

Indigenous and Local Ecological Knowledge and NOAA

A report from
the NOAA Science Advisory Board

1. Purpose and Scope

As a federal agency whose mission includes the statement “to conserve and manage coastal and marine ecosystems and resources,” NOAA must engage the full range of sources of expert knowledge on those ecosystems and resources. This must include both the holders of indigenous and local ecological knowledge (ILEK), and the experts in the use of such knowledge. ILEK holders carry the knowledge arising from direct contact with the environment over many years or generations. This knowledge may include an intimate and detailed knowledge of the physical and biological patterns and long-term changes of the plants, animals, and habitats that are important to NOAA’s natural resources management responsibilities. The information can include life histories of animal and aquatic plant species, their regional abundance levels, seasonal cycles, ecosystem variability, habitat diversity, historical reference conditions, and the incremental effects of anthropogenic drivers, including climate change, on ecosystem properties. As place-based observers, local individuals and communities can provide broad scale real time *de facto* monitoring and detection of change.

On November 12, 2013, NOAA released its 13175 Policy governing the NOAA procedures for Government-to-Government consultation with Federally Recognized Indian Tribes and Alaska Native Corporations (NOAA Tribal consultation handbook 111213). Embedded in that document is the definition of Traditional Ecological Knowledge (TEK) as “a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment” (F. Berkes et al., 2000), and the acknowledgement that NOAA’s scientific and resource management responsibilities can be greatly enriched through the incorporation of TEK.

Although the document does provide a consultation protocol that includes training of tribal liaisons with a solid grasp of the Tribe’s history, culture, and leadership, the process does not include best practices for accessing the indigenous and local ecological knowledge important to NOAA’s natural resources mandates or for integrating it with information from other knowledge systems. Nor does it address the degree to which comparably appropriate types of consultation processes are needed to access the ILEK held by other communities representing multi-generational cultural relationships with marine and coastal resources. Thus, the Ecosystem Science and Management Working Group sought to examine the consultation processes employed by NOAA to access, assess, and integrate ILEK into the full knowledge base on which natural resources management policies are based (ILEK Terms of References, see Appendix).

The components of this report include:

- Findings, Conclusions, and Ways Forward
- Guiding Principles for Engagement in the Conduct of ILEK research
- Survey of NOAA’s Access, Assessment, and Integration of ILEK

2. Findings, Conclusions, and Ways Forward

These conclusions and suggestions are made after an extensive review of the current literature, a survey conducted with NOAA personnel, and testimony offered by ILEK experts and holders. These suggestions may help NOAA engage and access ILEK in their resource management plans.

- A. For NOAA as an organization
 - i. Creation of NOAA-wide policies for engaging with both ILEK holders and ILEK experts at the stages of acquiring ILEK and applying the knowledge in assessments and other uses would help NOAA personnel in the engagement process.

- ii. Greater opportunities for training and other support for NOAA personnel working with ILEK holders and ILEK experts – including cross-regional coordination and collaboration would help NOAA personnel in the engagement process.
- B. Funding for ILEK research and engagement.
- i. Dedicated funding for ILEK would help in the access and integration of ILEK in NOAA's resource management initiative. The funding would be most useful if provided throughout the project from project initiation to end including continuing responsibilities such as population assessments. All too often, ILEK funding has been available only as opportunistic add-ons and/or during just one phase of the research-analysis-management process
 - ii. The creation and funding of an internship program for undergraduate/graduate students and postdoctoral fellows in ILEK at NOAA line offices would assist NOAA in the access and integration of ILEK in NOAA's resource management mission. The postdoctoral program could be part of the current National Research Council Research Associate Program already funded and operating in NOAA. These internship programs might be coupled through strategic community partnerships with on-going educational programs that are involved in artisanal research and local management. Additional benefits might be gained by efforts to recruit students from indigenous and local communities for these internships.
 - iii. The creation of a proactive strategic team with NOAA members from each region who are skilled in ILEK, ILEK holders/leaders, and experts from outside NOAA would help NOAA staff in the access and integration of ILEK in NOAA's resource management mission. This team could meet annually to review all NOAA-Regional Management Board interactions on ILEK.
 - iv. The further development of protocols to incorporate co-management with indigenous and local communities including tribal authorities, where appropriate, would likely encourage participation in ILEK programs, help foster trust, and potentially enhance the efficacy of management planning.
- C. For NOAA researchers and managers
- i. NOAA staff engaged in natural resources management would benefit greatly from the creation of a Best Practices handbook for ILEK information procurement, sharing, evaluating, and integrating with information from other knowledge systems.
 - ii. NOAA researchers and managers would benefit from a web-based place to exchange ideas and experiences, containing examples, summaries of new publications etc.
 - iii. NOAA staff would benefit from greater exposure to existing tools and development of new tools for the integration of quantitative scientific data with quantitative and qualitative ILEK information.
- D. For engagement efforts by NOAA regional offices
- i. Workshops on ILEK offered through the regional programs would be beneficial. These workshops could identify intersections between ILEK and NOAA resource management needs.
 - ii. NOAA regional programs would benefit from hosting a list of ILEK practitioners within the communities in their areas of jurisdiction for each NOAA office as well as names of NOAA staff with a history of interacting with the practitioners, and ensure that this list is shared within NOAA. It would also be helpful if the list described the expertise available for guidance.

3. Guiding Principles for Engagement and Scientific Exchange:

The ILEK subcommittee of the ESMWG reviewed the best practices (guiding principles) for engaging ILEK holders/practitioners offered by UNESCO, the Canadian governmental organizations, the US Departments of Interior and Commerce (BOEM, NOAA) and the Intergovernmental Panel on Biodiversity and Ecosystem Services. Table I represents a synthesis of these documents in short format as requested by the NOAA Scientific Advisory Board.

The existing literature regarding engagement practices with communities and indigenous peoples for ecological knowledge covers a range of perspectives from the rights of indigenous peoples to own their knowledge and to engage in the transfer of that knowledge in their own context, the guiding principles of engagement with a focus of cross collaboration and respect for the cultural context of the knowledge, and the

best practices for conducting ILEK research as a part of or in complement to scientific endeavors. It is probably this last perspective that is most relevant here.

Table 1: Guiding Principles for Engagement and Scientific Exchange for Indigenous and Local Ecological Knowledge

1. Acknowledge the validity and diversity of ILEK as a legitimate and comprehensive knowledge system, with a diversity of ILEK knowledge holders just as there is a diversity of scientific experts.
 2. Build and strengthen relationships with indigenous and local community partners and stakeholders. Develop trust, ensure co-participation in the process. Different communities and regions have different cultural practices and engagement must honor the place and the people, observe the protocols for entry and introduction.
 3. Assess and address the research and ecological concerns of indigenous and local community information users and providers.
 - a. Recognize that NOAA research goals and local goals may not be the same, even though focused in a common region.
 - b. Move towards the concept of collaborative and coordinated research goals with indigenous and local communities on issues of common importance.
 - c. Develop collaborative methods so that local goals can be supported and carried out in coordination with NOAA operations.
 4. Build on existing ILEK initiatives/networks already in place.
 - a. Consider ILEK/science relationship carefully to maximize project outputs.
 5. Establish procedures related to ownership, access, and sharing of ILEK.
 - a. Agree on ILEK protection and information sharing procedures.
 - b. Learn from and follow established research protocols and guidelines.
 6. Establish the basis for the ILEK research.
 - a. Define research goals including spatial references.
 - b. Ensure that the interdisciplinary team includes social and natural scientists, information management specialist with a background in ILEK, and where possible community leaders as they provide community engagement and support.
 - c. Establish the information management process at the beginning.
 - d. Train co-researchers on the historical and cultural context of the research as well as the appropriate methods for documenting and using ILEK.
 - e. Ensure that the research process has clearly understood methods for assessment of information. If the assessment methods require adaptation to ILEK, these methods should be discussed at the onset of the project.
 7. Familiarize the researchers with the legal context surrounding ILEK in your area.
 - a. Progressing from the sharing of available indigenous knowledge to use of that knowledge in the development of science and management products must take into account the legal rights of Tribes to natural resources, spatial areas, and other rights granted by relevant Treaties and Agreements. This requires case-by-base knowledge of the legal rights and entitlements of the ILEK partners.
 8. Mobilize adequate financial/human resources for ILEK.
 9. Maintain good communication practices.
 - a. Giving back to ILEK holders must be a priority.
 - b. Acknowledge cultural differences in appropriate communication strategies.
 - c. Understand and address language differences.
 - d. Discuss expectations, understand importance of indigenous gatekeepers and local community leaders.
 10. Create opportunities for indigenous and local capacity building and education.
 11. For each of these Guiding Principles, it is important to include spatial and temporal issues relative to ecosystem dynamics, social concerns, cultural patterns, research methods and interpretation. For example, issues and methods relevant to ILEK on the Eastern seaboard will most likely be different than those facing Hawaii. Similarly, ILEK concerns for long standing historical practices will be different than those looking at new environmental issues or protection of new zones.
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4. Results of the NOAA Survey

The Ecosystem Science and Management Working Group, as part of its deliberations regarding the access, and integration of indigenous and local ecological knowledge in NOAA's ecosystem management portfolio, conducted a survey among NOAA staffers who were identified as having some engagement with ILEK

holders. The names of these individuals were provided by the NOAA line offices liaisons. The seven members of the ILEK subcommittee of the ESMWG conducted telephone interviews of over 60 NOAA staffers from June through August of 2016. The individual questions are listed below with summaries of the responses provided for each question.

This section also highlights the conclusions made by working group members. Although those interviewed were presented with the full list of questions, interviews were relatively unstructured. Consequently, responses to single questions often covered themes relevant to other questions or raised completely different points. The summaries of survey findings reflect the nature of the full discussions rather than narrowly focusing on each question individually.

Question 1. How does NOAA identify individuals who are holders of indigenous and/or local ecological knowledge?

The most common answer to this question was that NOAA employees utilize both formal and informal networks to identify individuals with knowledge to contribute to their projects. (Informal networks refer to those which form organically with researchers or fishermen, for example, through time spent in these areas. Formal networks refer to approaching natural resource councils, state/federal/territorial agencies, tribal committees and councils, and trade associations specifically for experts or input.) Several times the idea of knowledge gatekeepers was discussed in the context that identifying community leaders would identify holders of knowledge. Equally often there were mentions of holders of knowledge approaching NOAA themselves or self-identifying, and slightly fewer cases of the use of a liaison-type person like a formal tribal liaison or an extension agent, to identify knowledge holders in his or her community. Another recurring theme was that NOAA had no official process for identifying holders of ILEK. Two people emphasized the importance of identifying ILEK experts after spending time in an area; one person mentioned that they listen to everybody and don't try to identify knowledge holders, and one person felt it was important to define who was an indigenous person to identify who might hold that knowledge. Finally, three people pointed to the policies of other federal agencies including EPA, FEMA, and BOEM, as examples for how ILEK experts might be identified. It will be important to see if these differences are regional or if any one of the methods for identifying holders might be in use in any of the NOAA areas.

In summary, there is no overarching guidance for NOAA employees to identify and approach holders of indigenous or local ecological knowledge. However, NOAA employees stressed the importance of building on existing networks and dedicating time to get to know a community.

Question 2. How does NOAA engage indigenous and/or local holders of ecological knowledge to identify the opportunities for sharing ecological knowledge for strategic resource management issues?

Most commonly, responses focused on the logistical point of engagement with more than half the interviewees citing workshops or meetings as the way they engage with holders of ILEK. A majority focused on how they get people to those meetings through partnerships, specifically through the Regional Planning Bodies and working groups. Nearly half said that it helped to focus on specific projects (engaging with holders of ILEK to identify opportunities, while still others emphasized the importance of maintaining an ongoing conversation. Community outreach and education was a strong theme in how NOAA engages with ILEK holders through letters and with the help of a communications team. As with the previous question, several repeated a recurring theme that there is no formal process. There were a few mentions of using interviews to access information, one mention that ILEK holders come forward with their own issues, and two interviewees mentioned that NOAA engaged through the formal public comment process. Finally, three NOAA interviewees pointed to other federal agencies, including BOEM, PIMPAC, and FWS, as engagement policies provided examples for them to follow in their own efforts. It is important to note that no respondent seemed to refer to "engagement" through making an ILEK *holder* an actual partner in the research project as it progressed.

Question 3. How is culturally sensitive information captured, retained, protected, and as appropriate share? What problems have you experienced and what solutions have been developed for sharing of culturally sensitive ecological knowledge?

Several interviewees noted that culturally sensitive data and information were protected by law under the National Historic Preservation Act section 304 and by prior agreements with the Tribes. The responses also referred to several references that were used as TEK guides: Hansen and Van Fleet, "Traditional Knowledge and Intellectual Property: A Handbook on Issues and Options for Traditional Knowledge Holders in Protecting their Intellectual Property and Maintaining Biological Diversity" AAAS, 2003; Bartsch, J., Abbot-Jamieson, S., and Whitmore, J. 2009. Voices from the Fisheries Handbook. NOAA, NMFS.; Climate and Traditional Knowledges Workgroup (CTKW). 2014. Guidelines for Considering Traditional Knowledges in Climate Change Initiatives. <http://climatetkw.wordpress.com/>. Some of the responders indicated that they did not capture culturally sensitive knowledge and for those who did work with culturally sensitive information, the responses were mixed. Some shared information without attribution as it was pooled data or it was left out of the data pool. Others were unaware that there was any protocol for traditional knowledge. One interviewee indicated that "very few of NOAA's staff are adequately, if at all, trained to work with indigenous people on initiatives involving traditional knowledge."

Question 4. What is NOAA's process for gathering "experiential knowledge" from groups that have no formal treaty status with the U.S. Government?

The responses to this question were mixed. Many (approximately half of the respondents) did not understand this question because they had only worked with federally recognized Tribes and consideration of other indigenous knowledge practitioners did not come up in their experience. NOAA employees who worked in Alaska were aware that not all the Tribes/villages there were recognized as Native Alaskan corporations. Staff associated with the Marine Sanctuary Program cited the publication: Consultation with Native Hawaiian Organizations in Section 106 Review Process: A Handbook. In the Humpback Whale National Marine Sanctuary NHPA Section 106 compliance review 2014-2015. For maritime cultural resources site assessment, staff cited BOEM's "A Guidance Document for Characterizing Tribal Cultural Landscapes."

In summary, the interviewee responses highlighted the limited recognition of the value of ILEK from local and non-recognized Tribes by NOAA employees.

Question 5. Does NOAA provide any resources to holders of ILEK to develop products from their own knowledge systems that are intended to directly inform NOAA decision making (and consultation) processes, or are the NOAA resources used to acquire the information from the ILEK knowledge holders and incorporate it in NOAA's decision-support tools and processes? In either case, what are the funding mechanisms and processes for using the knowledge products?

Survey respondents gave a wide variety of responses to this question. In aggregate, there is no single program within NOAA that provides funding to ILEK holders to directly inform NOAA decision making across line offices. A variety of mechanisms have been employed on a project basis by different line offices and regional programs. These mechanisms include contracts with consultants, direct payments to knowledge holders in a few projects, use of volunteers [youth and others] to interview knowledge holders, grant funding on a limited basis, specific funded projects through such entities as the Westpac, other projects funded by Bureau of Energy Management relating to oil and gas leasing, other one-off projects, and collection of oral histories. Overall the degree to which the Tribes of Indigenous Peoples are participating directly in governance has substantial impact on funding and related resources that are available to develop ILEK products. The more organized their presence in governance, the more likely that projects to collect, consolidate and interpret ILEK will be projects by the Tribes and communities. NOAA will fund, but the Tribes do their own work. Where the Tribal presence in governance is less fully developed, NOAA or academic experts may be more likely to produce the products. This probably reflects outcomes of capacity building and training programs for the Tribes and indigenous groups to participate in governance, reflecting the awareness that a key capacity to develop is how to make their knowledge more readily useable by the governance processes.

Question 6. How frequently, to what depth, and using what processes does NOAA use to access ILEK in: (Please provide examples).

6a. Management of specific stocks and fisheries?

From the NOAA interviewee responses, it appears that ILEK is not systematically a part of stock based management, and practices vary among regions. Several instances are reported as illustrating involvement of Native communities in planning processes but not necessarily did these rely on ILEK although it may have been part of the information used in the planning. To illustrate the diversity of practices regionally:

In Alaska, despite engagement with Native communities and their fisheries over the long term there is no specific attention to ILEK, although at times it seems that there is some transfer of this knowledge in management. The same holds true for marine mammals. It also spills over into the Community Development Program and various marine mammal co-management agreements. Certainly, the Native Alaskan participation and perspectives in these arenas includes ILEK but it is not separated out and not documented per se.

In Polynesia, interviews with elders in American Samoa were used to develop bans on harvest of several fish species.

WESTPAC has an explicit objective to increase ILEK in management processes and is in the process of pursuing that objective with ILEK advisors mandated to provide input into fisheries management processes. A specific example relates to the sharing of fish caught in the society in contrast to strictly commercial sale. These social norms were inputs into management decisions on reporting and allocation.

6b. Application of the ecosystem approach more generally in fisheries management

In general, all NOAA interviewees who reported on the nature of input by ILEK holders and experts, considered that the ILEK information was presented in broad contexts, consistent with what NOAA would consider an ecosystem approach. The contributions of ILEK might focus into the specific problem being investigated by NOAA as the interactions progressed, but the trend was almost always from broad to focused. Some interviewees noted that the ILEK contributors considered NOAA too often proceed in the opposite way; starting with a focused question and only broadening it as the project showed needs for broader scope.

Illustrations described by the interviewees included input from Native Alaskans who argued that cruise ship activities were considered to harm harbor seals, to the Passamaquoddy Tribe in New England, regarding cultural importance of river herring in the U.S. and Canada. In all cases reported, the contributed information led to some follow-up by NOAA, with the nature of the follow-up dependent on the nature of the problem, but always using the ILEK at least to some extent.

6c. Coastal estuarine and riparian habitat protection and restoration

Few of the interviewees stressed ILEK input on this area of NOAA responsibility. It was reported that NOAA's National Estuarine Research Reserve System is considering traditional Hawaiian ahupua'a approach to ecosystem/ecosystem services management in the proposed designation of a new reserve in Hawai'i. Also, it was mentioned that ILEK was used in a salmon recovery plan for freshwater habitat protection of this and other threatened and endangered species. Interviewees did report that sometimes habitat and other information, e.g., critical habitat for threatened or endangered species is collected but not on a regularized basis. Some indigenous groups are involved in participatory mapping of estuarine habitats and that could involve ILEK. There were no reports of use of ILEK in riparian habitat protection, although members of the ESMWG are aware of such initiatives at the State level and with other federal agencies.

It is unclear if the weak representation of this issue reflects an underrepresentation of NOAA staff working on habitat protection and restoration in the interview sample, or a true lack of access to ILEK knowledge and knowledge holders in these areas. To the extent that NOAA is engaged in coastal, estuarine, and riparian habitat protection and restoration there seems to be potential to expand the acquisition and use of ILEK in these areas.

6d. Climate change adaptation and mitigation?

No systematic approach was reported in most areas. Some greater attention appears to happen in the Arctic with respect to co-management and village-based adaptation planning. New England proposes to present a climate action plan for comment by Tribes but this may not actually elicit ILEK. Other areas mention climate change engagement at the village level with funding but it was not clear that climate issues and ILEK have been a priority compared with other concerns. NOAA supports opportunities to engage with

ILEK holders on climate change adaptation and mitigation topics through events like the Local Early Action Planning Process, “First Stewards” conferences, and outreach regarding Climate Science Action Plans. However, there was no consistent pattern across the interviewee responses on whether these events serve to engage with ILEK or to simply inform the ILEK holders of NOAA’s activities.

6e. Other management issues?

The interviewee responses described reports of access to and use of ILEK in many other management areas of interest to NOAA, such as:

- Cultural resource management under the National Historic Properties Act does obtain some funding for ILEK. BOEM funding has supported this work but it does not occur everywhere.
- Taxonomic assistance in terms of identifying and naming of Hawai’ian seaweed species has used ILEK.
- West Coast Tribes have received funding for citizen science, community monitoring as well as participation in regional marine spatial planning but these activities are not necessarily focused on ILEK rather engagement as sovereign governments.

Overall it is difficult to sort out the responses in this question. Answers included a combination of inputs including requirements of formal consultation processes, information shared in co-management and other participation in management processes and targeted research efforts. They also were a mixture of consultant driven processes to obtain information about indigenous people’s attitudes and concerns and direct access of ILEK holders often for use in management. In many cases, this is blended together in terms of process, e.g., http://www.coris.noaa.gov/activities/moes_fishing_awareness_compliance/.

In summary for question 6, examples of all five types of uses were found in the cases presented by respondents. However, it would have taken a much more exhaustive approach before it would be possible to give a reliable answer to the parts of the question of “How frequently” and “to what depth”. Some modest generalizations seem to emerge from the responses. ILEK is sought and used more often in areas where there are more ILEK holders and Tribal rights are being exercised, a finding that will surprise very few. When it is sought, efforts are made to at least go deep enough into the knowledge that it can be used as a complete system and not just as an incidental add-on to more mainstream science knowledge.

As for processes, responses again suggested that the processes vary with the type of application. However, that is true of NOAA science in general – the fisheries stock advisory processes are highly structured and occur on a regular cyclical basis. As ILEK projects in fisheries stocks mature, they seem to be accommodated in those processes. On the other hand NOAA has less regularized and structured processes for advice on coastal habitat protection and climate change, and the responses correspondingly report less structured processes for using ILEK in those areas. The ESMWG sees little payoff for developing structured processes for using ILEK in those subjects, but there is a clear opportunity to include consideration of ILEK in any structured advisory processes being developed for these topics.

Question 7. Will NOAA be consulting in the context of indigenous ecological knowledge as a separate but complete knowledge system, or as a method primarily for filling gaps in modern science knowledge systems?

The majority of interviewee responses indicated that ILEK is used as a system of knowledge to fill gaps for NOAA in contrast to the response summary for Question 6 that focused on specific uses. Different respondents highlighted its primary use as filling ecological gaps through providing additional observations, or as a way to add an economic and/or social impact element that would otherwise be lacking. A minority viewed ILEK as a complementary knowledge system worthy of protection, and one person said that the two knowledge systems are not different at all.

The responses revealed that there were two different aspects to how the respondents viewed the practices of NOAA. In instances when ILEK was sought, in general the practice appears to be to treat it as a complete and meaningful knowledge system in its own right. If a Tribe has a strong engagement in an issue, commonly ILEK is sought, and not just to fill gaps in the “science”. Insights and conclusions based on ILEK are considered to stand on their own, although of course there is a stage in NOAA activities when such insights and conclusions are lined up with insights and conclusions of the “science” knowledge system, and interpretations consistent with both are sought. This is all recognized as good practice in the

use of ILEK and those doing this work for NOAA are well versed in how to use it, which is an encouraging finding.

The second aspect is somewhat less encouraging. Even if ILEK is identified as a full knowledge system when it is used within NOAA, it does not seem to be treated as a necessary knowledge system. Two concerns with treating ILEK as complementary and overlapping systems were identified in the interviews. First, even if the ILEK knowledge is acquired, there is no standard for if or how it should be used in management, or if it needs validation. For example, by relying only on “scientific” knowledge in oil spill planning and response, decision-makers missed critical data that may have been available from ILEK for making resource allocation and protection strategy decisions. Second, few respondents reported much of a motivation of NOAA to seek ILEK when Tribal interests were not directly involved in the matter being studied. For example, the long timeframes of ILEK may give important perspectives for interpreting status and trends in some ecological variables in recent years but NOAA seemed to rarely look to holders or experts in ILEK for insights or information in such situations when looking for ecological baselines and benchmarks.

Question 8. The use of local and/or indigenous ecological knowledge may require validation under NOAA’s legal mandates.

8a. What is the process for validation (case studies)?

8b. How are indigenous and/or local people engaged in this process?

8c. How are funds allocated for this process?

NB: “Validation” is used in two ways regarding ILEK. First, validation can be used to mean the result of a review process akin to peer review in the scientific world. In other words, it means confirming that the documented information does in fact reflect what is known to ILEK holders in the area who are familiar with the topic in question. Second, validation can be used to mean confirmation of the information itself by other means, most commonly by scientific experts. This second sense is highly contentious, as it implies that ILEK is not “valid” unless and until it is confirmed by others. When the interviews were conducted, the questions were not constructed to distinguish between the two. In this section, we use “validation” in the first sense.

The majority of responses said there was no systematic process or systematic allocation of funding for validating ILEK. In several responses, it seems validation did not really take place in many cases when ILEK was collected and used. However, there were two types of cases in which validation was undertaken.

The first was when actual litigation was occurring or considered likely, and the ILEK would be part of the information provided in the judicial setting. The validation (often apparently quite rigorous) did occur, but in the context of meeting the standards of courtroom litigation, not necessarily in the context of use in trying to improve decision-making overall.

The second was when the collection and use of ILEK was collaborative or otherwise part of a research project by a social scientist working in the context of “western social science”. Then the validation was to the standards appropriate for professional social science publications. This process includes steps such as including ILEK holders as co-authors, review of information in community meetings, and the continued involvement of ILEK holders in the research effort. Although processes of validation of ILEK (in the first sense) to social science standards have been developed, some interviewees suggested that meanings and processes of validation in the cultures of ILEK holders needs further exploration.

The first sense of validation of information is important and in terms of ILEK, it is important to ensure that the knowledge has been documented accurately. Regardless of which definition used, there is no systematic funding, protocol, or procedure by which NOAA validates ILEK. Failure to support validation processes through adequate funding and systematic protocols and procedures would diminish the credibility and impact of ILEK when used in decision-making.

Question 9. Regarding the integration of indigenous and local ecological knowledge into NOAA’s scientific and resource management policies.

9a. What are the criteria that govern the use of ecological knowledge in formulating NOAA's scientific and resource management policies? What criteria will be used to guide the use of indigenous and local ecological knowledge in NOAA's scientific and resource management policies?

The most frequent response by far was that there are no criteria or that ILEK is not used to formulate NOAA's resource management policies. Many interviewees offered the closest thing they could to criteria by referring to written recommendations such as PIRO's FY16-20 Strategic Plan, Government to Government Consultation Procedures, and Recommendations for Integrated Management Using a Cultural Landscape Approach in the National MPA System. Some interviewees offered that NOAA acts in accordance with OPM guidelines, while others suggested that NOAA acts in accordance with ILEK holder desires. These responses are consistent with the finding that there are no NOAA-wide policies for how ILEK should be used in NOAA work, and in general respondents suggested that NOAA officers do not have criteria specific to ILEK.

9b. How does NOAA view indigenous and local knowledge, i.e. as standalone information or as knowledge that fills in the gaps?

As noted above in Question 7, there is no NOAA-wide view. Most respondents said ILEK is used to fill gaps or as complementary information to what western scientific knowledge offers, though one said it is used as stand-alone information. The Marine Heritage Program (MHP) explicitly seeks culturally diverse input through its cultural heritage working group but does not specifically mention ILEK. The apparent discrepancy in answers to this question and the similarly worded Question 7 may reflect an ambiguity in the questions, with regard to the abstract view of ILEK as a separate knowledge system in contrast to the use of ILEK alongside other forms of knowledge when it comes to decisions. In other words, it is a standalone knowledge system but its use in decision making often entails using it to fill gaps in what is available from other sources.

9c. How does NOAA recognize local versus indigenous knowledge and their respective contributions to ecological observations?

The most frequent response was that employees were either not sure or thought that there was no formal policy regarding local versus indigenous knowledge. A few interviewees said there is no difference between the two knowledge types, a comparable number viewed ILEK as just a specialized subset of TEK, while there were slightly more views that the knowledge types were different and that both are important. However, the majority of those interviewed make little distinction between local and indigenous knowledge. Our committee focused on ILEK in its broadest sense, but it was unclear from the interviews whether the lack of differentiation was because the respondents work where one form of knowledge predominates, because the respondents are not (yet) deep enough into the topic to make a distinction, or because the interviewees actually have thought about the two knowledge systems and concluded there is no justification for different uses within NOAA activities.

Question 10. The previous questions focused on how NOAA accesses and organizes ILEK. This final question is about what is done with the collected information once the investigation is concluded and what follow-up activities are conducted with the providers of the indigenous and local ecological knowledge.

10a. How do you incorporate the collected information into the knowledge base for decision making in policy and management? Do you find specific legislation or institutional mandates, requirements, or customary practices a hindrance or an encouragement to its use?

There was no majority view on this question. The most frequently expressed views were that there may not be a tangible product but that engaging with ILEK is worthwhile, or else that ILEK is incorporated through generating reports and materials. A few respondents stated that there is no official process for incorporating ILEK and one person said that NOAA has not incorporated ILEK into management at all. With regard to legislative or institutional mandates, about equal numbers of interviewees had no opinion or found mandates helpful.

Most narratives addressed how the ILEK is conveyed to the policy makers / managers and did not report on the extent to which the ILEK was used by them.

10b. What follow-up activities do you use to give the ILEK providers both feedback on how their knowledge influenced NOAA programs, and opportunities to be involved with the use of the knowledge in the decision processes and the activities that use that knowledge?

The most frequent response to this question referred to post-research outreach activities like presentations of results or posting products online. A few interviewees additionally suggested providing an opportunity to comment on ILEK reports after they were posted. Nearly half the interviewees, considered the notion of “taking the information back” to be inappropriate because researchers and ILEK holders were in constant communication. Other interviewees argued several times that there is no feedback to ILEK holders after a project was completed.

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APPENDICES

Terms of Reference

NOAA ESMWG: Traditional Ecological Knowledge Subcommittee Terms of Reference
Co-Chairs of Subcommittee: Jo-Ann Leong and David Fluharty.
Members: Jo-Ann Leong, David Fluharty, Jake Rice, Jacqueline Grebmeier, Michael Castellini, Henry Huntington
NOAA advisor: Richard Merrick/NOAA-NMFS, Mary Erickson/NOAA-NOS Gary Matlock/NOAA-OAR

Background and Purpose:

On November 12, 2013, NOAA released its 13175 Policy governing the NOAA procedures for Government-to-Government consultation with Federally Recognized Indian Tribes and Alaska Native Corporations. Embedded in that document is the definition of Traditional Ecological Knowledge (TEK) as "a cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment " (F. Berkes, 2000), and the recognition that NOAA's scientific and resource management responsibilities can be greatly enriched through the incorporation of TEK. The document also identifies several considerations that may guide the discussions and recommendations of the Ecosystem Science and Management Working Group.

1. The consultation process, formal and less formal, for sharing of TEK between NOAA and tribal individuals.
 - a. How does NOAA identify individuals who hold TEK?
 - b. How does NOAA engage tribal members to identify the opportunities to ask whether and how TEK may be shared?
 - c. How is culturally sensitive information captured, retained, and shared?
 - d. How does NOAA engage in the consultation process for indigenous peoples not recognized formally as tribal governments or Native Alaskan corporations? The NOAA 13175 Policy specifically denies the process for non-recognized tribal groups in the Pacific Island region and Native Hawaiians.
 - e. How does NOAA provide funds for this consultation process?
2. What TEK will be considered in NOAA's scientific and resource management policy development? Indigenous ways of knowing about the environment differ fundamentally from those of contemporary/industrialized societies. The knowledge systems often differ in spatial and temporal scales, and in the role of humans who are viewed at the top of a hierarchy of

nature in industrialized societies versus as inseparable and responsible parts of the environment in indigenous societies.

- a. In what context(s) will NOAA access and assess TEK on local and regional scales?
 - b. Will NOAA be consulting in the context of indigenous knowledge as a separate, but complete knowledge system, or as a method primarily for filling gaps in contemporary science knowledge systems?
 - c. The validation of what local indigenous peoples know about their environment. What is the process for validation (case studies)?
 - d. How are tribal members engaged in this process?
 - e. How are funds dedicated to this process?
3. The integration of TEK into NOAA's scientific and resource management policies.
- a. What are the criteria that govern the use of information in formulating NOAA's scientific and resource management policies?
 - b. What criteria will be used to guide the use of TEK in formulating NOAA's scientific and resource management policies?
 - c. As in 2b, will NOAA develop criteria based on indigenous knowledge as a separate but complete knowledge system, or as knowledge that fills gaps in contemporary science knowledge.

The TEK ESMWG effort will examine the NOAA effort to access and assess indigenous and local ecological knowledge and provide an evaluative report to NOAA on those efforts. In particular, the ESMWG will:

1. Review existing use of TEK in NOAA's scientific research and decision making
2. Identify NOAA's needs for TEK
3. Explore most effective ways to gain TEK
4. Evaluate how best to engage local observers of ecosystem change in informing scientific processes.
5. What sort of person should be looked for to facilitate TEK/NOAA interactions. Seems like an two-way interpreter function is necessary – fluent in community level engagement and able to engage with NOAA science
6. Prioritize the decisions where NOAA is most likely to depend on TEK

List of Presentations and Presenters

1. Sarah Rinkevich (General Natural Resources Manager and Biological Scientist, USFWS)
2. Henry Huntington (Senior Officer and Science Director for Pew's Arctic Ocean projects)
3. Joshua Drew (Ecology, Evolution and Environmental Biology at Columbia University, TEK of Coral Reefs) – Implementing TEK in tropical fisheries management
4. Ron Brower (Alaska Native Language Center, President of Ukpeagvik Inupiat Corporation) – A role for traditional and local ecological knowledge in NOAA's monitoring and regulatory programs
5. Andrey Petrov (Geography, University of Northern Iowa) – Traditional knowledge systems: challenges to integration and mobilization for environmental management – perspectives from social sciences
6. Kuulei Keakealani (Konohiki of Kioholo fishpond, Kona, Hawaii) – Perpetuating traditional conservation through blending cultural practice with contemporary science
7. Valerie Grussing (Cultural resources coordinator, NMPA Center, NOS) – Traditional ecological knowledge for the Marine Sanctuary Program.
8. George "Chuckie" Green and Casey Kahn-Thornburgh (Massachusetts Wampanoag Tribe) – Indigenous and local ecological knowledge
9. Charles Kaaiai (Indigenous Coordinator, Western Pacific Fisheries Council) Implementing Traditional Knowledge into current resource management regimes.

10. Kelson Mac Poepoe (Co-Founder of Hui Malama o Moomomi), and Kehau Springer (Conservation International) – Panel discussion on indigenous and local ecological knowledge in Hawaii.

These presentations are available at <https://sites.google.com/a/noaa.gov/esmwg-workinggroup/meetings>