A Collaborative and Mutually Beneficial Tribal Marine Science Workshop Format for Tribal Natural Resource Professionals, Marine Educators, and Researchers

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ABSTRACT

The Tribal Marine Science Workshop has run annually since 2010. The workshop takes place at the Kasitsna Bay Laboratory, owned by the National Oceanic and Atmospheric Administration (NOAA) and operated by NOAA and the University of Alaska, Fairbanks, near Seldovia, Alaska. It is hosted by the Seldovia Village Tribe, sponsored by the Bureau of Indian Affairs, and coordinated by Kai Environmental Consulting Services. The idea for the workshop started with two of the authors. Based on discussions with and requests from local tribal communities, they realized that many tribal natural resource managers have a range of responsibilities and extensive job experience but may not have relevant formal education and training. Lacking these, the managers believed their insight and opinions were undervalued by scientists, policy makers, and government officials. This workshop focuses on Alaska Natives in tribal environmental offices working in the coastal marine environment. It brings together researchers, educators, and tribal leaders who are experts in their respective fields to work with tribal natural resource managers. A primary workshop goal is to have the participants implement what they learn in the workshop in their communities. The Kasitsna Bay Laboratory is the perfect location for this workshop, with its wet lab, dry lab, classrooms, and ability to house everyone on-site. The format for the workshop combines classroom presentations, hands-on activities and field programs led by researchers, educators, and tribal leaders. The workshop closes with a potluck subsistence dinner featuring traditional marine and terrestrial foods from the participants' home regions. The organizers cover all costs of the workshop. The workshop's effectiveness is demonstrated by the desire of participants to return in subsequent years and to bring members of their community to the workshop, as well as by qualitative summary evaluations. Summary evaluations and conversations during the workshop indicate that participants view the integration of traditional knowledge and Western science as one of the strengths of the workshop and the presenters' focus on storytelling as a means of instruction. We hope to continue this workshop and to gather more quantitative evidence concerning its effectiveness, and we encourage others to replicate this workshop format in other areas and with other communities. © *2014 National Association of Geoscience Teachers*. [DOI: 10.5408/12-405.1]

Key words: Natives, storytelling, workshop, marine science, traditional knowledge

PURPOSE

The goal of the Tribal Marine Science Workshop is to instruct tribal staff members working in marine-related natural resource and environmental management positions in Western science concepts and techniques while incorporating traditional knowledge (TK), culture, and practices. Alaska Natives engage in sustainable harvest of marine resources throughout the year, with most of these activities in spring and summer. Ensuring that they retain access to these harvests is important and often entails discussions with researchers and government officials. Many native tribal resource managers told the authors that during such discussions they felt their TK was not valued and that they do not completely understand the Western science–based side of the issues.

The workshop provides an introduction to several marine science topics and field techniques in an attempt to make Western research methods and information accessible and relevant. We hope that participants will take what they learn and experience during the workshop back to their communities and integrate this Western science content and information with the shared TK in order to better manage their natural marine resources. The purpose of this paper is to provide a qualitative overview of why we believe we have been successful and why we think that this type of workshop should be repeated and studied in a more quantitative fashion.

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CONTEXT

TK has been recognized as a valid and valued component of ecosystem dynamics and natural resource monitoring (e.g., Ferguson and Messier, 1997; Becker et al., 2008; Danielsen et al., 2008). Haggan et al. (2006) examined how accumulated TK over the 19th and 20th centuries built a greater understanding of natural and human-induced ecological change. The issue of how to integrate TK into Western science was identified by Agrawal (1995), who stressed the need to eliminate the dichotomy of indigenous

versus scientific knowledge. He pushed the need to recognize that there is only knowledge and that all knowledge is useful but that it is "only when we move away from the sterile dichotomy between indigenous and western, when we begin to recognize intra-group differentiation; and when we seek out bridges across the constructed chasm between the traditional and the scientific, that we will initiate a productive dialogue to safeguard the interests of those who are disadvantaged."

Kimmerer (2002) took this one step further, considering those who possess TK not as disadvantaged (as Agrawal implied) but rather as possessing vital information. Kimmerer suggests that we are "ignoring an entire body of knowledge that has potential significance to contemporary science and policy: traditional ecological knowledge (TEK)." Pierotti and Wildcat (2000) present an excellent summary of TK as a body of knowledge in which all things are connected, "which changes the emphasis from the human to the ecological community as the focus of theories concerning nature." This differs from Western European philosophy, "which assumes that humans are autonomous from, and in control of, the natural world" (Pierotti and Wildcat, 2000).

Storytelling is an important method of communication for indigenous peoples, yet little research has been undertaken on the integration of storytelling and Western science. The Western idea of storytelling implies something that is made-up, fictional, untrue, even exaggerated. For Alaska Natives, storytelling is an important part of conveying wisdom and information to their youth and others. These stories or oral histories are based on (1) their true personal experiences or acquired knowledge (which are factually based) and/or (2) tales or legends handed down from their relatives, Elders, other tribes, etc. (akin to ancestrally derived mythology that is intended to teach important lessons about morality, strengthen connections to culture, etc.). This is an area that clearly needs additional study (Murphy, 2010). Murphy (2010) discusses the importance of stories in sharing culture and in teaching lessons to youth. She quotes Rogoff (2003, in Murphy, 2010), who stated: "Stories are central to instruction and learning in traditional American Indian and Alaska Native education. They are used to foster attention, imagination, metaphoric thinking, and flexibility and fluency of thought in understanding the natural and mortal world and the meaning of life." Ball (2004) provided a quote from a community member in her evaluation of the highly successful First Nations Partnership Program: "The Elders enjoyed themselves. They came every week and met with the students, and shared their stories. A lot of good came from that.... We all benefited in some way from the training." Simpson (2002) discusses storytelling in terms of "another way of knowing," remarking that "instructors must be very cognizant of the exclusionary nature of the discourse around science and actively promote Western science as just another way of knowing, not one that is more valid or more reliable than indigenous systems."

The Tribal Marine Science Workshop is designed to integrate both TK and Western science into a week of interactions, discussions, and stories. This integration has been attempted before (Huntington et al., 2002; Murphy, 2010) with varying levels of success. Huntington et al. (2002) discuss workshops that were focused on researchers and whalers (Barrow Symposium on Sea Ice, October 2000), information workshops designed to share research from scientists with communities (1997–1999), and annual meetings of the Alaska Beluga Whale Committee (scientists, managers, and hunters). Murphy (2010) discusses two camps, Seal Camp and Bear Camp, with different participant groups. Seal Camp included local Elders, hunters, biologists, and community members teaching about the science and full utilization of seals. Bear Camp targeted local youth and included local hunters, Elders, educators, and community members with a focus on the hunting, fishing, and utilization of bear and salmon. Our workshop differs from these earlier workshops in that our participants are tribal staff members in natural resource and environmental management positions who want to learn Western science and how to integrate this knowledge with their understanding of the issues based on their experience.

WORKSHOP PARTICIPANTS

The participants in the Tribal Marine Science Workshop are tribal natural resource and/or environmental staff members. In most cases, they grew up in their community or village. They know and understand their local environment but did not attend college or are not formally educated in Western science. Discussions with these Alaska Natives revealed that while they felt comfortable and respected within their communities, they felt unappreciated and undervalued when speaking to researchers and government staff members who have formal educations and degrees. They requested the opportunity to learn more about Western science and policy in order to better represent their community during natural marine resource discussions at the state and federal levels.

While tribes located along Alaska's vast coastline are primarily targeted for participation, marine resources and marine concepts are equally important to inland tribes. This is especially true along the Yukon and Kuskokwim River watersheds, where access to these resources, primarily salmon and sheefish, is an integral part of local subsistence and cultural tradition. One major objective of the workshop is to provide the participants with information relevant to the management of natural marine resources that are traditionally and important to the tribe and community. The workshop prioritizes the participants to include representatives from as many tribes as possible. Additional applicants are placed onto a waiting list. Once the resource managers have been given time to apply, the workshop is opened up to other organizations that work with tribes and then to other state and federal agencies that work with tribes.

The workshop started in 2010 with eight participants. The evaluations from this workshop were all favorable and recommended that the workshop and format continue. However, it was highly recommended that the timing of the workshop shift from May to April and that the duration of the workshop decrease from 7 to 5 days. Participants came from the coastal communities of Anchorage, Port Graham, Kasaan, Seldovia, Stebbins, and Iliamna (Fig. 1).

The 2011 workshop featured many of the same instructors. One of the 2010 participants was added to the 2011 staff, because she is an expert in policy, law, and management of marine resources important to Alaska

FIGURE 1: A map showing the geographic locations of the participants from each year. The workshop location is NOAA's Kasitsna Bay Laboratory (near Seldovia on the map). In 2010, the eight participants came from Port Graham (2), Kasaan (1), Seldovia (2), Stebbins (1), Iliamna (1), and Anchorage (1). In 2011, we had five participants from Eyak, Afognak, Unalakleet, and Homer and an Alaska Native staff person from Anchorage within the BIA. In 2012, we had nine participants from Craig (1), Pelican (1), Kodiak (2), Nunapitchuk (1), Seldovia (3), and Chickaloon (1). And our latest workshop in 2013 had eight full-time participants from Kodiak (2), Saint Paul (2), Ninilchik (2), Seldovia (1), and Juneau (1).

Natives. Five participants came from the coastal communities of Eyak, Afognak, Unalakleet, and Homer. In addition, an Alaska Native staff person from the Bureau of Indian Affairs (BIA) in Anchorage attended part of the workshop (Fig. 1).

In 2012, nine participants came from the coastal communities of Craig, Pelican, Kodiak, Nunapitchuk, Seldovia, and Chickaloon (Fig. 1).

The most recent workshop (2013) filled up early and had a waiting list of tribal employees. We had eight full-time participants from Kodiak, Pribilof Islands, Ninilchik, Seldovia, and Juneau (Fig. 1). In addition, three local residents from Seldovia joined some activities throughout the week.

Recruitment for the workshop started in 2010 with direct conversations with tribal resource managers who had initiated the workshop discussions years earlier. Since then, word of mouth has led to several applications. Presentations about the workshop are made at BIA meetings and gatherings of natural resource professionals. E-mail announcements have also been used the last 2 years, and the Facebook page of the Seldovia Village Tribe Tribal Marine Science Workshop (Facebook, Seldovia Village Tribe, 2011) was launched in early 2011.

WORKSHOP FORMAT

The 2010 workshop was held in May in order to take advantage of the low tides that month. In Alaska, tidewaters are owned by the state of Alaska. There are no tribally owned lands below mean high water. Regardless of actual ownership, the areas we visited during the workshop are important subsistence areas for the tribe. Subsequent workshops have been held in April because many tribal members are involved with subsistence harvesting in May and do not have time for a weeklong workshop. Starting in 2012, all travels costs were also covered. Participants are flown or ferried to the Kasitsna Bay Laboratory of the National Oceanic and Atmospheric Administration (NOAA, 2006), where they spend 5 full days learning in the greater Kachemak Bay marine environment.

Presenters are selected based on their expertise in the topic. They are asked to include TK in their presentations and to strive for an interactive discussion format. The specific topics are determined in response to community discussions and formative feedback. As the workshop progresses, and between the annual workshops, the organizers discuss the progress and evaluate the effectiveness of the delivery. We conduct as many of the presentations in the field as possible, but some of the content is still delivered in a classroom. Each presentation is delivered in an open manner and with a flexible time schedule so that there is time for sharing stories and information. Determining whether a presenter has the necessary expertise is done by polling the local tribal community for TK-focused presenters and by asking peer colleagues for Western science presenters. The workshop curriculum is adjusted every year based on summative

TABLE I: Subject areas provided for the Tribal Marine Science Workshop. Topics will likely vary from region to region depending on the needs and interests of the participants.

Subject	Speakers
Ecology of marine plants, marine fishes, fish dissection lab	Glenn Chen, Bureau of Indian Affairs
Marine mammals and biosampling	Lianna Jack, Alaska Sea Otter and Stellar Sea Lion Commission Nick Tanape, Nanwalek Village Indian Reorganization Act Council
Management of marine resources important to Alaska Natives	Ida Hildebrand, Chugach Regional Resources Commission Patricia Phillips, Federal Subsistence Southeast Regional Advisory Council
Concepts in physical oceanography	Kris Holderied, NOAA Kasitsna Bay Laboratory
TK and subsistence uses of marine resources	Iver Malutin, Kodiak Area Native Association
Marine plankton	George Matsumoto, Monterey Bay Aquarium Research Institute
Marine field sampling projects and techniques	Michael Opheim and Tracie Merrill, Seldovia Village Tribe
Ecology of marine invertebrates	Cathy Needham, Kai Environmental Consulting
Shellfish biology, domoic acid testing, and clam inventory	Ray LaLonde, University of Alaska Marine Extension Program
Contaminants in marine subsistence foods	Karen Pletnikoff, Aleutian Pribilof Island Association Violet Yeaton, Port Graham Tribal Council

feedback from the participants and discussions with tribal communities. Some topics have been added after specific requests from the tribal natural resource managers (e.g., fish dissections in 2013).

Because the 2010 workshop was held in May, the participants had an opportunity to serve as educators when a school group visited the lab for a short period. This reinforced the information and experience for the participants and was viewed as a highlight of the workshop by the participants. This has not been repeated in later workshops, because the shift to an April time frame made it easier for tribal members to attend but more difficult for school groups to visit.

The next three workshops in 2011–2013 followed a similar overall format to the 2010 workshop, with the presenters (Table I for 2013) representing both Western science and traditional science. Presenters were asked to integrate stories and lessons from both approaches. This melding eliminated the need for the lecture format and created more of a discussion in which both presenters and participants shared their knowledge and stories.

Despite reducing the length of the workshop, we have added requested content by adding evening sessions. The additional content is based on comments during community events, informal discussions, and the summative evaluation from the previous year. The agenda for the 2013 workshop (Table II) included current and emergent issues yet kept the core lessons intact (similar to the earlier workshops).

RESULTS

Primary results provide evidence of the effectiveness of the workshop in terms of (1) usefulness to the participants and (2) integration of TK and Western science. Both of these are supported but not explicitly identified in participant comments. We have learned over the past 4 years how to maximize field experiences, minimize the traditional lecture format, and increase communication. We have also learned that the workshop has been effective in engaging tribal staff members in learning Western science concepts while incorporating TK, culture, and practices within the marine environment. In addition, there have been a number of serendipitous results that have emerged over the past 4 years.

We have had five alumni from the workshops come back as presenters. This has increased the amount of TK in the specific curriculum, because their topics are usually focused primarily on Alaska Native interests and content. Peer-to-peer teaching was called out in the participant surveys as a valuable addition to the workshop. Connections have been made among tribes and between participants and researchers.

Workshop Effectiveness

At this point, the workshop effectiveness is anecdotal, mostly from late-night discussions about the day's activities or during workshop discussions during presentations. Opportunistic conversations with the participants following the workshop have revealed that they are still enthusiastic about the information gained.

In the 2010 participant survey, one participant noted that "I will definitely be able to bring something back to my community." Participant responses from surveys in 2011 included "All of the topics were very interesting and I learned so much from the presentations. I think it's the best conference I've ever been to"; "I was hoping to get an education on traditional subsistence use and applications of traditional knowledge in scientific research and I did"; and "I know tribal educators who MUST be here next year and I will start bugging them. Really!" In 2012, the survey feedback noted the success of this workshop format: "very organized, comfortable, friendly, overall workshop environment. This workshop is a must to attend."

Asking previous participants to reflect on their experiences provided some interesting insights. The importance of storytelling from the Elders and of hands-on activities was made clear by a number of participants:

> *"The diversity of the group was well thought out with Elders from our Native communities who shared their knowledge of*

TABLE II: Agenda for the 2013 Tribal Marine Science Workshop.

Tribal Marine Science Workshop Agenda Cosponsored by the Seldovia Village Tribe and the Alaska Region Subsistence Branch, Bureau of Indian Affairs NOAA Kasitsna Bay Laboratory Kachemak Bay, Alaska April 21–27, 2013 **Final Agenda**
Sunday, April 21: Arrival in Homer and NOAA Kasitsna Bay Lab
Sunday, April 21, DAY 1: Welcome, Introductions, and Facilities Tour
EVENING SESSION @ NOAA Kasitsna Bay Lab
2000–2030: Welcome and participant/instructor introductions 2030–2100: Facilities tour
Monday, April 22, DAY 2: Marine Plankton and Physical Oceanography
MORNING CLASSROOM SESSION @ NOAA Kasitsna Bay Lab
0800–0945: Marine plankton ecology 1000–1130: Marine field sampling projects and techniques
AFTERNOON LABORATORY SESSION @ NOAA Kasitsna Bay Lab
1230–1430: Laboratory identification of marine plankton 1445–1600: Introduction into concepts in oceanography
EVENING SESSION @ NOAA Kasitsna Bay Lab
1945–2100: Alaska Native marine science: observations through time
Tuesday, April 23, DAY 3: Marine Invertebrates, Seaweeds, and Marine Fishes
MORNING CLASSROOM SESSION @ NOAA Kasitsna Bay Lab
0800–0930: Ecology and uses of marine invertebrates 1000–1130: Ecology and uses of seaweeds
AFTERNOON CLASSROOM AND LABORATORY SESSION @ NOAA Kasitsna Bay Lab
1230–1345: Ecology of Alaska's marine fishes 1400–1530: Fish dissection 1600–1830: Visit to Seldovia (optional)
EVENING SESSION @ NOAA Kasitsna Bay Lab
1945–2100: Seldovia Village Tribe marine resources research and management
Wednesday, April 24, DAY 4: Alaska Native Involvement in Federal and State Management Processes for Marine Resources and Marine Mammals
MORNING CLASSROOM SESSION @ NOAA Kasitsna Bay Lab
0830–0900: Alaska National Interests Lands Conservation Act (ANILCA) presentation 0900–1000: Getting involved in the management of marine resources important to Alaska Native people 1015–1130: Getting involved in the management of marine resources important to Alaska Native people (continued)
AFTERNOON CLASSROOM AND LABORATORY SESSION @ NOAA Kasitsna Bay Lab
1230–1400: Marine mammals 1430–1700: Marine mammals (continued)
EVENING SESSION @ NOAA Kasitsna Bay Lab
1945–2100: Studies of contaminants in marine subsistence foods
Thursday, April 25, DAY 5: Shellfish
MORNING FIELD SESSION
0800–0830: Van travel to field site (location: Jakolof Bay, −3.8 ft @ 0900) 0830–1130: Field session Return to NOAA Kasitsna Bay Lab
AFTERNOON CLASSROOM SESSION @ NOAA Kasitsna Bay Lab Dormitory
1230–1330: Alaska shellfish biology and aquaculture 1330–1430: Climate change: ocean acidification and emergent issues

TABLE II: Continued.

AFTERNOON LABORATORY SESSION @ NOAA Kasitsna Bay Wet Lab
1445–1630: Testing for domoic acid poisoning
EVENING SESSION @ NOAA Kasitsna Bay Lab
1945–2100: Studies of contaminants in marine subsistence foods
Friday, April 26, DAY 6: Marine Invertebrates, Marine Plants, and Traditional Knowledge and Subsistence Uses of Marine Resources
MORNING FIELD SESSION
0800–0830: Van travel to field site (location: Outside Beach, −4.9 ft @ 0900) 0830–1130: Field session
Return to NOAA Kasitsna Bay Lab
AFTERNOON CLASSROOM SESSION @ NOAA Kasitsna Bay Lab
1230–1430: Traditional knowledge and subsistence uses of marine resources 1430–1800: Prepare for potluck traditional foods feast
1800–2000: Farewell potluck dinner, featuring marine subsistence foods/recipes from your locality
Workshop evaluations (by workshop participants)
Saturday, April 27: Departure from Homer and NOAA Kasitsna Bay Lab
Important Information for Workshop Participants
Please note that there are NO tuition costs for the 2013 Seldovia Village Tribe and Bureau of Indian Affairs Tribal Marine Science Workshop
What is covered and provided by the workshop:
• Ground transportation to and from the Homer Airport to the Homer Harbor • Boat transportation to and from the Homer Harbor to NOAA Kasitsna Bay Lab • All lodging costs at the lab • All bedding and linens for your stay at the lab (including towels) • All meals associated with the workshop, beginning with dinner on Sunday 4/21/13 through breakfast on Saturday 4/27/13 • All ground and boat transportation between the lab and the field session sites • All laboratory equipment, materials, and supplies • All instruction and instructional materials covering the topics in the workshop • For the 2013 MSW, tribal participants can now request funds (up to $1,100.00/participant) to cover travel costs to and from Homer (please contact Michael Opheim for more information about this)
For the subsistence foods potluck, we request that participants provide the necessary cooking ingredients to prepare the foods that you will share with others. (Please bring these from home, as there will be limited opportunities to purchase grocery items in Seldovia.) Well-stocked kitchen facilities are available at the lab for your use in preparing your potluck foods.

how they utilize and conserved the marine resources was very insightful, to the scientist in California who are studying very sensitive areas. It was very useful to do hands on training with the material that was shared in the classroom."—2010 participant

"The most useful was the traditional talks and the sampling presentations. I learned something from each of the presentations."—2011 participant

"My favorite parts of the conference were the traditional resource talk with Iver Malutin, the subsistence feast, and the plankton sampling."—2011 participant

"Biosampling harbor seal excellent."—2012 participant

"I especially appreciated our elders who shared such amazing perspectives, encouraging us and empowering us."—2013 participant

The ability of the presenters to talk with rather than to the participants was also clearly effective:

"I attended the summer session in 2010 and found it fun and useful in my work. I especially enjoyed the field trips and microscope work. The hands on activities and excellence in instructors were also greatly appreciated. Every moment was used and the time spent with other students and instructors was also quite fun and enjoyable and the level of instruction did not talk down to students or intimidate them if they did not have a science education; to the contrary it helped them."—2010 participant

The evaluation in 2013 (Table III) included an additional question not found on prior evaluations ("Please describe how the information and knowledge obtained from the Tribal Marine Science Workshop might/will be useful to you as a natural resource specialist for your Tribe/organization"). The responses to this question and to a more general question ("Overall, what did you find most useful about the workshop?") on evaluations from all 4 years showed that the workshop content was useful and that the material learned will be used:

"Most useful—seeing the everyday world through new lenses; ideas for improvement to programs and tribal services."—2010 participant

"Being in the field and then back in the classroom. TEK was very interesting with Malutin. I really enjoyed the plankton, getting it and looking at it. I will definitely be able to bring something back to my community."—2010 participant

"Most useful was the traditional talks and the sampling presentations."—2011 participant

"This was a great intro to a marine world that Chickaloon Village needs to know for their fish resources to help with stewardship issues."—2012 participant

"The workshop gave me a good introduction to different aspects of managing and monitoring different marine resources."—2013 participant

"The info obtained will assist with connecting TEK to marine science. The workshop provided information and tools to group, a practical understanding about the technical information related to marine science. Studying the plankton and seeing it in the microscope made it 'real' instead of being imagined. This allows for a basic understanding about the beginning of the food chain."—2013 participant

"Useful to see what other organizations are doing to see what is successful/not so successful."—2013 participant

"I work with marine mammals, birds, and this program has given me an extended look into their world and the ecosystems that make the balance for survival."—2013 participant

"The workshop gave me a good introduction to different aspects of monitoring different marine resources. We are interested in a fish consumption study in our region, as well as getting more PSP [paralytic shellfish poisoning] monitoring."—2013 participant

"We are currently assisting Kachemak Bay Research Reserve in retrieving clams from our beaches for PSP and domoic acid testing—being able to properly identify items from the beach will be helpful in the educating during the times we are out using the Educational Set Nets on the beach. It was great to go out and be a kid again."—2013 participant

"I learned about new ideas for GAP [Indian Environmental General Assistance Program] *workplans that I will apply to my region, encouraging GAP grantees to explore the water they rely on, in ways that will engage their communities and school kids, protect their subsistence resources and improve environmental health. The emerging issues information is especially important to apply to local situations to community sustainability."—2013 participant*

The information from the 2013 evaluations indicates that the Western science learned during the workshop is useful and will be applied in the native communities. This is supported by the push from past participants to get more members of their tribe to participate in the workshops. These stories that past participants are telling, which in turn cause more tribal members to want to participate, are qualitative evidence of effectiveness.

Beneficial Outcomes

We have learned from one another over the past years. The idea that there is a need for this workshop content was clearly accurate. Alaska Natives are hungry for information, not in a lecture format or in a peer-reviewed publication but in a discussion format and in a storytelling style. Workshop participants conveyed in informal conversations during the workshop that they had enhanced retention when content was passed on through a story. Therefore, rather than showing slide after slide of information, presenters included anecdotes, personal experiences, and relevance to communities to make the presentations more appealing for the workshop participants and to encourage them to talk about their stories and experiences without being intimidated.

This workshop has provided insights into the gaps in Western science. For example, some participants stated that they could taste the difference between seal species—before scientists determined with molecular information that there were different species. This was new information even for the Alaska Native presenters, because they were from a different region and were not aware of this story. Workshop staff members learned more about subsistence hunting, while Alaska Natives learned about what Western scientists know of life histories and scientific tools. The Alaska Natives shared information from their subsistence hunts (Fig. 2) with researchers,[1] providing scientists with access to biosamples that would otherwise be difficult or impossible to obtain (Willoya et al., 2005). The plankton tows are useful not just in identifying what plankton are present but also in helping workshop participants realize that knowing when barnacle larvae are about to settle means knowing when to pull their gear from the water to keep it from getting fouled by barnacles. The final subsistence potluck dinner (Fig. 3) is a stunning end to the workshop, because it empowers each person to present and discuss a regional specialty—and it increases everyone's appreciation and awareness of different values and traditions.

IMPLICATIONS

The success of this Tribal Marine Science Workshop has been greater than we could have hoped. For a minor expenditure of funds (approximately $50,000 each year), we have been able to educate and make networking connections with one another. Our workshop participants have been an intelligent and underappreciated resource in terms of their knowledge of local habitats and ecosystems. They are eager to learn new techniques and information and to apply them to their circumstances and needs. This workshop format is unique in terms of the content, delivery, and audience. The discussion format used in presentations and the emphasis on fieldwork and hands-on activities are viewed by the participants as important components of the workshop. The addition of Alaska Natives (Elders) as

[1]The Alaska Sea Otter and Steller Sea Lion Commission (TASSC) is a nonprofit 501(c)3 organization dedicated to preserving the balance between Alaska Native people and marine mammals. Currently, more than 50 Alaska Native tribes and organizations have become members of TASSC. The samples were taken by TASSC for analysis and entry into the database, because it is an opportunity to gather data on healthy animals for a baseline. Overall, training participants who are eligible to hunt could potentially send additional samples to TASSC if the commission can obtain sufficient funding to support this research.

Table III: Summative evaluation for the 2013 Tribal Marine Science Workshop provided to all participants and to most of the staff members (the authors did not fill out the evaluation).

Summative Evaluation for the 2013 Tribal Marine Science Workshop provided to all participants and to most of the staff (the authors did not fill out the evaluation).

Tribal Marine Science Workshop
Seldovia Village Council
April 21-26, 2013
Evaluation Form

1. Please rate how useful you found the following (1 = not useful, 5 = very useful)

Lecture on Marine Plankton	1	2	3	4	5	___NA
Lecture on SVT Marine Sampling Program	1	2	3	4	5	___NA
Marine Plankton Sampling	1	2	3	4	5	___NA
Laboratory ID of Marine Plankton	1	2	3	4	5	___NA
Lecture on Concept in Oceanography	1	2	3	4	5	___NA
Lecture on Alaska Native Marine Science	1	2	3	4	5	___NA
Lecture on Marine Invertebrates	1	2	3	4	5	___NA
Lecture on Marine Plants	1	2	3	4	5	___NA
Lecture on Marine Fishes	1	2	3	4	5	___NA
Fish Dissection	1	2	3	4	5	___NA
Visit to the Seldovia Tribe Museum	1	2	3	4	5	___NA
Lecture on SVT Research	1	2	3	4	5	___NA
Lecture on ANILCA	1	2	3	4	5	___NA
Lecture on Management of Resources	1	2	3	4	5	___NA
Session on Marine Mammals	1	2	3	4	5	___NA
Lecture on Subsistence and Contaminants	1	2	3	4	5	___NA
Jakolof Bay Field Trip	1	2	3	4	5	___NA

presenters started in the second year of the workshop and was viewed as a valuable addition. Having the participants and presenters live together means that there are ample opportunities for informal discussions over meals and during breaks. We feel strongly that it is an excellent working model for other locations and other content and audiences.

Huntington et al. (2002) reviewed three types of workshops and found that a successful workshop "provides participants with a common reference point that can serve as a summation of what has been done or as the basis for future work and decision making." That common reference point for our workshops is that there is room for both Western science and TK in resource management. Awareness of the two viewpoints, appreciation and respect for methods and beliefs, and communication by all concerned parties is important. Perhaps one of the reasons our workshop has been well attended is that we are not trying to determine policy or affect resource decisions. We are continually learning more about the organisms and habitats from the Alaska Native participants.

Table III: Continued.

Lecture on Shellfish Biology/Aquaculture	1	2	3	4	5	___NA
Testing for Domoic Acid Poisoning	1	2	3	4	5	___NA
Lecture on Ocean Acidification	1	2	3	4	5	___NA
Field Trip to Outside Beach	1	2	3	4	5	___NA
TK & Subsistence Uses of Marine Resources	1	2	3	4	5	___NA

2. Please rate the following about the instructors in general (1 = poor, 5 = excellent)

They were courteous	1	2	3	4	5	___no opinion
They addressed relevant topics	1	2	3	4	5	___no opinion
They were knowledgeable	1	2	3	4	5	___no opinion
They encouraged questions	1	2	3	4	5	___no opinion
They were organized	1	2	3	4	5	___no opinion
They presented information well	1	2	3	4	5	___no opinion

If you have additional comments about instructors, please comment here:

_____

Please rate the following about the training (1 = disagree, 5 = agree)

There was enough time for each session	1	2	3	4	5	___no opinion
The topics were relevant to my job	1	2	3	4	5	___no opinion
There were sufficient breaks	1	2	3	4	5	___no opinion
The planning of the course was sufficient	1	2	3	4	5	___no opinion

3. Please describe how the information and knowledge obtained from the Tribal Marine Science Workshop might/will be useful to you as a natural resource specialist for your Tribe/organization. (If possible, please provide specific examples pertaining to a particular program[s], activity[ies], work assignment[s], etc.)

_____

Table III: Continued.

4. Overall, what did you find most useful about the workshop?

_____

Overall, what did you find least useful about the workshop? What changes would have better suited your needs (please use back of form if you need more room)?

_____

What ideas do you have to offer for future workshops that would be relevant to your work?

_____

How did you find out about this workshop (check all that apply)?

☐ BIA Providers Conference ☐ Email Distribution

☐ Alaska Forum on the Environment Conference ☐ Flier in the mail

☐ Other _____ ☐ Facebook

We are hopeful that similar workshops will begin to take place not just in Alaska but wherever there are native populations. An objective of this paper is to share this workshop format in the hopes that it will spur similar workshops in other areas. Requirements include a suitable venue that provides housing, classroom space, laboratory space, and accessibility to the ecosystems being studied. It is also necessary to recruit experts who can provide content that addresses the needs of the targeted community.

In 2013, we altered our summative evaluation to better assess the effectiveness of the workshop (Table III). The mixture of classroom discussions, hands-on activities, and field excursions keeps all of us engaged. Even after 4 years, we find that, like the participants, we are continually

FIGURE 2: Participants in the 2013 workshop watching as a harbor seal is harvested for subsistence, with research data being collected at the same time.

FIGURE 3: The final dinner in 2012—a subsistence potluck dinner featuring local marine and terrestrial contributions from the various regions represented by the participants.

learning from the other presenters and the participants. This was an unexpected outcome but one that has enhanced the value of the workshop. One of the 2012 participants noted that the following was most useful about the workshop: "I liked that the instructors were students too. That they too learned from other presenters." We look forward to sharing our experiences and information with interested parties.

This paper is not a research study that has purposefully collected and analyzed the effectiveness of native oral histories (storytelling) and how this can be integrated with Western science. We hope that others will undertake such a study using this workshop format as a starting point.

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