

Managed out of existence: over-regulation of Indigenous subsistence fishing of the Yukon River

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Abstract Humans are adversely affected by the loss of vital fishery resources, specifically Indigenous peoples and the traditional knowledge systems that are foundationally tied to their culture. Discounting the ability and knowledge of Indigenous peoples stems from concepts rooted in “Tragedy of the Commons” in which a shared resource, in this case fisheries, if left unchecked will be destroyed by the mismanagement of users. The Alaskan fisheries policy regime is recognized as one of the best managed and influential fisheries in the world, but the state is predominantly driven by a conservation approach that discounts other knowledge systems. Alaskan Native fishers, for example the Gwich’in, who maintain a sustainable 30,000 year (conservatively) relationship with their environment, possess culturally specific Traditional Ecological Knowledge (TEK) that is a result of the mechanisms or physical act of fishing, thus giving meaning to the term we will use in this paper, Indigenous Fishers’ Knowledge (IFK). Alaskan Natives along the Yukon River derive specific knowledge about their environment and King Salmon through the act of fishing. TEK is not static nor is IFK as it is transmitted to younger generations through the practice of fishing. TEK and IFK play a large role in the transmission and acquisition of knowledge, they both connect knowledge to culture and play a role in

creating culture and traditions, they are in fact very intricate systems. Indigenous fishers seek inclusion and involvement that does not separate them from their knowledge but recognizes and implements their practices/control on a local level.

Keywords Traditional Ecological Knowledge · Indigenous Fishers Knowledge · Indigenous fishers · Alaska Policy · Yukon River · King Salmon

Introduction

From afar, the policies which regulate and manage the Alaskan king salmon fishery are recognized as some of the best and most influential in the world. Unfortunately, though, the state is predominantly driven by western ideologies in the construction of policy and delivery of regulatory practices, which largely discount, and manipulate proven Alaska Native knowledge systems in the pursuit of capitalism. Since the United States began colonizing the Alaskan frontier, traditional knowledge systems utilized by Alaska Natives have been replaced or compromised by young, unproven western management systems in this part of the world (*Treaty of Cession 1867-USF&W*).¹ As is

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¹ The *Treaty of Cession 1867* represents the first actual US occupation in Alaska, and the United States Fish and Wildlife Service, the lead land manager on the Yukon Flats, was founded in 1959. The reality is 30,000 years of observation and

commonly the case, when western management systems built on western ideologies work to control the natural resources Indigenous people rely on for sustenance, these western regimes come to dominate, overshadow, and marginalize Indigenous people's inherent rights (Nadasdy 2004). Such is the case with the king salmon fishery on the Yukon River in Alaska. Alaska Natives on the Yukon Flats have lived a traditional and customary lifestyle forging a sustainable relationship with the land and resources that provide sustenance. Some Alaska Natives, like the Gwich'in, have maintained that relationship with the land in Alaska for 30,000 years (Williams et al. 2016). Today, however, that relationship is being shaped in a way that values state laws and policies that do not, or which minimally, incorporate the traditional knowledge systems of those who have lived there the longest. Ultimately, the Alaska Native voice and knowledges are drowned out, marginalized, and at times, worse, forgotten as western resource management policies and regulations are implemented from satellite locations well away from the resources and people the state is tasked with managing.

Uniquely, through interviews with Alaska Native fishers on the lower, middle, and upper geographies of the Yukon River, this research works to understand fishers' perceptions of how the king salmon fishery is being managed by the state of Alaska. In this paper, we first provide a context for the use of the term Indigenous Fishers Knowledge (IFK) and its overall relationship with Traditional Ecological Knowledge (TEK). The paper goes on to focus on how state policy and regulation is a process that marginalizes and excludes Indigenous Fishers Knowledge from the king salmon fishery in Alaska. This paper shows how Indigenous Fishers Knowledge (Alaska Native) of king salmon and the king salmon fishery on the Yukon River has been marginalized by the bureaucracy of state policy and regulation. We provide the fishers' perspective of policy and regulation and their understanding of how these systems limit their ability to acquire and transmit traditional and fishers' knowledge of the fishery. We specifically discuss how the feedback system developed to be inclusive to fishers' voices is actually a barrier to the implementation of

TEK in sustainable king salmon fishery policy. Finally, we conclude with an exploration of the inherent traditional and customary rights of Alaska Natives.

Brief introduction of Indigenous Fishers Knowledge on the Yukon River in Alaska

Cultural and traditional knowledge systems for Alaska Native subsistence fishers are adversely affected by the conservative management systems that regulate and enforce the laws for *Luk choo*² or king salmon³ (*Oncorhynchus tshawytscha*) on the Yukon River. These fairly new western management systems in Alaska limit the ability for Alaska Native Fishers (ANF) to fish and to live a subsistence life, which in turn limits their ability to practice and transmit traditional knowledge systems. The definition used for all subsistence user's rights can be viewed as an example of how fishery regulations and laws affect Alaska Native knowledge systems and culture. In 1980, the state of Alaska defined subsistence as, "the customary and traditional uses by rural Alaskan residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade." (ANILCA 1980, Sec. 803). The state's definition describes people interacting with their environment as well as each other, which are basic building blocks for traditional knowledge. For example, Traditional Ecological Knowledge (TEK) is based on "...relationships between knowledge, people, and all of Creation (the "natural" world as well as the spiritual) ... the process of *participating* (a verb) fully and responsibly in such relationships, rather than specifically as the knowledge gained from such experiences...it is not just about understanding relationships, it *is* the relationship with Creation" (McGregor 2008, 145–146). This connection has been acknowledged by congressional declaration in findings Sec. 3111 which say

Footnote 1 continued
experiential knowledge cannot be replaced by 60 years of knowledge of a place.

² Gwich'in Athabascan word for king salmon (Interview, male fisher 6/19/15).

³ Also known as Chinook Salmon.

subsistence is “...essential to Native physical, economic, traditional, and cultural existence...” (ANILCA 1980). While this definition acknowledges that the traditional and customary practices of Indigenous peoples in the US are a part of a larger, ongoing and very old knowledge system, it does not incorporate input from all Indigenous people. In other words, this defined subsistence rights and practices without the input of Alaska Natives. Therefore, using this definition to shape the inherent rights of Alaska Natives is short-sighted.

Alaska Natives along the Yukon River derive specific knowledge about their environment and, particularly for this paper, king salmon through the act of fishing. Indigenous Fishers Knowledge (IFK) systems on the Yukon River have developed over time using trial and error, and a commitment to transmit what has been learned. Within fisheries literature Fishers’ Knowledge⁴ has been recognized as a distinct type of knowledge that can contribute to fisheries’ research, science, and management (Stephenson et al. 2016). Indigenous Fishers Knowledge is unique, and it differs in Alaska from one region of the Yukon River to another. IFK is both Traditional Ecological Knowledge and Local Ecological knowledge. More broadly, a vital element of TEK for Indigenous people is the process or way of living, a lifeway, “one cannot ever really “acquire” or “learn” TEK without having undergone the experiences originally involved in doing so” (McGregor 2008, 146; Figueroa 2011). Meaning, ANF, for example the Gwich’in in Alaska, who have maintained a sustainable relationship with their environment for millennia, possess culturally and regionally (Silvano and Valbo-Jørgensen 2008) specific TEK that is a result of the physical act of fishing, being taught how to fish by relatives and community members, and teaching others how to fish, thus giving meaning to the term we use in this paper, Indigenous Fishers Knowledge (IFK). Indigenous Fishers Knowledge is not dissimilar from Local Ecological Knowledge (LEK), but there are differences. LEK is defined as “knowledge held by a specific group of people about their local ecosystems... concerns the interplay

among organisms and between the environment...LEK may be a mix of scientific and practical knowledge; it is site-specific and often involves a belief component” (Olsson and Folke 2001, 87). Indigenous Fishers Knowledge is the combination of both TEK and LEK as fishers utilize their knowledge of local ecologies and their own lived culture to practice fishing sustainably.

Indigenous Fishers Knowledge is a knowledge system that uses a variety of mechanisms to transmit cultural teachings and knowledge through the activities and functions associated with fishing. More specifically, as described by Berkes et al. (2000, 1256), “Both knowledge and institutions require mechanisms for cultural internalization, so that learning can be encoded and remembered by the social group.” In this case, fishing is the mechanism that contributes to cultural knowledge systems practiced by Alaska Native people that fish the Yukon River broadly, and in turn, these knowledge systems are reciprocal, contributing valuable information about the practice or act of fishing, making IFK both the product and contributing factor for culture and traditional knowledges. These factors combined reveal the value of the ANF voice; they are part of the mechanism and cultural encoding processes and their voice will highlight where their knowledge is affected. Then, including IFK voices in the regulation of the king salmon fishery in Alaska is paramount, they are on the river daily and have well established knowledge systems about the fishery.

Marginalized by process

While global fisheries management systems have made an effort to include Indigenous Fishers Knowledge, studies across the globe show there is a lack of incorporation of the fishers’ voice into management and policy regimes, and as this trend has increased fishers’ knowledge has declined over the past decade (Hind 2014). Fishing, as a subsistence activity, has a vital “trial and error” component which creates evolving Indigenous knowledge systems capable of “cultural adaptations and the ability to utilize resources often associated with or affected by seasonal variation and changing ecological conditions” (Therriault et al. 2008; Nuttall et al. 2005, 67). Alaska Native interactions with their natural environment are

⁴ Fishers’ Knowledge is referred here generally as knowledge held by fishers of any type (Johannes, Freeman, and Hamilton 2000) and is different than Indigenous Fishers Knowledge which is referring to a fisher who is Indigenous to that area or land such as Alaska Natives to the Yukon River.

continually restricted by non-Alaska Native entities, and these restrictions hamper their ability to acquire knowledge about the changing climate that is now widespread in the Arctic. In other words, not only does increased regulation restrict ANF access to resources, it has a negative impact on the fishers' ability to practice IFK.

If fishers want their IFK to be considered by management regimes they must abide by the rules established for communicating or presenting their knowledges, meaning they are forced to detach themselves from their IFK to some degree to satisfy the structural requirements of the dialogue in order to change or make the knowledge palatable for western ideals. Although management regimes may be listening to fishers and fisheries councils they have no commitment to implement changes based on Alaska Native testimony, and the burden for accessing and navigating the process of contributing to policy falls squarely on the shoulders of individual fishers who have limited experience with understanding and navigating bureaucratic systems. Attempts to integrate Indigenous Fishers Knowledge into policy regimes is a significant movement within Alaskan fisheries management, however, participants suggest this is lip service. There is limited evidence of the inclusion of the fishers' voice in regulatory practice, which creates barriers for the fisher to voice their concerns.

In many ways, this is a state exercise of colonial power as it defines how and when Alaska Native Fishers (ANF) can assert their voice by creating limited opportunities to do so and structuring the manner in which dialogue is allowed to occur. For ANF who are adamant that their subsistence rights are intricately tied to their rights to practice and live their culture, this presents a significant barrier. In Alaska, the space allowed for ANF to speak and raise concerns creates two distinct problems: (1) it involves a complicated review process established by the Alaska Department of Fish and Game for public input regarding regulations, and (2) it includes a method that attempts to integrate TEK by detaching that knowledge from the holder and retrofitting for western systems.

When Alaska Natives are successful in accessing the space provided for raising their voices, they face an additional barrier: perceptions of legitimacy and acceptance within policy and management regimes (Pinkerton 1994; Pinkerton and John 2008; Johannes

et al. 2000; Berkes and Henley 1997; Danielsen et al. 2014; Hind 2014; Howitt 2001). Part of gaining legitimacy and acceptance is in the presentation of knowledge. McGoodwin (2006) argues that "...fishers' knowledge that has been self-generated, without significant prompting by external forces, will also be much more amenable for incorporation into contemporary fishers science and management than will knowledge that has been generated mostly as a reaction or resistance to externally imposed management authority" (182). In other words, a western world view demands fishers' knowledge meet key requirements in order to gain acceptance in higher levels of management (McGoodwin 2006; Pinkerton 1994; Hind 2014). Indigenous fishers and communities must prove they are invested in the success of a resource, and then their TEK is scrutinized by state and federal governments (Sepez 2002; Wenzel 2004). This is the case in Alaska where the state has established a system to separate, scrutinize, and approve IFK, further pushing fishers' knowledge into the fringes rather than establishing a way to incorporate fishers into active management roles.

Methodology and study area

In 2015 and 2016, the author conducted a total of fifty-five semi-directive qualitative interviews with a total of forty-eight fishers and community members who rely on the fishery for sustenance as a way of life, and who live along the Yukon River in Alaska. Of the fifty-five interviews, seven were follow-up interviews with previous participants. Each interview was transcribed and reviewed manually in Atlas.Ti qualitative software for themes and coding categories (Saldana 2016). All interviews were conducted in English and the chain sampling method was utilized to find interviewees, allowing new sources to be accessed based off the reference or direction of the current source (Hay 2010). Using the chain sampling method allowed the authors to gain access to participants who were viewed within the community as very knowledgeable about fishing. In line with common Alaska convention participants were compensated for their time.

Permission from each tribal government was obtained to conduct research in three main communities (see Table 1): Gwichyaa Zhee Gwich'in Tribal Government (Fort Yukon, AK), Tanana Tribal

Table 1 Interview communities along Yukon River by year

Year	Location	Total
2015	Fort Yukon, AK	22
2015	Minto, AK	4
2015	Russian Mission, AK	14
2016	Fort Yukon, AK	14
2016	Tanana	3

Council (Tanana, AK), Iqurmiut Council (Russian mission, AK), and at the Yukon River Intertribal Watershed Bi-annual Summit in 2016 (Minto, AK). For each community, an *immersion* method was utilized as the author resided in each location for one to five weeks to gain, “access to the fluidity of others’ lives [in order to enhance] ... sensitivity to interaction and process” (Emerson et al. 2011, 2). This allowed time to understand the point of view of interviewees, to “capture and preserve indigenous meanings...[and to] recognize and limit reliance upon preconceptions about members’ lives and activities” (Emerson et al. 2011, 12). The semi-directive interview was utilized whenever possible to allow the interviewee to “guide the direction and scope of the interview...allow[ing]...the participant’s train of thought” to be uninterrupted (Huntington 2000, 1271). Questions focused on the fisher’s experience and knowledge of king salmon fishing and the effects of resource management. In 2016, the authors conducted follow up interviews to gain more insight on findings from 2015 interview data, and to incorporate the community of Tanana, AK which was not interviewed in 2015 due to the danger of wildfires.

The Yukon River was chosen for this study for its size, geographic location, abundance of Chinook salmon, and the number of Indigenous fishers residing along the river. The Yukon River “is the largest salmon-bearing river in Alaska, with about 50 remote rural communities along its long path from the Bering Sea to Canada” covering 1980 miles in length (Meacham and Clark 1994; Loring and Gerlach 2010, 2968). Due to the vastness of the Yukon River, three main interview communities were strategically chosen for their geographical locations on the upper, middle, and lower parts of the river: Fort Yukon, Tanana, and Russian Mission (see Fig. 1). Each community selected has a high number of fishers and

members who participate in and hold positions on state fishery boards, nonprofits, or are known to be activists concerning fisheries’ issues. Russian Mission, AK is near the mouth of the Yukon River and is one of the first locations king salmon pass through as they migrate upriver. Tanana, AK is at the confluence of the Yukon and Tanana Rivers and represents the middle of the Yukon River. Finally, Fort Yukon, AK is near the northern interior at the confluence of the Porcupine and Yukon River. Visits to each community were planned in conjunction with the king salmon migration through that location. This was taken into consideration since those communities would focus on fishing king salmon if the season was open. Conducting interviews with fishers and community members during the king salmon fishing season was vital to understanding responses to state issued regulations.

Findings: frustration and animosity

To understand why Alaska Native fishers (ANF) are upset with the management of salmon on the Yukon River one must understand the structure of the Alaska Fisheries Management System. This is a system that ANF must not only understand but also learn to navigate. It starts with policy at the international level in the Pacific Salmon Treaty (PST) of 1985. The PST, signed between the US and Canada, is essentially the larger umbrella for US policy regimes regulating salmon stocks in Washington, Oregon, Idaho, Alaska, British Columbia, and Yukon Territory (PST 1985). The PST requires the US and Canada to develop programs and research goals in order to carry out treaty objectives. The Yukon River Panel, established in 1995, is a product of the PST and is an international panel of advisors consisting of US and Canadian members who are tasked with overseeing and supporting fishers and the “optimum production of salmon” as well as being responsible for the management and monitoring of all salmon that originate in the Yukon River (PST 1985, 7). The methods used to monitor Yukon River salmon stocks come from the combined efforts of various agencies but specifically from the Yukon River Joint Technical Committees (JTC), which were developed to implement research and management endeavors in order to better understand the declining salmon populations (PST 1985; YRA 2005). Each of these organizations and entities



Fig. 1 Locations and populations of communities visited in 2015–2016 by author

are comprised of professionals and/or elected officials who take into account the opinions and recommendations of fishers.

In order to voice concerns, questions, and even make suggestions, ANF must interface with a variety of state, federal, and non-profit organizations. The Alaska Department of Fish and Game (ADF&G) and their management relationship is the result of the 2001 Yukon River Salmon Agreement (YRSA) established between the US and Canada. The YRSA binds both countries to the escapement-based management methods which ensure adequate spawning of salmon in the Yukon River (YRA 2005). The state of Alaska primarily places ADF&G in charge of all salmon management. To do so, the ADF&G created the Board of Fisheries (BOF), which has the highest authority on fishery regulation in the state. Their goal is to “conserve and develop the fishery resources of the state,” and their directive is to oversee “setting seasons, bag limits, methods and means for subsistence, commercial, sport, guided sport, and personal

use fisheries, and it also involves setting policy and direction for management of the state’s fishery resources” (ADF&G 2017; Alaska Statute 16.05.221). Another purpose of the BOF is oversight of the Advisory Committees established around the state of Alaska. Currently, there are eighty-four committees described as “grass roots volunteer groups that are a local voice for recommendations on management of Alaska’s fish and wildlife resources” (ADF&G 2017). The state of Alaska is divided into six regions (Southeast, Southcentral, Southwest, Western, Arctic, and Interior) and within each region there are sub-regions and each sub-region represents communities that hold meetings to discuss issues related to fishery regulation. These advisory committees hold public meetings to discuss fish and wildlife issues and make recommendations to the board. In any given year the BOF meets four to six times in different communities around the state to consider these recommendations and proposals. This is only the first step in a many-tiered system and not a guarantee that local

concerns will be heard at the state level. However, even navigating the advisory committees presents significant challenges to ANF.

In interviews with ANF a sense of frustration and animosity surround the complex, multi-layer management system of king salmon. Three concerns were repeatedly raised by participants. The first was their lack of confidence in the methods used to establish and monitor salmon stocks on the Yukon River. Second, participants expressed dissatisfaction with public feedback systems. The third concern surrounds frustration with Canadians and the confusion ANF experience during the fishing season as they face fishing limits set during the season to let fish pass for the Canadian border with no clear indication of limits set for Canadians.

Interview participants discussed at great length the manner in which management systems compartmentalize ANF voices in these meetings. There were participants who alluded to feelings of inadequacy, stating, “you got to be [on] a goddamn board to change the policies I guess...Don’t make much sense to me, but you can’t argue with them” (interview, male fisher, 7/11/15). Although the BOF has a system that allows proposals to be submitted via mail, email, or uploaded to their website, only two interviewees said they use the internet on a proficient level. This underscores the value ANF put on being at a board meeting in person in order to voice their opinions.

Other participants described the challenges they face when they attempt to sit on a board and attend meetings. Some positions are paid while others are not. As described by a board member, “It’s all volunteer, but being here and being employed here, I can get paid to go do it. As long as my hours are approved and my job isn’t running away from itself here, then yeah. I’ve been told I couldn’t go to meetings before, and I just say well, I’m taking a week off and go anyway. If you don’t want to pay me to go, fine. Don’t ask me for a fisheries update when I get back. You know, because in the past I’ve still go round and round with them about that. I said, you know, I go to these meetings, and you guys ask me for updates, reports. Could you guys help me out financially some way? It sucks to fly to Anchorage with 10 bucks in your pocket when you don’t have a job and you’re not working or something. At least give me per diem for meals. In return, I’ll come here and give you guys a written and oral report on your council meetings. That

was kind of how it started, but now that I’m working here, it’s kind of good, I can actually get my hours covered” (interview, male fisher, 7/24/15). ANF expressed frustration at seeing the same people show up on boards,⁵ meaning there has been a hegemonic consolidation of power on these boards which can discourage new people from joining a board. For example, an ANF who is a board member said, “I’ll see [the same people] on the Yukon River Panel, I’ll see them at our ERAC [Eastern Regional Advisory Council]⁶ meetings and also at some other stuff, at our fish and game advisory board meetings, and then the federal advisory board meeting. For the Yukon River Panel, and actually with the YRDFA [Yukon River Drainage Fisheries Association] there’s just the managers are the same, you’re just talking with them from four different forums, or three different forums. You kind of end up seeing a lot of the same people and knowing them, so it’s not uncommon to have the same people sit on multiple boards, or maybe they’re just active in this one and that one, but they’re kind of the same group of people” (interview, male fisher, 7/24/15). Between the same people sitting on so many boards and the expense of being able to attend meetings at all frustrations among potential participants mount quickly.

Of major concern to ANF was how disconnected the management system is from their lived reality. One fisherman states: “It’s a lot different for someone to sit behind a desk and look at a computer and estimate... and tell us when to go fishing...whereas a person that is actually there doing these things, they’ll have a different view than someone who’s just sitting behind a desk” (interview, female fisher, 7/8/17). Indigenous fishers also expressed a desire to be active and included in monitoring. As stated by another fisher, “We should have our own management around here...instead of living by and managing the fish for

⁵ Alaska Boards of Fish and Game is comprised of two boards established in 1975: Board of Fisheries (BOF) and Board of Game (ADF&G 2017). Yukon River Drainage Fisheries Association (YRDFA 2018), Yukon River Inter-Tribal Watershed Council (YRITWC 2017), and Yukon River Inter-Tribal Fish Commission (YRITFC 2007) elect or select representatives.

⁶ The Eastern Regional Advisory Council (ERAC) is a United States Federal Subsistence Management Program and is under the Federal Subsistence Regional Advisory Councils system (USDOI 2018). This interviewee is saying the same people show up on state and federal boards.

us...we eat it they don't eat it" (interview, male fisher, 11/7/15). Indigenous fishers seek inclusion and involvement that does not separate them from their knowledge but recognizes and implements their practices and control on a local level.

In interviews, ANF revealed they don't believe the laws and regulations between Alaska and Canada are set fairly and that Alaska must endure stricter regulations in order for Canadians to meet their quota. While there are advisory boards and fisheries commissions established for fishers to have input on agreements set with Canada, ANF expressed concern that this process is far removed from their day-to-day reality. Three ANF discussed issues related to survey methods, for example sonar and the fact that there are only a few select points in the Yukon River with sonar stations. These fishers argue this method is flawed and king salmon are not being accurately counted, "...they [king salmon] don't come to the same river/creek. Those [king salmon] are going to Canada and the Chandalar River up there. They don't count them. I asked them last fall [2014], I called in and I never did get a good answer... There are a lot of fish up in creeks, I've seen it" (interview, male fisher, 7/1/15). Another fisher echoes the same concerns: "I told them, well you guys don't have any clue what goes up the Porcupine, the Chandalar, the Chalkyitsik, the Black River. 'No one goes up there.' A fish isn't going to swim up a river until it just drops dead and dies, his goal is to go up and reproduce, so he's going to reproduce somewhere. He's going to find conditions somewhere that are suitable to reproduce and so there you go. Why would a fish swim another 1000 miles up the river when they can go in the Chandalar and be perfectly happy right there, and die right there?" (interview, male fisher, 7/24/15). These ANF express a lack of confidence in a system where they are held accountable for the success of a migrating salmon species and are also not included in the methods of monitoring said species.

Discussion: barriers for fishers

The security of a fisher's voice within Alaskan management regimes is not the cause for concern. It is the cumbersome structures, protocols, and processes that fishers are required to follow that is called into question. Since Alaska statehood the resource

management regime has made efforts to appear inclusive and the result has been over-management of fishers in attempts to create a co-management system. The system itself is overwhelming and in many cases viewed with resentment and frustration by Alaska Native fishers (ANF). For example, fishers interviewed residing along the Yukon River in 2015 and 2016 were not enthusiastic about advisory boards. Advisory boards, from the point of view of the state, are intended to be the main tool aiding fishers in raising their voice. Much of the frustration expressed by fishers focus on two issues: the process of being heard is too cumbersome, and they have not seen evidence of any changes since implementation in the 1950s. Both concerns are amplified by other life hardships that they must prioritize.

There were forty-eight interviews conducted with ANF. Interviewees were asked if they had a desire to be on a committee and all responses resulted in "no" or "it's not worth it." When asked if they had attended advisory committee meetings, responses included "I used to" or "Sometimes." Those who had experience with advisory boards reported conflict at meetings. For example, "Even going to meetings together just turns into...I represent this area from here to the border. I have to really fight like hell with everybody down below me [on the river]... about quotas, fish, who's getting the fair shake. You know they're all spreading rumors about us. We'll spread rumors about them. It's just a nasty situation." In other instances, fishers reported frustration with the amount of work they would put into proposals that were prepared for BOF's (Board of Fisheries) review: "We work on proposals and stuff. We make ... regional proposals. Most of the time, we have people from Fish and Game there to update us. Anytime you want to have it done and we want to change the system, it's hard to move the state. There are a few people that we complain to...even though we were crying and bitching and all that stuff, they don't budge." Much of this frustration comes from the lack of change or even consideration for fisher proposals submitted to BOF.

While Traditional Ecological Knowledge (TEK) has gained momentum and been recognized more widely as a valuable source of knowledge, there are still issues of validity. For example, "scientists are beginning to understand that traditional knowledge can be quite extensive beyond descriptive biology, species identification, or behavior description"

(Moncrieff 2004, 17), and TEK was recognized by the State of Alaska in the 2012 Alaska Department Fish and Game Needs and Gaps Analysis. At the same time ADF&G acknowledges, “While a great deal of traditional knowledge is held by Alaskans, studies to systematically record and communicate this information are lacking for most Chinook salmon stocks in the state” (ADF&G 2012, 2). The difficulty with integrating TEK into Western knowledge systems and the inability to extract this knowledge is a common theme among researchers (Nadasdy 1999; Deloria 1995; and Agrawal 2002), and recently TEK has been described in the following way: “Aboriginal knowledge is a ‘package deal’; it comes complete with its original holders, without which it cannot properly function” (McGregor 2008, 140). This leaves ANF stuck in a system that is trying to collect and commodify IFK while changing that knowledge in the process.

The structure of the advisory boards make three main demands of fishers. The first is time, as a fisher must plan to attend a meeting according to the state’s timeline. The second is validity, as fishers are placed in situations where IFK is scrutinized. In these forums, IFK is vetted through the fisher themselves, the community they represent, advisory boards, and BOF. Lastly, the fisher must face intellectual and geographical detachment from their location and knowledge. The large BOF meetings, held twice a year, are hosted in large cities away from remote villages, so a fisher must not only find the funding for travel, but they must geographically detach themselves and determine how to best portray their culturally based knowledge. These spaces demand that Alaska Natives present a piece of their heritage and culture for public scrutiny in exchange for a chance to have an impact on policy, a process which comes without any guarantee of understanding or practice.

In summary, the space and place established for fishers to voice their knowledge is simply that, a place to speak up; there is no way for fishers to follow that knowledge to determine if and how it is implemented in any way. This process is ultimately frustrating to the fisher who must overcome issues such as time, validity, and strict unmitigated scrutiny of the knowledge itself from a western perspective, which in turn separates the fisher from management. This system also requires fishers to stay up-to-date on these changing regulations based on the outcomes of these

meetings and are penalized or fined if they do not comply. This complicated bureaucratic process designed to save king salmon has inadvertently put Indigenous Fishers Knowledge at risk of extinction.

Conclusion

In this article, we state the process established by the state of Alaska to conserve natural resources has adversely affected Alaska Native fishers. While it is true the Alaska fisheries management system has made a place for fishers’ voices, it has pushed that voice to the margins of management. Indigenous people along the Yukon River hunt, fish, gather, and share their harvest to provide for their families and community (AJS and CATG 2010). Throughout the course of Indigenous people’s existence in the Alaskan Arctic there has been much ecological and social change due, primarily, to climate change and inflexible management policies and systems born from extractionist economies (Williams et al. 2016; Godoy 2005; Goldsmith 2010). Alaska Natives have gone from a system of natural resources stewardship built on varying scales of relational experiences and observations over thousands of years with the natural environment (Williams et al. 2016), to a system that is inflexible and young, merely 60 years old in Alaska. It’s an issue of maturity; while organizations rise and fall, Indigenous peoples remain.

Historically, the relationship between Indigenous fishers and governmental management systems is contentious. As resources began to deplete and regulations were put into place without consulting local communities and subsistence fishers, Indigenous communities resisted. As a result, resource managers were cautioned not to overlook fishers’ and community knowledge and concerns or they risked political activism and increased amounts of “defiant and illegal fishing practices” (McGoodwin 2006, 184). Due to the large role community plays in fishing, recent shifts in management recognize the community within which the fisher resides as a stakeholder (Nuttall et al. 2005). Regardless, the state of Alaska is reluctant to adjust or has provided little evidence of adjusting the decision-making processes. For example, active resource management offices in the communities could be established year-round to train, employ, and utilize

fishers and community members who are directly working with and around resources.

Fishers' are the gritty type of people who dedicate hours of preparation, financial expense, and in some cases their lives to the activity. Interviews with Indigenous fishers indicated a frustration with the overregulation of two primary methods of fishing; the first is the use of a fish wheel, and second is the gillnet (Loring 2017). An experienced Indigenous fisher of the Yukon River describes the task of using a gillnet to fish as "...a lot of work. When you're in a canoe and that water's ice cold and you're pulling on a heavy, heavy net, you know, it's unsafe" (7/15/15). Fishers multitask and spend all their spare time caring for nets or building fish wheels by hand as described by an Indigenous fisher of the Yukon River: "... [when you] build the baskets from ground zero, it takes two or three days...It'll take... a couple more days to go and get the raft... When I'm talking about the cable, the nails, the fish wheel wire, those are the major expenses, plus the gas to go out and get your poles, get gas to go get your wood, at least 500 bucks ...couple more days to get the crew together to actually pack the wheel onto the boat... Then another day to push it out and find a good spot" (7/15/15).

In rural Alaskan villages, where the unemployment rate remains above national averages, there are not many opportunities to buy groceries and shipping costs are passed on to the community. For example, if a village is lucky enough to have a grocery store, a bag of Lays potato chips costs an average of \$7.00–\$9.00. Living solely on grocery bought foods is financially unrealistic (Brinkman et al. 2014), so communities rely on a mixed commercial and subsistence lifestyle supplementing grocery-bought foods with fish and game. When entire fishing seasons are shut down and community members are no longer able to fish for subsistence purposes they become reliant on other forms and sources of subsistence or they continue to fish and hunt and face consequences of breaking the law. The current structure has yet to find a way to seamlessly share and value information. It's time to move from Indigenous people providing lessons for societal consideration into an era of application, where Indigenous Knowledge systems are the foundation of effective natural resources stewardship (Whyte 2017). While much has been written about the value of Indigenous Knowledge, i.e., TEK, ILK or IFK, there remains a dearth of information about how state and

federal natural resources offices access and implement these knowledges. The social, economic, and environmental implications associated with the decline of a community's subsistence lifestyle is not easy to understand, but one thing is certain, the implementation and inclusion of IFK in Alaska fisheries management must change.

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Data availability All data generated or analyzed during this study are included in this published article.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Research involving human participants Interviews with participants were done with approval and according to guidelines set forth by the University of Kansas Human Research Protection Program. Interviews were approved by each Indigenous tribal government beforehand. All interviews were anonymous.

Informed consent Oral consent was approved by the University of Kansas (KU) Human Research Protection Program and each participant is anonymous and received oral consent procedures approved by KU.

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