Arctic Rivers Summit Action Plan:

Weaving Together Traditional Knowledge and Western Science for Management

December 2022

Action Plan: Partnering Indigenous Knowledge and Western Science for Management

1.0 Introduction

The Arctic Rivers Summit was a gathering that brought together nearly 100 people to discuss the current and potential future states of Alaskan and Yukon rivers and fish and how we can adapt. The summit was held in Anchorage, Alaska from December 6-8, 2022. People who attended included Tribal and First Nation leaders, community members, managers, and knowledge holders, western scientists, federal, state, and provincial agency representatives, academic partners, non-governmental organizations and others. The Summit was held as part of a five-year Arctic Rivers Project funded by the National Science Foundation's Navigating the New Arctic Program. The Arctic Rivers Project was co-led by the University of Colorado-Boulder and the National Center for Atmospheric Research, and both the project, and the Summit were guided by an Indigenous Advisory Council. Additional Summit partners included the Institute for Tribal Environmental Professionals, the Yukon River Inter-Tribal Watershed Council, the U.S. Geological Survey, the University of Saskatchewan, and the University of Waterloo.

One of the key goals of the summit was to develop action plans centered around four topics:

(1) State of Salmon
(2) State of Rivers
(3) Weaving Together Indigenous Knowledge and Western Science for Management
(4) Youth and Elders: Building a Bridge of Traditional Knowledge

This action plan focuses on *Weaving Together Indigenous Knowledge and Western Science for Management*. Current management principles in both Canada and the United States rely heavily on western science and mindsets. Indigenous knowledge, however, has been integral to the resilience and sustainability of Tribal communities and their innate care and protection of their environmental surroundings. Intergenerational knowledge sharing is a central part of Indigenous cultures and has been done by Native peoples for thousands of years. The potential for braiding together Indigenous knowledge and western science to inform decision-making, management, and research is explored here. Although each of the action plans is presented separately, interconnections exist among all the plans with Indigenous knowledge sharing being key among them. To develop the *Partnering Indigenous Knowledge with Western Science for Management Action Plan*, two small group activities/ discussions were held.

2.0 Process for developing the *Partnering Indigenous Knowledge with Western Science for Management Action Plan*

The process for developing the *Partnering Indigenous Knowledge with Western Science for Management Action Plan* consisted of three steps completed during two in-person meetings during the Summit. The steps consisted of:

1) Developing a collective vision of a desired future for partnering Indigenous Knowledge with Western Science
2) Engaging in a Strengths, Weaknesses, Opportunities, Threats (SWOT) activity that took into account the desired future
3) Identifying potential actions to work towards the desired future based on the SWOT activity

2.1 Collective vision

During the first gathering, group members first developed a collective vision for a hoped for future for weaving together Traditional Knowledge and Western Science for management. The vision described different elements to support respectful partnering. This is described in Section 3.0.

2.2 Strengths, Weaknesses, Opportunities, and Threats (SWOT)

The hopes/desires identified while developing a collective vision for the future laid the foundation for the next activity, a strengths, weaknesses, opportunities, and threats exercise that also took place during the first gathering. Strengths and opportunities were considered to be factors helpful in reaching the collective vision. Weaknesses and threats were factors presenting challenges to reaching the desired future. In general, strengths and weaknesses were described as happening during the current time while opportunities and threats were described as potentially or likely to happen in the future, however, in practice, overlap among the various categories occurred.

To promote brainstorming, group members were encouraged to consider the LESTER categories, which include **L**aws and policies, **E**nvironmental and biological factors, **S**ocial factors and Indigenous Knowledge, **T**echnology and infrastructure, **E**conomic factors, and **R**esearch and monitoring. These categories overlap with one another and were not intended to limit in any way the strengths, weaknesses, opportunities, and threats identified.

For the SWOT activity, the group focused on a single category at a time (ex. strengths were discussed first). Each group member individually filled out sticky notes and then added them to the collective board. Once all group members had a chance to contribute their thoughts, the group discussed the overlap and connections between all the ideas on the board. This process was repeated for all four categories of the SWOT. During both the

Gathering 1 discussion and later by facilitators, similar factors (sticky notes) were grouped into themes.

2.3 Identifying Potential Actions

During the second gathering, group members reviewed the themes and, in some cases, the individual strengths, weaknesses, opportunities, and threats characterized and were then asked to identify key potential actions. These actions could build on strengths, address weaknesses, take advantage of opportunities, and mitigate threats.

The results for all three steps are described in Sections 3 through 5 below.

3.0 Collective Vision

During the first gathering, the group had many ideas regarding their vision for the future of partnering Indigenous Knowledge with Western Science. Key components of this vision included:

- Respect for Indigenous Knowledge (IK) as well as Western Science (WS)
- Removal of barriers to knowledge co-production and co-management
- Braided knowledge systems working together for decisions, management, and research
- Investment in Indigenous youth – providing both IK and WS experiences
- Data sovereignty/ Tribal sovereignty
- Accountability of research and researchers
- Understanding the difference between Indigenous Knowledge and diversity, equity, inclusion, and access
- Indigenizing science to Tribal standards

Some of these components are discussed in more detail below.

Respect for Indigenous Knowledge as well as Western Science

A challenge noted by some group participants was that Indigenous Knowledge (IK) was not necessarily accepted or validated by Western science (WS) and in some cases was disparaged. One person wrote, “Don’t make fun of my culture.” The group’s future vision includes honest, respectful, and two-way conversations around IK and WS with true listening happening. The importance of ensuring that everyone at the table understands why IK is valuable was also brought up so that people were not including IK “just because ‘it’s what we’re supposed to do’.” The importance of recognizing that culture and IK “are here and not only in the past” and that they can change and adapt was raised as well.

Removal of barriers to co-production and co-management

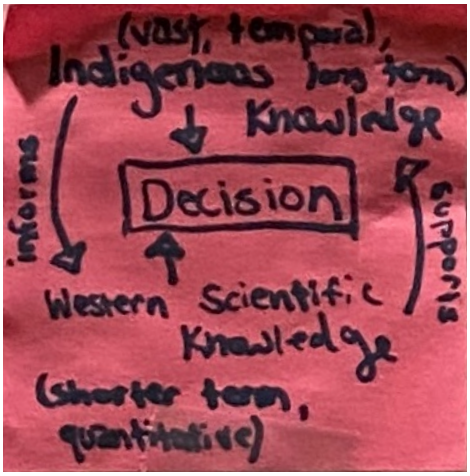
The group also raised a variety of barriers to co-production and co-management and how to overcome them. These included mindset shifts and changes to laws and funding. The

group's future vision included a desire to learn, re-learn, and unlearn previous ways of thinking. One mindset shift brought up was moving away from the "idea that there is only one way to approach an issue/ a question/ research/ etc." towards respecting different knowledges. Another shift raised was making clear that "there is no preference for western science in our institutional bodies" over IK. A third mindset shift mentioned was making "it okay and healthy to share truths and traumas between disciplines" and also share what may be the spiritual importance and context of IK.

Changes to laws envisioned included "requiring state and federal governments to seek out and address traditional knowledge when making decisions," "requiring decisions on a timeframe that allows for full consultation [with Tribes] and development of traditional knowledge," and "legal restructuring of priorities for land, water, and animal rights." The group also pictured a future in which there is "equal funding for traditional knowledges and western science," and monetary compensation for knowledge holders who share their wisdom in the same way that there is compensation for western scientists for their knowledge. Climate reparations were raised as well in which Indigenous peoples are compensated for the economic impacts of climate change, which they have done little to cause.

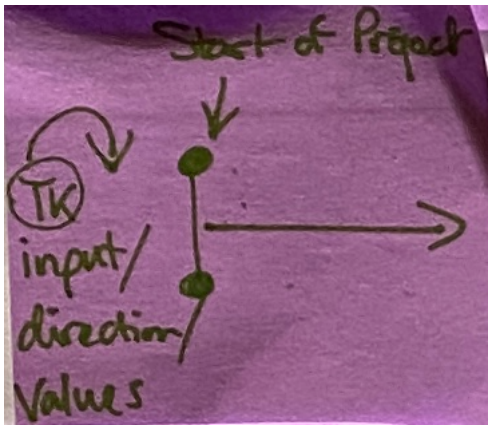
Braided knowledge systems working together for decisions, management, and research

The group's vision for weaving together Traditional Knowledge with Western Science included a mutually beneficial, symbiotic partnership in which IK informs western scientific knowledge, WS supports Indigenous Knowledge, and both inform decisions related to management and research.



Specific ways identified in which the above could work entail Increasing the inclusion of IK in what have, since colonization, been a predominantly western perspective led realms. Management-related examples include adding "Indigenous advisory councils to all institutions and organizations that rely on laws and policies to make decisions," including Indigenous Knowledge holders on councils/boards that make decisions, decision-making based on free, prior, and informed consent. Other actions envisioned included expanding co- or Indigenous management across all public lands, "putting western scientists to work for Tribes, developing a Yukon River Indigenous Fishery Management Plan, and developing a holistic Yukon River Integrated Salmon Management Plan making use of both IK and WS.

Research-related examples include staring a project with Traditional Knowledge input, direction and values, combining IK and WS to fill in data gaps, having agreed upon standard operating procedures between scientific institutions and communities to “integrate local experience/observation with scientific sampling and/or monitoring of ecological or biological targets,” “better communication of why the research matters,” and “more cultural exchange between Indigenous knowledge holders and western scientists.”



4.0 Strengths, Weaknesses Opportunities, Threats

During the first gathering, working group members also identified and discussed strengths, weaknesses, opportunities, and threats that could further or hinder their desired vision for the State of Salmon.

4.1 Strengths

For the strength category of the SWOT exercise, several themes emerged. The group identified that the two most important overarching strengths of weaving together Traditional Knowledge and Western Science are:

1) Increased recognition of a colonial legacy and awareness of the need to decolonize processes and
2) The rise of Indigenous leaders in positions of power within government and resource management agencies and the need for more.

Additional strengths identified by group members included:

3) IK Inclusion - creating safe spaces and proper protocols to share and protect IK,
4) Growing Native youth leadership,
5) The shift in state and federal politics to be more inclusive of Tribal rights, sovereignty and leadership,
6) The resurgence of ceremonial practices by Tribal members and communities and the potential for their inclusion in spaces where IK and WS are shared,
7) The rise and support for ‘Land Back’ campaigns,
8) The restoration of salmon rights,
9) The removal of dams to restore flowing rivers, and
10) “Not all is lost just yet”

Some of these strengths are discussed in more detail below.

Indigenous knowledge inclusion
Group members brought up that people are talking about IK inclusion – the "dialogue is now open." "People see the benefit of working together." There are more opportunities for communication, more recognition of IK in academia, and an increased willingness to collaborate. The current administration published guidelines on the inclusion of IK in federal research, policies, and decision-making. One participant wrote, "We are generally aware of what we could do to improve co-production of management or ecological knowledge. Awareness is a good first step."

Growing Native youth leadership
School districts have been working with villages to grow cultural connections supporting native language and cultural classes and to provide vacation during subsistence/ hunting seasons. One group member also brought up partnerships with Tribal Colleges. Both support the increase in young people in leading the way forward.

4.2 Weaknesses

For the weaknesses category of the SWOT exercise, some of the main weaknesses that emerged for bridging the gap between IK and WS were the:

1) Lack of Indigenous authorship including not giving credit where credit is due
2) Extractive nature of western science and the structure of grants and institutions.
3) Institutional reluctance to include IK in decision-making and other processes (still a long way to go), and the
4) Lack of communication by western research institutions and the inaccessibility of western scientific language.

Additional weaknesses identified by group members included:

5) Misunderstanding positionalities –the framework from which we perceive and understand ourselves, others, ideas, and the world around us.
6) The continuing suppression of Indigenous voices through lack of access and opportunity
7) Challenge of studying/managing a large geographical area with many different regions.

One of these weaknesses are discussed in more detail below.

Extractive nature of western science and structure of grants and institutions
A variety of weaknesses related to the structure/ nature of academia and grants were brought up by group members. Many Indigenous peoples have experienced academics and researchers as entitled, being poor listeners, and lacking in cultural humility. They have also experienced them as extractive. One example of this is western researchers appropriating Indigenous concepts and knowledge as their own rather than properly attributing this information to the Indigenous members and communities from where this information

came and welcoming them as co-authors on publications, presentations, and more. Another example is expecting Indigenous knowledge holders to participate in projects and provide their time and wisdom for free, not compensating them in the same way that westerners would be compensated.

In both the research and management realms, another weakness has been a deficiency in translators in order to ensure that Indigenous elders and community members, for whom English may not be their first language, truly understand what is going on. Related to this are challenges with understanding western scientific language.

Group members also noted that funding for the inclusion of traditional knowledge has been unequal and less than funding for western science studies and projects. Moreover, including IK as part of grants can be challenging because "to get funding you need to pitch an idea but to get the values of a community and priorities, the input needs to happen before the project begins." Timing may also be mismatched in that there may "not be enough time to obtain and consider traditional knowledge as part of a decision process or project design."

4.3 Opportunities

A variety of opportunities to bridge the gap between IK and WS were identified during the SWOT activity. Some of the main opportunities identified included the:

1) Development of Indigenous-led research questions based on community needs
2) Respectful knowledge co-production

Additional opportunities identified include:

3) Cultural humility and IK trainings for western scientists
4) Establishing Indigenous Advisory Councils (with a living wage) for research projects
5) Electing elders/ knowledge holders for governing boards
6) Engaging Native youth
7) Educating about and applying free, prior, and informed consent principles
8) Tribal consultation on a timeline determined by communities
9) Funding for co-production and co-management

Two of these opportunities are discussed in more detail below.

Respectful knowledge co-production

A number of group members raised the opportunity posed by truly respectful co-production noting that intertwined data can equal stronger, positive outcomes. One wrote, "Through co-production there is potential for Indigenous people to be lifted up and valued which could lead to an improvement with human rights issues."

Cultural humility and IK trainings for western scientists
Western scientists would benefit from trainings and workshops on Indigenous history, ethics, implicit bias, the practice of cultural humility and more. Given localized contexts and differences, it would be helpful if such trainings were region-specific.

4.4 Threats

Finally, for the threats category of the SWOT activity, the threat of greatest priority was:

1) Greed and the commodification of Indigenous Knowledge,

causing Tribes to hesitate to collaborate with western researchers and managers.

Additional threats identified by group members included:

2) The incorrect interpretation of Indigenous Knowledge (not understanding cultures, contexts, and places)
3) The lack of funding opportunities for Tribal communities
4) Engagement driven by urgency and deadlines rather than by a desire to develop long-standing working relationships with the time needed to build trust and understanding
5) Asking for too much IK from communities – overburdening them
6) The ego of western scientists and their unwillingness to share accreditations
7) Lack of/ shifting political support/ priorities for IK-WS collaborations
8) Ambiguity around who has the power to change institutions and institutions resistant to change and inclusion of IK
9) "Indigenous frustration with the system – giving up and walking away from co-production"
10) The extraction and mining that are inherent within renewable energy development and electric vehicle technologies
11) Climate change – we've hit the tipping point and are "too late"

One of these threats is discussed in more detail below.

Greed and commodification of IK
Several concerns were noted by group members with respect to the commodification of IK by westerners. These include knowledge being gathered and used without proper authorization and/or community member support (stolen knowledge) and use of knowledge without crediting the Indigenous individuals or communities imparting the knowledge. Concerns also include insincere motivations such as "seeking IK for profit (greed)," and seeking IK solely to qualify for/obtain grant funds or to meet diversity, equity, and inclusion requirements. These types of motives do not recognize the importance of mutual benefit in IK – WS collaborations and of giving back to the communities who provided the IK. A final concern noted was losing sight of the purpose/common goals that drove the collaborations in the first place.

5.0 Actions

During the second gathering for this working group, people discussed actions to create opportunities for Indigenous Knowledge to be authentically woven together with western science. As described in section 2.3, these actions can build on strengths, address weaknesses, take advantage of opportunities, and mitigate threats.

In addition to identifying actions during the second gathering, in some cases, group members identified actions during the Strength, Weaknesses, Opportunities, and Threats activity that took place during the first gathering. Actions identified during both gatherings are listed in Table 1 below.

Four overarching action themes emerged, including:

- *Community Engagement in Indigenous Knowledge and Western Science Collaborations*
- *Inclusion of Indigenous Knowledge in resource management*
- *Youth Capacity Building*
- *Learning Opportunities for Early Career Researchers*

5.1 Community Engagement in Indigenous Knowledge and Western Science collaborations

Historically, western science and data has been a way to regulate Indigenous peoples. If Indigenous knowledge and western science are braided, it must be done in a way that recognizes and moves away from being a mechanism of control and colonial underpinnings. Instead, western scientists should understand that it can be risky for Tribal communities to share Indigenous Knowledge given that this information could be used against or taken from the Tribe. In order to address this, Tribal communities must be consulted and included throughout the entirety of the research process.

This involves western scientists completing trainings including ethics, cultural competency, and free, prior, and informed consent prior to approaching Tribal communities about integrating IK into their work and also entails establishing relationships with Tribes ahead of projects. In addition, the working group emphasized the need for increased communication from western partners and input from Indigenous communities into project goals, methods, and outcomes. Examples of what this could like in practice include developing Indigenous-led research questions based on community needs and establishing and abiding by mutually agreed upon Indigenous project protocols, which can vary from Tribal community to community. The group also recommended that Tribal communities have the opportunity to review any research products prior to submission, be included as authors on publications and presentations, and that upon publication, Tribal communities have free,

We shouldn't have to buy our knowledge back

open access to the research that their Indigenous knowledge informed. One group member expressed, “We should haven’t to buy our knowledge back.” An additional component of engagement noted was supporting communities in using information developed from IK-WS collaborations in community planning. Finally, the group suggested that other forms of knowledge holders, such as traditional dance groups should be included in knowledge co-production processes. Traditional dances are essential to knowledge sharing and storytelling within Tribal communities.

5.2 Inclusion of Indigenous Knowledge in resource management

The importance of having Indigenous Knowledge holders on resource management governing boards was emphasized by the group as a way to bring Indigenous knowledge and western science together in support of ecosystem, species, and cultural sustainability and resilience. One action identified to increase the presence of IK holders on boards was to education First Nations and Tribes about what governing boards do and how to become a member. Providing opportunities for Indigenous communities to manage or co-manage their historic lands was also highlighted.

5.3 Youth capacity building

If long-term partnerships between Indigenous knowledge holders and western scientists are meant to thrive, there must be an investment in Native youth to support Tribal capacity building. One idea brought up was to maintaining support for the Arctic Youth Ambassadors Program and its inclusion of Indigenous youth and that this program could serve as an example for others. A second idea was to increase Indigenous youth involvement in projects like the National Science Foundation’s Long-Term Ecological Research Network. A final idea was to involve existing programs such as the Alaska Native Science and Engineering Program (ANSEP) in educating youth about respectful knowledge co-production and potentially involving Indigenous youth in co-production pilot projects.

5.4 Learning opportunities for early career researchers

The group determined that both Indigenous and non-Indigenous early career researchers should be educated on respectful and ethical research protocols, the FAIR data principles (Findability, Accessibility, Interoperability, and Reusability), and on decolonization and how it can relate to research practices. This could help promote widespread understanding and a shift across the scientific community about working with and using Indigenous knowledge. Native Movement and the First Alaskans Institute were both mentioned as having relevant trainings. Another action brought up was promoting academic support groups for Indigenous early career professionals. Engaging early career researchers in educating older western scientists on the need for knowledge co-production done in a respectful, ethical way was also mentioned.

Table 1. Actions for Weaving Together Traditional Knowledge and Western Science for Management

Action Category	Examples
Engaging communities in IK – WS collaborations	• Require western researchers to take trainings that include Indigenous-focused ethics, and free, prior, and informed consent prior to approaching Tribal communities about weaving IK into their work • Build relationships with First Nations and Tribes before projects start • Provide direct funding to communities to engage in collaborations • Develop Indigenous-led research questions based on community needs • Establish Indigenous Advisory Councils (with a living wage) for research projects • Educate western researchers on free, prior, and informed consent policies • Provide advocates to Tribes sharing IK outside their communities. • Establish and abide by Indigenous Project Protocols • Provide communities with the opportunity to review publications prior to submission • Include IK holders as authors on publications • Make publications open access so that IK holders do not need to buy back their knowledge. • Include dance groups as knowledge bearers in co-production. • Support communities in using information from IK-WS collaborations in community planning.
IK inclusion in resource management	• Educate First Nations/Tribes about what governing boards do and how to become a board member • Elect elders and knowledge holders to resource management governing boards • Elect Indigenous advocates by region • Give Indigenous communities sovereignty over the management of historical lands
Build the capacity of Indigenous youth	• Continue support for the Arctic Youth Ambassadors Program • Increase Native youth involvement in the National Science Foundation's Long-Term Ecological Research (LTER) network and increase the number of LTER sites • Support programs such as the Alaska Native Science and Engineering Program (ANSEP) in educating Indigenous youth about respectful knowledge co-production practices and/or conducting co-production pilot projects.

Action Category	Examples
Build the capacity of early career researchers	• Educate both Indigenous and non-Indigenous early career researchers on respectful and ethical research protocols the FAIR data principles (Findability, Accessibility, Interoperability, and Reusability), and decolonization. *Native Movement and the First Alaskans Institute were both mentioned as having relevant trainings.* • Provide academic support groups for Indigenous early career professionals. • Engage early career researchers in educating older western scientists on the need for knowledge co-production done in a respectful, ethical way.
Additional actions identified	• Provide free legal assistance to tribes to tackle threats to ecosystems, species, and people • Support the establishment of healing spaces to discuss trauma and address it.

5.0 Conclusion

The Arctic Rivers Summit brought together a diverse array of people, both Indigenous and non-Indigenous, to share ideas about ways to support weaving together Traditional Knowledge and Western Science for management. The group of people who gathered were driven by a desire to support holistic, sustainable management of land, water, and fish resources in a way that considers Indigenous perspectives and wisdom.

It is our vision and intention that the discussions and ideas presented in this plan will motivate conversations and inspire actions to support respectful and innovative Indigenous knowledge and Western Science collaborations to sustain rivers, oceans, fish, cultures, and communities for generations to come.

For questions

Please contact Karen Cozzetto, Institute for Tribal Environmental Professionals (ITEP) Tribal Wellbeing for Seven Generations Program Co-Manager and Nikki Cooley, ITEP Co-Director, with any questions or comments about this plan.

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