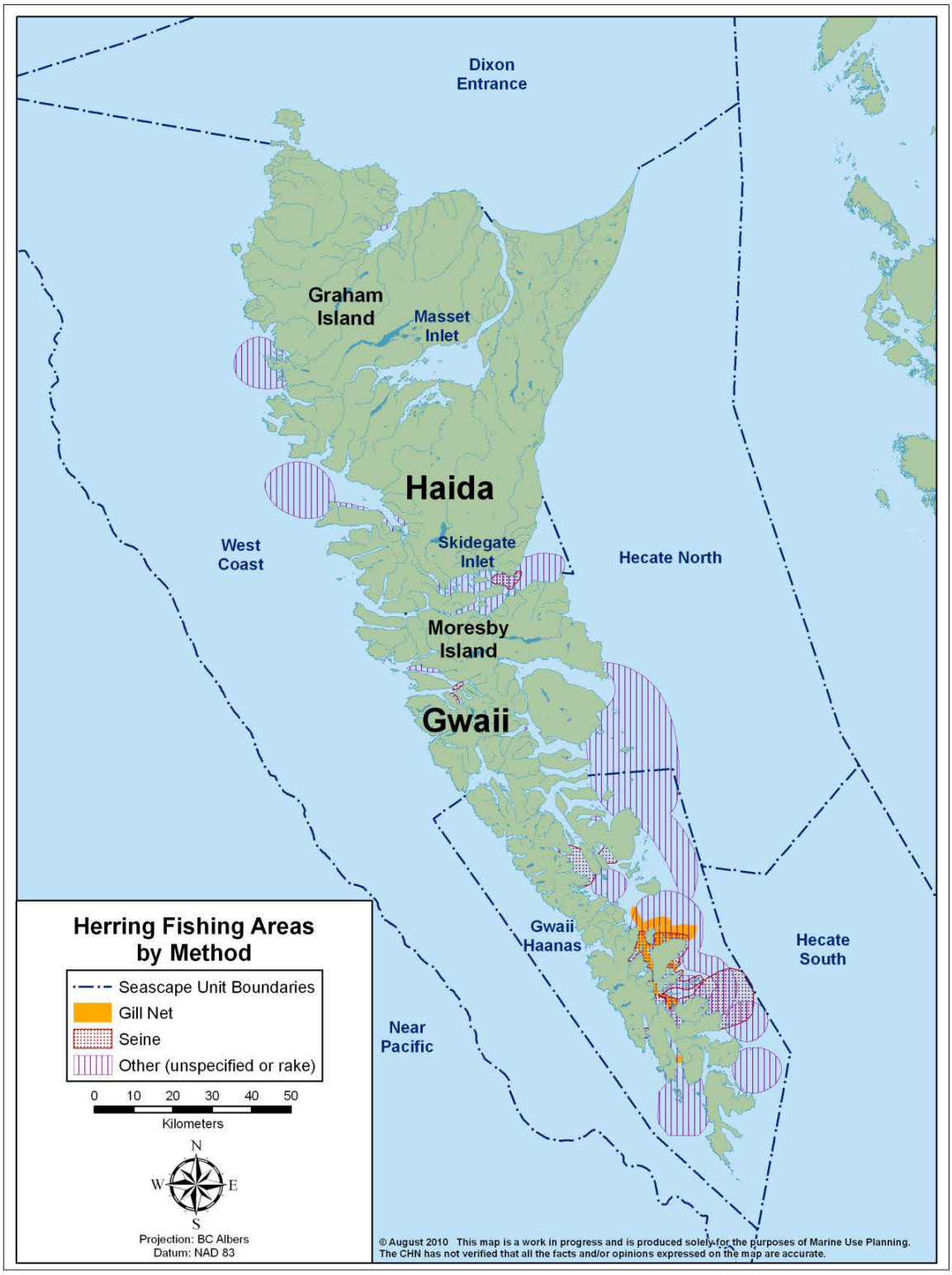

Figure 2: Herring fishing locations documented during the HMTK interviews (Source: HMTK 2011)

Table 1. List of Haida Participants Quoted in Report

Participant Name(s)	**Occupation**	**Vital Statistics**
Jason Alsop, Gaagwiis	Council of Haida Nation, Food gatherer	1983 – present
Arnie Anderson, Gidjujaws	SOK Operator, herring surveys, seine fishery	1961 - present
Oliver Bell	Fisher	1959 – present
John Bennett, Daaxiigan	Fisher, Boat Builder	1948 – present
Cindy Boyko, Suudahl	Food gatherer, Archipelago Management Board	1958 – present
Isabel Brillon, Iljuu Xiilaay,	Food gatherer	1941 – present
Diane Brown, Gwaaganad	Matriarch and Food Gatherer	1948 – present
Judson Brown, Gudt'aawt'is	CHN Manager	1972 – present
Robin Brown, Xilang Kuns	Fisher	1933 – 2017
Stephen Brown	Fisher	1923 – 2012
Conrad Collinson, Skildaaxiigan	Fisher	1965 – present
Dempsey Collinson, Chief SGiidagiids	SOK Operator	1928 – 2008
William Davies	Fisher	1976 – present
Patricia Ann Gellerman, Taawa K'awas	Food Gatherer	1941 – present
Henry Hageman, K'aam Singaa	Fisher	1932 – present
Roy Jones Sr., Gaaying.uuhlas	SOK Operator	1924 – 2020
Sascha Jones, Luu Taaydals	SOK Operator	1974 – present
Mick Morrison	Fisher	Not available
Roberta Olson, Keenawaay	Food Gatherer	1941 – present
Vince Pearson	SOK Operator	1953 – present
Jack Pollard	Fisher	1907 – 2003
Betty Richardson, Taalgyaa' adad	Food Gatherer	1935 – present
Colin Richardson, Laada	Fisher and Resource Manager	1958 – present
Gary Russ, Yaahldaajii	Fisher	1943 – present
Reynold Russ, Chief Iljuuwas	Hereditary Chief and Fisher	1930 – 2011
Edward Russ	Fisher	1967 – present
Barbara "Babs" Stevens	Skidegate Band Council – Chief Admin. Officer, Food Gatherer	1948 – present
Monte Stewart-Burton	Fisher	1958 – 2010
Harvey Williams, Niis Waan	Fisher and Hunter	1932 – present
Percy Williams, Chief Gidansda	Hereditary Chief and Fisher	1930 – 2017
Rolly Williams	SOK Operator, Massett Band Council, Fisher, Hatchery Worker	1962 – present
Barbara Wilson, Kii'iljuus	Matriarch	1943 – present
Ernie Wilson, Chief Niis Wes	Hereditary Chief and Fisher	1913 – 2009
Captain Gold – Richard Wilson	Haida Historian, Food Gatherer, Watchman at SGang Gwaay	1942 – present
James Young, Nang King.aay 'uwans	Fisher, Haida Historian	1923 – 2008