# *Roots of Wisdom* Summative Evaluation

## *Public Audience Impacts*

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OMSI, in collaboration with Indigenous Education Institute, Confederated Tribes of the Umatilla Indian Reservation, Eastern Band of Cherokee Indians, Pacific American Foundation and the Waikalua Loko Fishpond Preservation Society, Smithsonian's National Museum of the American Indian, and Tulalip Tribes

Also included is *The Story Area Summative Evaluation: Supplement to the Roots of Wisdom Public Audiences Summative Evaluation*, prepared by Taline A. Kuyumjian, Oregon Museum of Science and Industry.

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Native Pathways
Tamástslikt Cultural Institute

## Overview of Summative Reports

*Roots of Wisdom* (RoW, also known as "Generations of Knowledge") is a project funded by the National Science Foundation from 2010-2016 to engage Native and non-Native youth (ages 11 to 14) and their families in Traditional Ecological Knowledge (TEK) and western science within culturally relevant contexts that present both worldviews as valuable, complementary ways of knowing, understanding and caring for the natural world. The Oregon Museum of Science and Industry (OMSI) and its partner organizations, The Indigenous Education Institute (IEI), The National Museum of the American Indian (NMAI), the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Tulalip Tribes, Pacific American Foundation and Waikalua Loko Fishpond Preservation Society (Native Hawaiians), and Eastern Band of Cherokee Indians worked collaboratively to develop all aspects of the project, which included the following deliverables: (a) a 2,000-square-foot full traveling exhibition, (b) a 150- linear-foot traveling graphic panel exhibition, (c) a website, (d) an activity kit for Native youth in informal and formal settings, and (e) opportunities and resources for reciprocal collaboration between ISE and Native American partners.

These educational products were developed and evaluated through reciprocal collaboration between partner institutions Lifelong Learning Group (Columbus, OH) and Native Pathways (Laguna, NM). OMSI led front-end, formative, and remedial evaluation efforts for public audience impacts. Lifelong Learning Group and Native Pathways led summative evaluation efforts. Remedial evaluation revealed that the part of the exhibition which contained a seating area and text versions of traditional stories had the potential to be much more attractive, engaging, and more effective for sharing stories. Summative evaluation identified it as a space which could better introduce visitors to TEK in an immersive and culturally appropriate way, while bringing out the universality of exhibition messages by bringing together the four Native communities featured in RoW. As such, OMSI sought and received supplemental funding from NSF to ensure that project goals could be met and that culturally appropriate remediation of this area of the exhibition could be completed. An additional summative evaluation on the remediated space was led by OMSI, with guidance from Lifelong Learning Group and Native Pathways.

A summative study is typically conducted in the final year of a project to better understand the effectiveness of a project at achieving its intended impacts. This summative report is divided into two parts: a complete summative evaluation report of the *Roots of Wisdom* exhibition (including the banner exhibit and activity kit), and a supplemental summative evaluation report of the remediated Story Area exhibit within *Roots of Wisdom*. Jill Stein (Lifelong Learning Group) and Shelly Valdez (Native Pathways), led the full summative evaluation study. Taline Kuyumjian (OMSI), with input from Stein and Valdez, led the supplemental evaluation study of the Story Area.

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*The Story Area Summative Evaluation: Supplement to the Roots of Wisdom Public Audiences Summative Evaluation* begins on page 56.

# *Roots of Wisdom* Summative Evaluation

*Public Audiences Impacts*

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# Executive Summary

*Roots of Wisdom* (ROW; also known as *Generations of Knowledge [GOK]*; NSF-DRL #1010559) is a project funded from 2010–2016 by the National Science Foundation to engage Native and non-Native youth (ages 11–14) and their families in Traditional Ecological Knowledge (TEK) and Western science within culturally relevant contexts that present both worldviews as valuable, complementary ways of knowing, understanding and caring for the natural world. The Oregon Museum of Science and Industry (OMSI) and its partner organizations, The Indigenous Education Institute (IEI), The National Museum of the American Indian (NMAI), the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Tulalip Tribes, Pacific American Foundation and Waikalua Loko Fishpond Preservation Society (Native Hawaiians), and Eastern Band of Cherokee Indians worked collaboratively to develop all aspects of the project, which included the following deliverables: (a) a 2,000-square-foot full exhibition, (b) a 100-linear-foot traveling graphic panel exhibition, (c) a website, (d) an activity kit for Native youth in informal and formal settings, and (e) opportunities and resources for reciprocal collaboration between ISE and Native American partners.

The Lifelong Learning Group (Columbus, OH), in collaboration with Native Pathways (Laguna, NM), was engaged to conduct summative evaluation of the *Roots of Wisdom* public audience impacts. Summative evaluation of public audience impacts took place over the final year of the project[1]. Evaluation questions focused on understanding visitor use and engagement, the extent to which intended outcomes were achieved, and what supported the learning outcomes. To answer the evaluation questions, mixed methods were used. Exhibit evaluation included reflective tracking and exit interviews, and an expert review was used to assess the youth activity guides, in addition to participant feedback tied to the reflective tracking and exit interviews. Overall, 320 visitors participated in the full exhibition evaluation; 39 visitors in the banner exhibit evaluation; and 7 educators in the expert review. A summary of findings is presented below based on each deliverable.

## Key Findings for Full Exhibition

**For the full Roots of Wisdom exhibition, individual components were well attended and much liked by visitors overall.** The most appealing exhibit components were those that allowed visitors to *do* something, such as the computer games and interactives/manipulatives (e.g. *River Cane, Medicine of the Land* and *Aloha Aina).* Videos were slightly less appealing to visitors, followed by panel-only stops, with one exception. The *Native Origins* panel had high attendance, even though

[1] The summative evaluation team was engaged throughout the GOK project (2010–2015), primarily as participants in meetings, in order for the team to have some context and build relationships in support of the summative evaluation. However, the bulk of the public audience summative evaluation work occurred in 2014–2015.

it was a text/graphics only stop. Only one of the exhibit components experienced low attendance, engaging only about one-third of visitors (*Taking Care of Homelands Map*, which was only available for part of the data collection and thus had a far lower sample size). Similarly, visitors were most likely to report playing a game or using an interactive (when available) and exhibited fairly high rates of reading text information that accompanied those games and interactives. Independently, visitors experienced all exhibit components as at least somewhat interesting, and many as even highly interesting, and consequently reported high satisfaction and enjoyment ratings of their experience.

**Adults and youth showed different preferences around learning styles.** Adult visitors attended to panel-only stops at a higher rate than did youth visitors and were more likely to stop at one video *(Cherokee River Cane Restoration).* Youth were significantly more likely than adults to stop at the *Native Hawaiian Fish Ponds Game*. Furthermore, youth were far more likely than adults to play a game, use an interactive and watch other visitors at an exhibit. Conversely, adults were more likely to read label text than were youth, though overall adults and youth found exhibit components equally interesting (with a few exceptions— primarily adults finding the panels more interesting than did youth). Nonetheless, adults may have connected to ROW more than youth as measured by desire to follow up and by perceived understanding of key ideas.

**Visitors clearly gained an awareness of some of the main ideas within the exhibition.** A third of respondents took away from the exhibition ideas around awareness of Native cultures, traditions, and practices, and preservation of cultural knowledge in general. Slightly fewer saw the main take-away as emphasizing the importance of environmentally sustainable practices in general. Slightly more than a fifth of respondents saw main ideas related specifically to Traditional Ecological Knowledge, though very few actually used this term. One-tenth of respondents shared awareness of a specific connection between Indigenous ways of knowing and Western science as a key message of the exhibition. Independently, one in five respondents mentioned one of the specific Tribal nations or communities in the exhibition as part of articulating their main take-aways, suggesting some awareness of the exhibition's focus on specific communities rather than Native American or Indigenous cultures more broadly. Adults were more likely than youth to express awareness of how Indigenous knowledge and Western science were connected, while youth were more likely to focus on either "the environment" or "Native cultures" in general and were more likely than adults to identify the main take-away from the exhibition as learning about Native American cultures, traditions and practices without specific reference to the environment. Adults were significantly more likely to feel they understood the main messages of the exhibit than were youth, suggesting that some of the concepts may have felt too complex for youth or were not experienced as much through the interactives (which youth were significantly more likely to use than reading panel text).

**Visitors reported learning gains that align with intended outcomes for the exhibition.** Quantitative self-report measures of how the exhibit may have influenced visitors' awareness, interest and attitudes around TEK (or Native ways of knowing) and Western science showed significant positive change throughout and was strongest for areas related to Native ways of

knowing (the aspect visitors may have known least about coming in). While visitors came in with fairly strong support for the idea that Native ways of knowing and Western science are both valuable and complementary ways of understanding the natural world, the exhibition significantly increased this belief.

**Learning outcomes were best supported by the interactive, hands-on nature of the full exhibition.** Visitors consistently referenced these components as key to their engagement and learning, although adults were more likely to cite information shared via panel text as an important component of their learning. The framework of focusing on place-based, community stories also provided an accessible pathway for visitors to connect to the content and concepts of the exhibition.

In addition, **OMSI visitors were highly supportive of the idea to feature Indigenous perspectives in the science museum.** The vast majority of respondents shared positive opinions, with nearly half of the visitors expressing a general positive remark and more than one-quarter of visitors stating more specifically that they enjoyed learning about Native cultures and perspectives. Only a small percentage of respondents (8.4%) provided more equivocal responses, expressing some hesitation within a generally positive perspective. **Visitors to the tribal museums generally felt positively about the idea of featuring science, including Native science, in a tribal or cultural museum.** More than one-third shared a general positive response, and almost one-fifth felt that this could help connect people to their cultural knowledge. Some simply enjoyed learning about science and felt that a focus on Native science was well aligned with the museum's goals. Only a small minority of respondents expressed an equivocal perspective on including an exhibit of this nature at a tribal museum.

## Key Findings for Banner Exhibit / Website

**Attendance to individual banners in the banner exhibit was extremely high though largely included adults visiting without youth or children**, suggesting that the banner exhibit is more appealing to this audience**.** All of the banners were attended by more than three-fifths of visitors who participated in the study, though this may be partially due to a self-selection bias toward "label readers" and cuing of study participants. In part due to cuing, attendance rates were consistently higher in the banner exhibit than in the full exhibition. Data indicated that for older adults who like to read information, a banner exhibit can be attractive, particularly when placed in hallways where incidental encounters are easy and where benches provide opportunities for viewing banners while relaxing.

**Banner exhibit visitors were highly satisfied with their experience.** Respondents moderately agreed that they understood the main messages of the banner exhibit and were moderately likely to have conversations about the exhibit with others in their group, but expressed high interest in seeing more exhibitions like Roots of Wisdom in the future. **More than half of the banner exhibit visitors articulated key take-aways that were highly aligned with intended messages**, which is notably higher than for full exhibition visitors. While this is not a comparative study, it is

interesting to note that messages were clearer for adults and through the panel text, which was the main form of interpretation in the banner exhibition.

**Attempts to get visitor feedback on the website during the banner exhibit data collection were not successful.** Despite cuing visitors to use the website during their visit, none of the 39 visitors interviewed actually did so. Reasons for this included: 1) intermittent and slow internet connection during the time of data collection and 2) the use of a small, unappealing laptop computer. Data from the banner exhibit study suggested that while visitors enjoyed and learned from the exhibit, they wanted and expected something more interactive and hands-on, especially given the location at the High Desert Museum, which includes a great deal of interactive components in their exhibits. In this way, **including the videos via the project website through a large, attractive touch screen would enhance the visitor experience of the banner exhibit.**

## Key Findings for the Activity Kit

**Both adult and youth participants generally enjoyed and learned from the activities**. For museum visitors, the floor activities added to their experience and allowed for a hands-on exploration of the exhibition concepts. Overall, the activities seemed more effective in supporting awareness of Indigenous knowledge and practices, with a need to more explicitly link to the scientific process if that is the goal. The Natural Dyes activity was seen as the most effective in the area of supporting science process skills.

Overall, the activities were perceived as **well designed, easy to understand and valuable** for the target audience (Native youth, age 11–14) in a variety of ways. Educators felt the resources were informative, clear, and visually engaging; and that the activities could successfully engage Native youth in connecting to the science embedded within their culture, though there is a need for more support in making those links. General **suggestions for improvement** included starting with the Voices in Our Community activity as a foundation for the rest of the activities. From a Native worldview, this activity supports youth in learning from elders through story. The activity honors elders as the knowledge holders and begins with story, reflecting core values. Another recommendation is to be considerate of technology issues in how the ROW activity kit is disseminated; specifically, the fact that not all teachers/educators will have the same access, particularly in some tribal communities.

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# Tables and Figures

# Introduction

Roots of Wisdom (also known as "Generations of Knowledge") was a project funded by the National Science Foundation from 2010–2015 to engage Native and non-Native youth (ages 11–14) and their families in Traditional Ecological Knowledge (TEK) and Western science within culturally relevant contexts that present both worldviews as valuable, complementary ways of knowing, understanding and caring for the natural world. The Oregon Museum of Science and Industry (OMSI) and its partner organizations, The Indigenous Education Institute (IEI), The National Museum of the American Indian (NMAI), the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Tulalip Tribes, Pacific American Foundation and Waikalua Loko Fishpond Preservation Society (Native Hawaiians), and Eastern Band of Cherokee Indians worked collaboratively to develop all aspects of the project, which includes the following deliverables: (a) a 2,000-square-foot full exhibition, (b) a 100-linear-foot traveling graphic panel exhibition, (c) a website, (d) an activity kit for Native youth in informal and formal settings, and (e) opportunities and resources for reciprocal collaboration between ISE and Native American partners.

The Lifelong Learning Group (LLG) and Native Pathways (NaPs) conducted summative evaluation of the public audience impacts as part of a larger effort to evaluate the impacts of the project. Summative evaluation of public audiences took place over the final year of the project.[2] The following intended outcomes were used as a guiding framework for the public audience evaluation:

- *Awareness* that Traditional Ecological Knowledge (TEK) is a way to understand the natural world that is used today
- *Awareness* that TEK and Western science offer complementary ways of understanding the natural world
- *Attitudes* that TEK and Western science are both relevant and valuable for understanding the natural world
- *Skills* of the scientific process, such as predicting or measuring, to care for the environment
- *Other* unanticipated positive impacts

# Evaluation Process and Methods

## Collaborative Evaluation

The summative evaluation team followed a collaborative, participatory process for developing and implementing the summative evaluation for the public audience impacts. Following an Indigenous

[2] The summative evaluation team was engaged throughout the GOK project (2010–2015), primarily as participants in meetings, in order for the team to have some context and build relationship in support of the summative evaluation. However, the bulk of the public audience summative evaluation work occurred in 2014-2015.

process for seeking input and support (or getting the blessings of one's leadership and community), the summative evaluation team used a three-part process: 1) seek in-depth input from project leadership (akin to a tribal council) and strengthen the plan based on their advice; 2) with a strong foundation supported by the leadership, seek input and endorsement from the community partners, exhibit team, and advisors (akin to the broader community or "the people"); and 3) solidify the plan and send it back out to leadership and the community to allow for any additional thoughts, questions, or input before finalizing the plan (akin to validation or approval to move forward from "the people," the community). These three steps are described in more detail below.

## Evaluation Questions

Based on conversations with the project team and partners, the following evaluation questions guided the summative evaluation for public audiences, which included evaluation of the full exhibition, banner exhibit, activity kit, and website (see Table 1).

### Table 1: Evaluation questions by deliverable

| Evaluation Questions | Deliverables |
|---|---|
| 1. How do visitors experience and interact with the exhibit space and other deliverables? What aspects and components are most/least engaging and why?<br>2. To what extent and in what ways do the exhibit and other deliverables achieve intended outcomes (awareness, attitudes, and skill-building related to TEK and conventional science)? What aspects best support the intended outcomes of the project?<br>3. What are unanticipated impacts, uses, and benefits of the ROW project and deliverables for public audiences? | • Full 2,000-square-foot exhibition<br>• Banner exhibition<br>• Youth Activity Kit<br>• Website |
| 4. How do visitors interpret the main messages or "big idea" of the exhibit? To what extent does the exhibit help people see connections between TEK (or Indigenous ways of knowing) and conventional science?<br>5. To what extent and in what ways do Native youth see themselves or their community reflected in the exhibit? | • Full 2,000-square-foot exhibition<br>• Banner exhibition |

## Study Design, Methods, and Data Collection

The summative evaluation followed a joint evaluation process that brings together Indigenous and conventional evaluation practices and seeks to balance voices and worldviews, thereby mirroring the type of collaboration the project itself is designed to support. Summative evaluation for public audiences utilizes a naturalistic design that uses visitor voice, stories and self-reflection as the primary data for understanding project impacts. Both qualitative and quantitative measures were utilized to provide multiple lenses in order to strengthen the validity of results. Below we describe our methods and data collection by project deliverable (see

Table 2).

### Table 2. Overview of methods and data collection

| Deliverable | Data collection sites | Method / activity | Participant Sample[3] |
|---|---|---|---|
| **1. 2,000-sq-foot full exhibition** | OMSI, Tamástslikt, Hibulb | Exit interview<br>Reflective tracking questionnaire | Native adults (n=34)<br>Non-Native adults (n=129)<br>Native youth[4] (n=18)<br>Non-Native youth (n=42) |
| **2. Youth Activity Kit** | N/A | Expert review –online survey and semi-structured phone interview | Teachers and ISE educators working with Native youth (n=6) |
| ***Exploring Natural Dyes*** | Tamástslikt | Observation<br>Sticker voting / Comment board | Native and non-Native youth 11–14;( n=45) |
| ***Weaving activity*** | N/A | Expert review –online survey and semi-structured phone interview | Teachers and ISE educators working with Native youth (n=3) |
| ***Match card game*** | OMSI, Tamástslikt, Hibulb | Exit survey<br>Observation<br>Sticker voting / comment board | Museum visitors (n=8)<br>Native and non-Native youth 11–14 (n=55) |
| ***Natural dyes demo*** | OMSI | Survey | Museum visitors (n=19) |
| **3. Banner Exhibition** | High Desert Museum | Exit interviews with reflective tracking (short) | Museum visitors (n=40) |
| **4. Website** | Included in banner exhibit evaluation | | |

*Full Exhibition*

[3] Sampling strategies are described in the section Sampling, Recruitment and Consent. In general, a combination of random sampling with some purposive sampling (to increase numbers of participants in the target audience groups) was used.

[4] Throughout the report, for ease of analysis, youth is defined as 17 and younger; youth younger than age 9 were not included in the study.

For the 2,000-square-foot full exhibition, the evaluation team used two methods: 1) Reflective tracking and 2) Semi-structured exit interviews. Data were collected at three sites (OMSI, Tamástslikt Cultural Institute, and Hibulb Cultural Center and Natural History Preserve) from November 2014–July 2015. At OMSI data collectors from LLG and OMSI administered **105 reflective tracking surveys**[5], which provide an understanding of how visitors interact with the space, what moves them through the visit, where they were most/least engaged, and what and how they learn along the way. In addition data collectors conducted **89 exit interviews**, which focused on the visitor experience and learning in the exhibition, their understanding of the "big idea" and main messages, and what aspects of components supported their learning. Data were collected on various days and times to account for different crowd conditions and group types.

*Youth Activity Kit*

Summative evaluation for the youth activities was conducted using a combination of observation, exit survey, sticker voting and comment cards, as methods were adapted to each unique context in which the activities were being implemented. In addition, evaluators conducted an expert review of the activity kit. For the **expert review of the kit**, seven educators focused on Native youth and/or Native science education were recruited to review the materials and then completed an online survey and/or semi-structured phone interview. The experts included three museum educators and three K-12 educators. A thank-you gift of a $50 Amazon card was provided for each teacher/educator who participated. For the activities that were designed as **museum floor activities** for general visitors, three questions were added to the online survey for those who stopped at one of the activities.

*Banner Exhibit and Website*

Due to delays in the production of the banner exhibition, data collection was only conducted at one site, the High Desert Museum in Bend, OR. Exit interviews were conducted in order to understand the impacts and learning outcomes of the banner exhibit. A small thank-you gift of a museum postcard was provided to each participant. A total of 39 adult visitors participated in an exit interview. While the website was set up for testing as part of the banner exhibition evaluation, poor Internet connection and display (a laptop, as opposed to a full kiosk or touch screen) may have made it an unappealing or unnoticeable stop for visitors, although cued visitors were encouraged to use it for evaluation purposes. For this reason we only report briefly on the website findings in the Banner Exhibit section of this report.

## Sampling, Recruitment, and Consent

[5] In an effort to use culturally responsive evaluation methods, conventional timing and tracking was not included in this study. Instead the evaluation team conducted a modified version of a post-only reflective tracking protocol. Indigenous partners felt that timing and tracking of Native families would not be appropriate.

In consultation with project partners and the IRB firm (Ethical and Independent Review), the evaluation team adjusted its sampling, recruitment, and consent processes based on the type of deliverable, data collection site, and audiences for each component of the study, in order to practice culturally responsive approaches.

### Full Exhibition

Overall, a combination of random and purposive sampling was used for the exit interviews and reflective tracking protocol across each of the three data collection sites (OMSI, Tamástslikt, and Hibulb), described in more detail by site below. This was intended to minimize data collector bias while also ensuring that target audiences (Native and non-Native youth age 11–14 and their families) were included in the study to the greatest extent possible.

At **OMSI,** a random sampling strategy was used for exit interviews and reflective tracking by selecting the third visitor to exit the exhibition space[6] who appeared to be 18 years or older. Purposive sampling was used periodically to increase the number of Native and youth participants. This was done in two ways: 1) by approaching exiting visiting groups who appeared to have a youth age 11–14 in their group, and requesting consent from the parent/guardian and assent from the youth to participate in an exit interview; and 2) at OMSI, by offering a Native American Family Science Night and promoting the event through the Portland Public Schools Title VII Indian Education Program, Native American Youth and Family Center (NAYA), and other community partners and organizations reaching the urban Indian population in Portland. A flyer promoting the exhibition and evaluation was created to hand out in the lobby as visitors entered the museum, since other parts of the museum were open that evening.

During regular museum hours and during the special event, visitors were invited to participate in a brief interview or reflective tracking protocol after they exited the exhibition, and were made aware that participation was voluntary and unpaid; that feedback would be used anonymously in order to understand whether the exhibition's goals were being achieved; and that they were free to end the interview at any time. Once verbal consent was given (by a parent/guardian if participant was under age 18), the exit interview or reflective tracking protocol began. Visitors were offered a Study Form for their records (see Appendix A – Instruments) but signatures were not required. Visitors were given a small thank-you gift (a "root" pencil from the OMSI gift shop) in respect of their time.

At **Tamástslikt,** the project partners recruited middle school students through the local school district to come visit the Roots of Wisdom exhibition, participate in some of the ROW youth activities, as well as participate in the evaluation. A package was sent to the school administrator,

[6] When visitation was slow, data collectors switched to a population sample (approaching every visitor who exited the exhibition and who appeared to be over age 18). At OMSI, visitors exiting the Earth Hall were also included in the sample, as we noticed visitors might enter the Roots of Wisdom exhibit and then continue through the Earth Hall before exiting.

including written permission slips for parents/guardians, which were returned to the museum prior to the field trip.

At **Hibulb,** the project partners recruited visitors to participate in the evaluation in two ways: 1) through collaborating with the local Boys and Girls Club; and 2) inviting community members to a Family Night event. For the Boys and Girls Club youth component, a recruitment packet and consent form were sent to the club administrator. At the Family Night event, data collectors intercepted visitors as they exited the ROW exhibition. Due to relatively low attendance at the event, data collectors approached nearly all visitors (utilizing a "population sample") to participate in evaluation. The same process of verbal consent was used as described at OMSI, except a poster was made to show the study information for those who were interested, rather than having to go over the study information sheet with each visitor, as was done at OMSI. In addition, data collectors recruited walk-in visitors to the exhibition using the same sampling and recruitment protocol described for OMSI.

### Banner Exhibition / Website

All data for the banner exhibition and website were collected at the **High Desert Museum** (Bend, OR). Due to relatively low visitation in the museum and banner exhibit area[7] *convenience sampling* was used to ensure that we reached our data collection goals within a fairly short time period (2 days). Once a visitor was approached, the same consent process was used as for the full exhibition.

### Youth Activity Kit

Youth participants in the activity kit evaluation were recruited as part of the field trips to Tamástslikt and Hibulb (see above for recruitment and consent process). Teachers and museum educators were recruited for the expert review of the activities through evaluator and museum partner contacts. The main criteria were that the educator works with Native youth, preferably with a focus on 11–14 year olds, though we broadened this age range in order to ensure we gathered enough useful feedback for the study. Educators from museum and afterschool settings were also included in recruitment. An email was sent to teachers/educators to invite them to participate in an online survey and follow-up interview. Consent to participate in the online survey was given by checking a box stating they agreed to participate, after reading information about the

[7] Data collectors noted that visitors tended to walk through the hallway where the banner exhibition was displayed, glance at a few banners and continue toward their destination. In a museum with interactive exhibits and live collections, it is to be expected that many visitors may not take time to read a banner exhibit. Given the time constraints in which to reach our data collection goals (40 interviews in 2 days), we chose a convenience sampling approach, which meant we approached visitors before the exhibit and asked if they would be willing to spend some time in the space and provide feedback ("cued" visitors). This included approaching visitors who had begun glancing at the banners. A small number of visitors were "uncued," in that they were approached after data collectors noted they had spent time in the banner exhibit area on their own.

study purpose, use of data, and confidentiality. Verbal consent was acquired prior to beginning the follow-up phone interviews.

## Terminology and Language

This section defines some of the key terms that are used in the report to provide more clarification and context for the reader.

*Full exhibition* – This refers to the 2,000-square-foot interactive exhibition, which was installed and tested at three sites: OMSI, Tamástslikt Cultural Institute, and Hibulb Cultural Center.

*Banner exhibition* – This refers to the 100-linear-foot exhibit, which was installed and tested at the High Desert Museum in Bend, OR.

*GOK and ROW*— GOK is the title of the original name of the project and title of the grant proposal and stands for Generations of Knowledge. During the exhibit development process, the project team chose Roots of Wisdom as the exhibition title. The team then shifted to calling the exhibit and the rest of the project by this name.

*TEK* – this refers to Traditional Ecological Knowledge, which is a Western-science term used to describe Indigenous Science. Tribal nations and communities tend not to use this term; so we mostly use Indigenous knowledge and Native Science throughout the reports, except when referring to the intended project outcomes as articulated by the lead institutions in the grant.

*Western science* – this term refers to science and the scientific process as developed and practiced through the Western European tradition, academic disciplines and institutions. In this project and report, it is used to distinguish between science as practiced in the western European tradition and Indigenous or Native science, which is also sometimes referred to as TEK (see above).

# Results and Discussion

The summative evaluation was structured around the project's primary public audience deliverables: 1) Full exhibition; 2) Banner exhibit and Website; and 3) Educational Resources (or "Activity Kit") for youth. This section discusses results from each of these components. Questions and response items were included in the various evaluation instruments to address each of the five **evaluation questions** (see page 8). To report these results in a clear and accessible way, each section is organized in the following sub-sections: 1) Demographics of Participants; 2) Use and Engagement; 3) Learning Outcomes / Main Messages; and (for full exhibition only*)* 4) Values around Bridging Indigenous Knowledge and Western Science.

## Full Exhibition

### Demographics of Participants

**Overall, the target audiences of families with a focus on Native and non-Native youth, age 11–14 were reasonably well-represented in the sample, with a somewhat larger representation of non-Native adults than originally intended for the study.**

Basic demographic information was gathered to understand who was participating in the study and to gauge whether or not we were reaching the target audiences, defined in the project logic model as "Families, with a focus on Native and non-Native American youth, age 11–14."[8]

Overall, 179 adults participated in the full exhibition study (reflective tracking and interviews combined); 79 youth under age 18 participated, with the majority (77.2%; n=61) being between the age of 11–14. In addition, about one-fourth of the adults (23.0%; n=41) who participated reported having a youth age 11–14 in their visiting group.[9]

More than a quarter of the participants self-identified as either American Indian/Native American or Native Hawaiian/Pacific Islander (25.6%; n=81). Specific tribal affiliations represented a broad range of cultures (see Table 12 in Appendix B – Data Tables). Almost half of the participants (48.3%; n=153) self-identified as White; 6.3% (n=20) as Latina(o) or Hispanic; 6.0% (n=19) as Asian; 4.4% (n=14) as African American; and 1.9% of participants (n=6) indicated that they

[8] Note that the recruitment strategy of focusing on families with youth who appeared to be 11–14 proved challenging, as there were low numbers of that age group visiting during the data collection periods (outside of school groups). In order to ensure enough data were gathered from families for summative evaluation, data collectors also approached visitors with youth outside that age range, and adults visiting alone. To compensate, two middle school groups were invited to the Tamástslikt Cultural Institute to provide feedback on the exhibition from the target age range.

[9] When an adult seemed to have an 11–14 year old in their group, the data collector asked if they would be willing to participate in an interview or survey as well; however, there were cases in which the parent or youth declined, or where the youth was not immediately present with the adult.

preferred not to answer this question. Participants could select multiple categories, so responses totaled more than 100%.

More than half the participants in the study identified as female (58.3%; n=156); and 38.3% of respondents (n=102) identified as male. Eight participants (2.5%) indicated that they preferred not to answer this question.

## Use and Engagement

**Summary of Key Findings for Full Exhibition: Use and Engagement**

*The Roots of Wisdom exhibit components were well attended and much liked by visitors.* The most appealing exhibit components were those that allowed visitors to *do* something, such as the computer games and interactives/manipulatives (e.g. *River Cane Ecology, Food: Medicine of the Land,* and *Aloha 'Aina).* Videos were slightly less appealing to visitors, followed by panel-only stops, with one exception. The *Native Origins* panel had high attendance, even though it was a text/graphics only stop. Only one of the exhibit components experienced low attendance. Similarly, visitors were most likely to report playing a game or using an interactive (when available), and exhibited fairly high rates of reading text information that accompanied those games and interactives. Independently, visitors experienced all exhibit components as at least somewhat interesting, and many as highly interesting, and consequently reported high satisfaction and enjoyment ratings for their experience.

*Adults and youth exhibit different preferences.* Adult visitors attended to panel-only exhibits at a higher rate than did youth visitors and were more likely to stop at one video (Cherokee *Re-establishing a Native Plant).* Youth were significantly more likely than adults to stop at the *Hawaiian Fish Ponds* game. Furthermore, youth were far more likely than adults to play a game or use an interactive, and were also more likely to watch other visitors at an exhibit. Conversely, adults were more likely to read label text than were youth, though overall, adults and youth found exhibit components equally interesting (with a few exceptions – primarily adults finding the panels more interesting than youth). Nonetheless, adults may have connected to ROW more than youth as measured by desire to follow up and by perceived understanding of key ideas.

### Stops at Exhibit Components

**About two-thirds of visitors to the *Roots of Wisdom* exhibit (67.4%; n=93) reported stopping at 10 or more stops (more than 50% the exhibit components), suggesting the exhibition was highly appealing to visitors overall[10]** (see **Error! Reference source not found.**). There were no s ignificant differences between adults and youth, or between visitors who identified as Native or non-Native, in terms of how many components they stopped at.

[10] Based on Serrell 1997, percent of Diligent Visitors

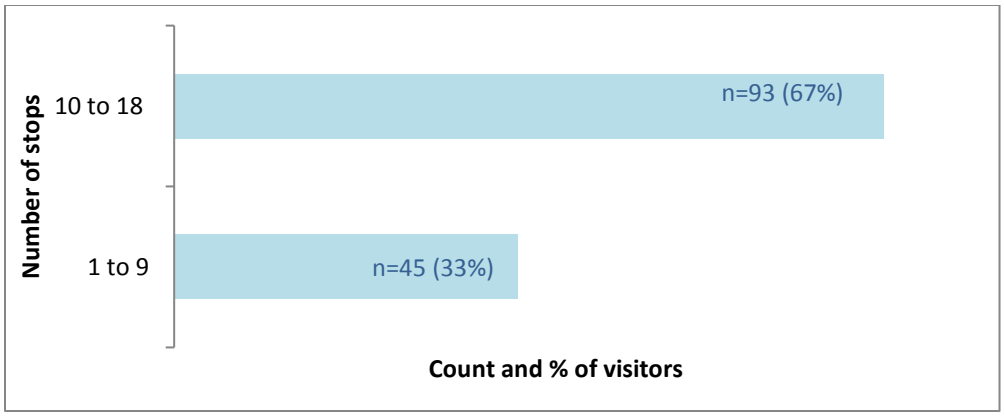


**Figure 1. Percentage of "diligent visitors" to Roots of Wisdom (self-report)**

Stops were defined as the 18 main components or panels, including the *Introduction* and *Cross-Cultural Collaboration* panels. Some of these stops had several components (e.g. video and panel text); the specific use of these exhibit components is reported in the next section. Stops data were intended to measure the relative attractiveness or appeal of the various exhibit components in ROW (i.e. "attraction power") rather than how interesting those components were to visitors once they engaged with them. Results are shared in the text below in terms of high (60% and above), medium (41-59%), and low (below 40%) attendance. Differences between youth and adults, and Native and non-Native audiences, are only noted only where applicable.


**Figure 2. Visitors were most likely to stop at this exhibit *component* (Cherokee River Cane Ecology)**

**High attendance** – Almost half of the exhibit stops[11] (n=10) were attended by more than 60% of visitors, suggesting these either had high appeal and/or were placed in a higher traffic area (e.g. at OMSI, the Hawaiian section was at the front of the exhibition space and more visible to visitors passing by). As shown in Table 3, the most highly attended exhibit components were the interactives, games, and hands-on activities (i.e. *Passing a Tradition* includes a weaving activity), confirming that visitors were most drawn to exhibit components in which they could *do* something more than reading a label or watching a video. The Cherokee *River Cane Ecology* "ball" activity ranked highest (80.1% of visitors stopping), followed by the CTUIR *Healthy Streams* building activity (76.1%), the Tulalip *Food: Medicine of the Land* gardening activities (74.7%), the Native Hawai'ian *Hawaiian Fish Ponds* video game (72.2%), the Cherokee *Passing a Tradition* video and basket weaving exhibit (72.0%), the Native Hawaiian *Aloha 'Aina: Love of the Land* interactive (70.6%), and the Native Hawaiian *Restoring Fish Ponds* video (69.8%). The CTUIR *Protecting an Ancient Fish* lamprey interactive was

[11] This includes 19 exhibit components and 2 museum floor activities (*Match Card Game* and *Natural Dyes*) that were available at certain times during data collection.

also highly attended (67.3%), as was the Tulalip *Connected to the Land* video game (64.1%), although not as highly as the other interactives, possibly because of each component's location near the back of the exhibition at OMSI, where the majority of exhibit data were collected. The only panel (without video or interactive components) that was highly attended by visitors was *Native Origins* (66.5%), possibly because of its bright imagery of familiar products and prominent location in the exhibition space, and/or because visitors found the title appealing.

**Figure 3. The *Healthy Streams, Returning Salmon* component was one of the most highly visited**

**Medium attendance** – Ten of the exhibit components were somewhat well attended by visitors, defined as between 40-59% of visitors stopping. This included the remaining three community videos: the Cherokee *Re-establishing a Native Plant* video (54.4%), CTUIR *Saving Streams and Wildlife* video (52.2%) and the Tulalip *Rediscovering Native Foods* video (46.1%). This data suggests that the videos were not as much of an initial draw to visitors as the interactive components. Other exhibit components with medium attendance included panel stops (non-interactive), such as the *Introduction* (58.8%), *Biopiracy* (54.4%) and *Cross-Cultural Collaboration* (47.2%). More than half the visitors reported stopping at the *Story Area* (54.8%) while less than half (44.9%) stopped at the *Comment Board.*

**Low attendance** – Only one exhibit (*Taking Care of Homelands Map*) could be described as poorly attended, which was defined as below 40% of visitors stopping. This exhibit was attended by 35.1% (n=26) of those who had the opportunity to view it. The fact that the map was only available at Tamástslikt and Hibulb (and not at OMSI) was factored into the analysis of attendance. Overall, having only one exhibit in the "low attendance" category suggests that the full exhibition was appealing overall for those who chose to attend.

**Table 3. Popularity of exhibit components listed from most to least attended**

| | | Exhibit | Attended | % of Total | N |
|---|---|---|---|---|---|
| **High** | | Cherokee River Cane | 132 | 81.0% | 163 |
| | | CTUIR Healthy Streams | 124 | 76.5% | 162 |
| | | Tulalip Medicine of the Land | 122 | 73.9% | 165 |
| | | Cherokee Passing a Tradition | 120 | 73.2% | 164 |
| | | Hawaiian Video | 119 | 72.1% | 165 |
| | | Hawaiian Love of the Land | 118 | 70.7% | 167 |
| | | CTUIR Ancient Fish | 112 | 68.7% | 163 |
| | | Hawaiian Fish Ponds Game | 114 | 68.7% | 166 |
| | | Native Origins | 110 | 66.7% | 165 |
| | | Tulalip Connected to Land | 106 | 65.0% | 163 |
| **Medium** | | Introduction | 97 | 58.1% | 167 |
| | | Story Area | 90 | 54.9% | 164 |

| | | | | | |
|---|---|---|---|---|---|
| | | Cherokee Video | 89 | 53.3% | 167 |
| | | Biopiracy | 87 | 52.7% | 165 |
| | | CTUIR Video | 85 | 51.8% | 164 |
| | | Comment Board | 75 | 45.5% | 165 |
| | | Cross-Cultural Collaboration | 76 | 45.2% | 168 |
| | | Tulalip Video | 72 | 44.7% | 161 |
| **Low** | | Taking Care of Homelands Map | 26 | 35.1% | 74 |

= games/interactive = videos =panel only

Note: Due to space constraints, tribal community names are abbreviated in figures and tables as: Cherokee (Eastern Band of Cherokee Indians); CTUIR (Confederated Tribes of the Umatilla Indian Reservation); Hawaiian (Native Hawaiian); and Tulalip (Tulalip Tribes).

### *Attendance to Exhibit Components (Adults and Youth)*

Data showed several significant differences in attendance (or "attraction power") of the exhibits, mostly on the side of **adults attending to panel-only exhibit components at a higher rate than did youth.** This included the *Introduction, Cross-Cultural Collaboration,* and *Biopiracy* panels. Adults were also significantly more likely to stop at the Cherokee *Re-establishing a Native Plant* video. Youth were significantly more likely to stop at the Native Hawaiian *Hawaiian Fish Ponds Game* than were adults.

### *Use of Exhibit Components*

To get a sense of how, and the extent to which, visitors used the specific exhibit components, a subset of visitors were asked to identify (from multiple choice options) the activities they did at each exhibit stop[12]. Across the exhibit stops, **visitors were most likely to report playing a game or using an interactive** (when available), with all but one being played by more than two-thirds of visitors who stopped. Visitors also reported **fairly high rates of reading text information** that accompanied the games and interactives,[13] with these percentages ranging from 45.6% to 63.4%. Visitors were **less likely to report watching other visitors use interactives or play games**, with these activities ranging from 23.5% to 42.5%. Interestingly, the only "authentic objects" in the exhibition (the Cherokee baskets) were just as likely to be viewed by visitors as using the games and interactives, with 63.3% of visitors looking at the baskets.

The areas that did not have an interactive component were the *Comment Board* and *Story Area*. In the Comment Board area, visitors were **far more likely** to read messages (77.1%) than to write one of their own (25%). In the Story Area, visitors were **more likely** to do the weaving activity (55.8%) or relax on the benches (32.7%) than to read one of the stories to themselves or to others (17.3% and 19.2%, respectively).

[12] This data excluded panels – Introduction, Cross-Cultural Collaboration, Native Origins, and Biopiracy

[13] These percentages may be skewed high due to a potential social-desirability bias; e.g., some visitors feel they "should" report having read the labels. To mediate this, visitors did the reflective tracking portion individually in an online survey format.

The main difference between adults and youth in terms of exhibit use were that youth were **far more likely to play a game or use an interactive,** which ranged from 73.9% (for the Tulalip *Connected to the Land* computer game) to 96.9% (for the *Protecting an Ancient Fish* lamprey scanning activity), compared to a range of 32.5%-61.4% for adults. Youth were also **more likely to watch other visitors at an exhibit,** likely due to watching other youth playing a game or using an interactive. **Adults were more likely to read label text than were youth,** with 62.5% - 75.0% of adult visitors reading label text, depending on exhibit, compared to 31.4% - 56.3% for youth.

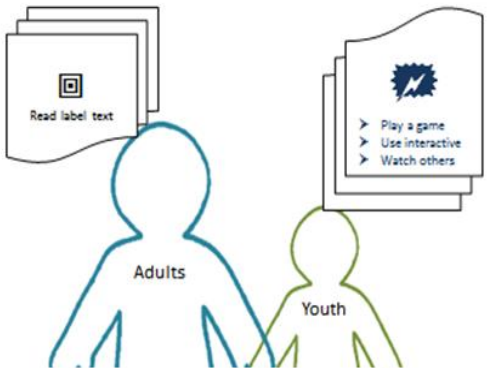


**Figure 4. Use of exhibit components by adults and youth**

## *Interest Ratings for Exhibit Stops*

Visitors participating in reflective tracking were also asked to rate each exhibit component where they stopped as "very interesting" (3), "somewhat interesting" (2), or "not interesting" (1). These were calculated as means, and are shown in Table 4 from high to low. Visitors felt almost all of the exhibit components where they stopped were highly interesting (rating them 2.50-2.79, on average). Visitors found three exhibit components to be only moderately interesting, with mean ratings from 2.08-2.43. These were the *Introduction* panel (2.43), the *Cross-Cultural Collaboration* panel (2.41), and the *Taking Care of Homelands* map (2.08). [14]


**Figure 5. Visitors found *Protecting an Ancient Fish* (Confederated Tribes of the Umatilla Indian Reservation) and the *CTUIR video* (right) to be among the most interesting exhibit components**

[14] Note that the sample size for the *Taking Care of Homeland Map* was limited to 23 participants due to the late addition of this component in the data collection process.

### *Interest Level for Adults and Youth*

Almost all significant differences in interest between adults and youth were on the side of **adults finding certain exhibit components more interesting than did youth**. Adults found the *Introduction, Biopiracy* and *Cross-Cultural Collaboration* panels significantly more interesting than did youth[15]; as well as the Cherokee *Re-establishing a Native Plant* video. For two exhibit components (the *Comment Board* and Native Hawaiian *Fish Ponds* game), the trend was reversed in that youth found them significantly more interesting than did adults who stopped there. **Overall, this data suggest that adults and youth found the ROW exhibit components equally interesting (with a few exceptions – primarily adults finding the panels more interesting than youth).**

**Table 4. Interest ratings for exhibit components rated from most to least**

| | Exhibit Component | Mean | N |
|---|---|---|---|
| | Hawaiian Fish Ponds Game | 2.79 | 97 |
| | CTUIR Ancient Fish | 2.73 | 90 |
| | CTUIR Video | 2.73 | 68 |
| | Tulalip Connected to the Land | 2.72 | 81 |
| | Cherokee River Cane | 2.70 | 105 |
| | Hawaiian Love of the Land | 2.68 | 99 |
| | Story Area | 2.68 | 72 |
| | Native Origins | 2.67 | 96 |
| | CTUIR Healthy Streams | 2.66 | 101 |
| | Hawaiian Video | 2.65 | 95 |
| | Tulalip Video | 2.62 | 56 |
| | Biopiracy | 2.61 | 82 |
| | Cherokee Passing A Tradition | 2.61 | 97 |
| | Cherokee Video | 2.52 | 73 |
| | Tulalip Medicine of the Land | 2.50 | 105 |
| | Comment Board | 2.44 | 61 |
| | Introduction | 2.43 | 82 |
| | Collaboration | 2.41 | 68 |
| | Taking Care of Homelands Map | 2.08 | 13 |

= games/interactive = videos =panel only

### *Enjoyment and Satisfaction with ROW Exhibition Overall*

**Visitors overall enjoyed their experience in *Roots of Wisdom.* On a 10-point scale, visitors rated their enjoyment 8.22 on average (see**

Table 5). Visitors rated their desire to see more exhibitions like this one (7.68) and their understanding of the main messages of the exhibition (7.57) slightly lower. Visitors were also asked to rate the extent to which the exhibition sparked conversations with others; this area ranked

[15] Mann-Whitney, p value <0.05

notably lower than other areas (mean=6.55), though this measure only captures the exhibition experience and not conversations that may occur afterward.

**Table 5. Enjoyment and satisfaction items for ROW exhibition, with 1 being "not at all" and 10 being "very much"**

| Item | N | Mean | SD |
|---|---|---|---|
| **I enjoyed visiting the Roots of Wisdom exhibition.** | 270 | 8.22 | 1.787 |
| **I would like to see more exhibitions on traditional Native knowledge at OMSI.** | 277 | 7.68 | 2.085 |
| **I understood the main messages of the exhibition.** | 274 | 7.57 | 2.046 |
| **I had conversations with others about the exhibit or activities.** | 267 | 6.55 | 3.243 |

**Adults were significantly more likely to express that they would like to see more exhibitions like *Roots of Wisdom* (p=.000) than were youth, and significantly more likely to feel they understood the main messages of the exhibition (p=.003)**. This may be partly due to the youth in our participant sample leaning toward the young side of the 11–14 age range (and some being younger); thus it would be expected that younger visitors may have more difficulty understanding the main messages, as the exhibition was designed for 11–14 year old visitors.

## Intended Outcomes

**Summary of Key Findings for Full Exhibition: Intended Outcomes**

*Visitors gained an awareness of some of the main ideas within the exhibition.* A third of respondents took away from the exhibition ideas around awareness of Native cultures and traditions, practices, and preservation of cultural knowledge in general. Slightly fewer saw the main take-away in emphasizing the importance of environmentally sustainable practices in general. Slightly more than a fifth of respondents saw main ideas related specifically to Traditional Ecological Knowledge, though very few actually used this term. One-tenth of respondents shared awareness of a specific connection between Indigenous ways of knowing and Western science as a key message from the exhibition.

Independently, one in five respondents mentioned one of the specific tribal nations or communities in the exhibition as part of articulating their main take-aways, suggesting some awareness of the exhibition's focus on specific communities rather than Native American or Indigenous cultures more broadly. In this, adults were more likely than youth to express awareness of how Indigenous knowledge and Western science were connected, while youth were more likely to focus on either "the environment" or "Native cultures" in general, and were more likely than adults to identify the main take-away from the exhibition as learning about Native American cultures, traditions and practices without specific reference to the environment.

*Visitors reported learning gains.* Quantitative self-report measures of how the exhibition may have influenced visitors' knowledge, interest and beliefs around TEK (or Native ways of knowing) and Western science showed statistically significant positive change throughout, and was strongest for interest in and knowledge about Native ways of knowing (the aspect visitors may have known less about coming in).

The project logic model identified three intended **public audience outcomes** for the Roots of Wisdom exhibition as articulated below:

- *Awareness* that traditional ecological knowledge (TEK) is a way to understand the natural world that is used today
- *Awareness* that TEK and Western science offer complementary ways of understanding the natural world
- *Attitudes* that TEK and Western science are both relevant and valuable for understanding the natural world

The extent to which these outcomes occurred for visitors to the full exhibition was documented using both quantitative and qualitative measures in order to provide multiple perspectives.

*Visitor Awareness around Exhibit Main Ideas (Qualitative Responses)*

In order to understand visitors' awareness gain in an emergent way, participants were asked to articulate what they saw as the "big idea" or main message of *Roots of Wisdom*. Additional prompts of "what did you think it was about?" or "what did you take away?" were used in some cases in which the question didn't seem clear to the visitor. An emergent coding rubric was developed and responses were coded after inter-rater reliability was established through a consensus-building process. Responses could receive multiple codes if more than one idea was shared. Note that because these were qualitative, open-ended responses, percentages of 20% or higher should be considered as a prevalent idea.

Overall, visitors described the main messages in a variety of ways, which were relevant to the exhibition to varying degrees (see Alignment to Intended Outcomes). Together these provide a rich understanding of what visitors took away from their Roots of Wisdom experience. These take-aways fell into three main areas: 1) focus mostly on environmental science, nature and sustainability (with no specific references to Native knowledge or TEK; 2) focus mostly on Native cultures, knowledge and traditions, including TEK; and 3) focus on both Native knowledge and Western science (see Figure 6).

**The most common ideas that visitors took away from the exhibition were around awareness of Native cultures and traditions, practices, and preservation of cultural knowledge in general**, **with almost one-third of visitors responding this way (32.5%; n=70).** These responses did not specifically mention environmental practices or knowledge but rather focused on Native culture, traditions, and history, sometimes specifically mentioning the importance of preserving cultural practices or passing knowledge onto youth. In some cases, the reference to Native knowledge or cultures was inferred from the context or from the visitor's identity, such as references to "passing on our traditions." The following representative quotes help to illustrate this area:

> *Preserve Native American heritage and culture*; *that history is an important aspect of our community.*
>
> *We need to carry on our traditions so they do not become extinct.*
>
> *Reconnecting the young to tradition; it's worthwhile but hard; a little bit of hope.*
>
> *A basic introduction to Native American practices and works; Native American history and tradition.*
>
> *Help show and talk more about Native Americans and how their lifestyle is.*
>
> *Inform you about Native American areas and practices, Native information in general.*

**Nearly one-third of visitors to the full exhibition (29.3%; n=63) saw the main take-away as emphasizing the importance of environmentally sustainability practices in general**, such as being conscious of the environment, protecting the environment or conserving natural resources. These included general references to "the planet" or "the environment," sustainable methods of living, growing, and farming; humans can impact the earth (positively or negatively); and our

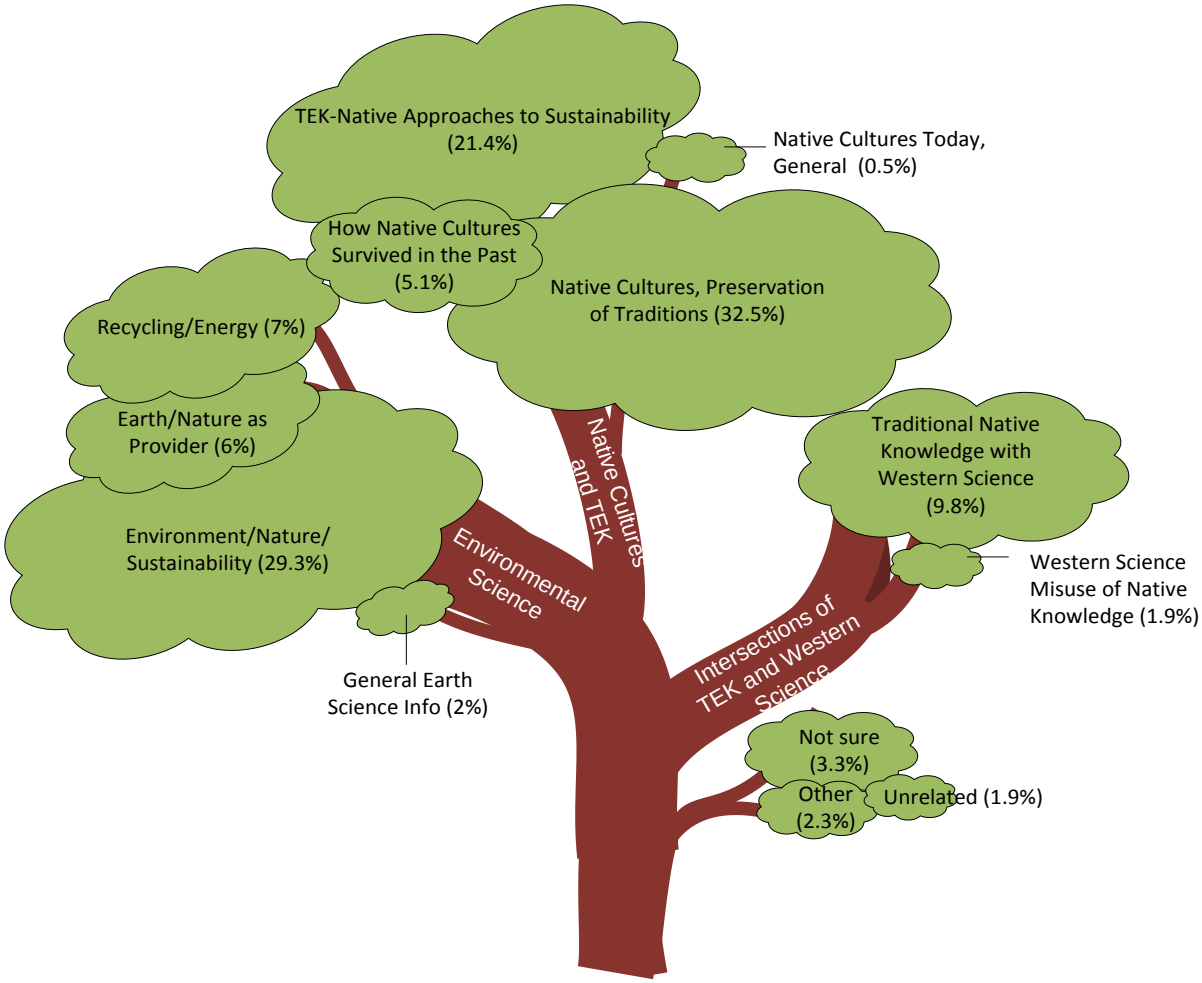


**Figure 6. Roots of Wisdom Tree – Visitor Awareness around Exhibit Main Ideas**
Note: Some visitors provided more than one response, so total is more than 100%. Total n=307

shared responsibility to protect the earth[16]. These visitors did not mention Native, traditional or Indigenous knowledge specifically, but rather engaged with the exhibition's content at a broad level. Following are some representative comments to help illustrate this point:

> *Be more aware of environment; environmental responsibility, sustainability.*
>
> *How to better our farming systems now, how to farm for the future; what kind of impact we have.*
>
> *Mostly that conservation of land and natural resources. Preservation & restoration.*
>
> *Way we use plants affects our health and environment and everything around us.*

[16] These responses may have been inflated due to the ROW exhibit being part of the Earth Science Hall at OMSI, where the majority of visitor data were collected. Some visitors confused or conflated the exhibits, despite efforts to clarify the exhibition space being referred to in the interview or survey.

**The next most common idea that visitors took away from the exhibit related specifically to Traditional Ecological Knowledge (TEK), though very few visitors used this term.** These visitors (21.4%; n=36) framed their main takeaway as related to Indigenous approaches to sustainability, traditional Native American practices around natural resources and land use, as well as Indigenous relationship to nature, and/or the interrelationship between humans and nature. Some of these visitors mentioned specific tribal communities from the exhibition and others were more generally focused on Native American or Native/Indigenous cultures. Following are some examples of these comments to illustrate this area:

> *How the tribes used what they found in the area to live off the land; educating people about how natives used their environment for subsistence.*
>
> *How Native Americans are using old traditions to preserve the land.*
>
> *Message was about how Hawaiians use their land.*
>
> *Sustainability and environmentalism but with an emphasis on how native populations valued these topics.*
>
> *I like how it showed sustainability through a Native lens.*

**Almost one-tenth of visitors (9.8%; n=21) shared awareness of a specific connection between Indigenous ways of knowing and Western science.** This included references to the idea of Native knowledge and Western science working together, and the benefit and value of Native knowledge, perspectives and practices to conventional/Western science, as well as to western or other cultures more broadly. This included references to the general importance of Native culture, values, respect and responsibility for human survival. Following are some representative comments to illustrate this area:

> *I think [the exhibit was about] tying in traditional native knowledge with contemporary science.*
>
> *Seeing how different cultures have used environment over the years and how it benefits the environment.*
>
> *That indigenous wisdom revolves around caring for the earth and its natural resources and that many of the answers pertaining to sustainability that the mainstream scientific community is looking for are available through traditional indigenous knowledge.*
>
> *That there is more to the world than is known in your (western) philosophy.*
>
> *I see the main message as the importance of ancient/traditional knowledge as essential to solving contemporary problems. We need this if we are to survive.*

While not a specific intended outcome, nearly one-fifth (19.5%; n=60) mentioned one of the specific Tribal nations or communities in the exhibit as part of articulating their main take-aways, suggesting some awareness of the exhibit's focus on a deeper understanding of specific communities rather than broadly grouping Native American or Indigenous cultures together.

**Viewed from a holistic perspective across Indigenous and Western science worldviews, a few themes emerged that help to understand how audiences interpreted the main messages.** Ultimately it was the hands-on and interactive areas of the exhibition that were key components to presenting Native knowledge in a way that engaged visitors through a more holistic approach. The four areas below reflect key take-aways that were influenced through the ROW exhibit:

Conservation of nature and environment – This theme included responses from visitors around the importance of preserving nature and the environment, and how nature has been used to sustain a way of life and Native cultures. The emphasis of these responses was on the importance of maintaining and caretaking of the natural world. Generally, this aligns with various core values of Indigenous communities and is part of the internal process of reciprocity in which the land gives to you and you give back to the land through caretaking. From an Indigenous worldview, humans don't own the land but are given rights to care for the land, or to be stewards of the land, and are responsible for keeping it in its most natural state so continuation of nature and culture can be sustained. Following are some examples of visitor responses that reflect this belief:

> *That indigenous wisdom revolves around caring for the earth and its natural resources and that many of the answers pertaining to sustainability that the mainstream scientific community is looking for are available through traditional indigenous knowledge.*
>
> *Culture preservation seemed like a recurring theme in the exhibits. Educating people about how natives used their environment for subsistence was another main message I gleaned.*

Restoration of environment and culture – This theme included responses from visitors focused on how unsustainable practices have led to the need for healthy environmental and cultural sustainability, particularly in areas where nature is out of balance due to human activity. They also showed recognition that this imbalance can lead to an imbalance within culture and that environment and culture are interconnected. In some instances visitors emphasized the importance of healing the land through sustainable practices and doing right by the environment. As a result of this exhibition some visitors began to think about who they were as an active member of this environment and what they can do to keep it healthy. Some visitors also focused on the idea of protecting the continuance of culture through keeping the environment healthy. Following are some examples of visitor responses that reflect this area:

> *Tribes were restoring, connecting traditions, w/ scientific past knowledge, demonstrating values of traditional knowledge for understanding ecological issues.*
>
> *There were several (main ideas) - one of them was to restore and preserve indigenous traditions - there was a big - people do more if you cooperate - the Sesame Street message.*

Relationship – This area emerged specifically for the Native visitors, and focused on a sense of cultural pride ignited through the exhibition. Some Native visitors expressed pride about the exhibition in seeing their culture and cultural knowledge of the land being shared. They also commented on the relevancy and connection of cultural knowledge with Western science. Following are some examples of visitor responses that reflect this area:

*An excellent idea. It seems that the further we come in science, the more appreciation we have for the wisdom our ancestors held.*

*Extremely important as it conveys the importance of our ancestors and the knowledge the transmitted.*

*I think it is a good idea because it is important to know our ancestors knowledge.*

*I think it is excellent. We have Cherokee blood in our family and I would really like my children growing up and knowing about that part of their history.*

*I think it's pretty great - I have a fair amount of Native American roots on both sides of my family; great to see it here.*

Disconnect - In a few areas there are still individual paradigms of viewing Native people and Native knowledge in the past tense, with no connection to the present. Following are some examples of visitor responses that reflect this area (we bolded areas that emphasize this point):

*It is instructive to explore what humans manage to discover as **a primitive society**.*

*The Natives **were** scientists, too.*

***Naïve to think it's totally modern**, but great to have a concrete example.*

*Educates you on an **old way of life**, what they **used**, those things have disappeared; trying to replace with **newer things**.*

### *Differences in Take-Away Messages between Adults and Youth*

**Adults were significantly more likely to express awareness of how Indigenous knowledge and Western science worked together in some way**; while youth were more likely to focus on either "the environment" or "Native cultures" in general. Youth were significant more likely than were adults to say the main take-away from the exhibition was learning more about Native American cultures, traditions and practices without specific reference to the environment.

### *Quantitative Measures of Learning Outcomes*

Quantitative measures were used to triangulate with qualitative data around awareness of the exhibition's main messages. These included pre/post retrospective scales to measure how the exhibition may have influenced people's self-reported awareness, interest, and attitudes around Native ways of knowing and Western science more broadly[17], as well as the relationship between Indigenous and western perspectives of the natural world. As seen in Table 6 below, **visitors reported positive change pre to post around all areas, with the perceived or stated increase**

[17] These were intended as proxy measures of whether visitor felt the exhibition influenced any change around their understanding and perspectives related to TEK and WS

**being higher for outcomes related to Native ways of knowing** than Western science or a combination of Western science and Native ways of knowing (or TEK).

**It is interesting to note that visitors came into the exhibition already with a high level of belief that Native knowledge and Western science are both complementary and valuable for understanding the natural world and addressing environmental issues.** On a four-point post-retrospective scale, visitors rated themselves, on average, 2.91 and 2.93, *before* the exhibition; and increased this rating significantly (p>.001) to 3.32 and 3.35, on average, *after* viewing the exhibition. This suggests that the exhibition served to reinforce and increase prior-held beliefs around the equally valuable role of Native ways of knowing and Western science.

**Table 6: Interest and awareness (before/after), on a 4-pt. scale from "not at all" to "very much"**

| Statements | Mean Before | Mean After | Mean Difference |
|---|---|---|---|
| My knowledge of western science | 2.41 | 2.85** | +0.44 |
| My interest in Native ways of knowing. | 2.58 | 3.10** | +0.52 |
| My knowledge of Native ways of knowing | 2.30 | 2.89** | +0.59 |
| I believe that Native knowledge and western science are both valuable for addressing environmental issues | 2.91 | 3.32** | +0.41 |
| My interest in western science | 2.60 | 2.97** | +0.37 |
| I believe that Native knowledge and western science are both valuable for understanding the world | 2.93 | 3.35** | +0.42 |

N=245

** Significantly different with $p<.001$

For improved ease of use[18], a set of post-retrospective items was developed and used as part of the exit interviews at one of the tribal museum sites (Hibulb) to understand visitors' perceptions, awareness, interest and attitudes related to Western science and Native ways of knowing. Visitors rated these all very highly, ranging on average from 7.76 to 8.87 on a 10-point scale (see Table 7). Similar to the post-retrospective measures, these data confirmed that **visitors felt that the exhibition helped them increase their beliefs that traditional Native knowledge and Western science are both valuable and relevant systems,** as well as their beliefs that the two worldviews could be used together in a complementary way. Data suggests that the exhibition was also successful in increasing awareness about how traditional Native knowledge is being used today, in their own communities, but even more so in other communities. This suggests that the exhibition helped broaden awareness of how Native knowledge is being used by many different cultures.

[18] Data collectors noted that some visitors struggled with the pre/post (before/after) construct, and needed some additional explanation

**Table 7: Revised items for attitudes and awareness around Native ways of knowing and western science (with 1 being "not at all" and 10 being "very much")**

| As a result of visiting Roots of Wisdom… | Mean | SD |
|---|---|---|
| I believe that traditional Native knowledge and western science are both valuable and relevant | 8.87 | 2.161 |
| I believe that traditional Native knowledge and western science can be used together to help the environment | 8.55 | 2.293 |
| I am more aware of how other communities are using traditional knowledge to address the environment | 8.13 | 2.345 |
| I am more aware of how traditional Native knowledge is being used today | 8.13 | 2.255 |
| I am more aware of how my community is using traditional knowledge to address the environment | 7.76 | 2.081 |

n=38

*For Hibulb Site Only*

For one of the tribal community sites (Hibulb), a set of items was added in order to understand the extent to which visitors from one of the featured tribal communities saw themselves and/or their community reflected in the exhibition. Visitors felt strongly that their community was reflected in the exhibition, with an average rate of 8.12 on a 10-point scale; and they felt moderately strongly that the exhibition was relevant to them or their family, with an average rate of 7.21 (see Table 8). Visitors felt more strongly that they became aware of how other communities are using traditional knowledge to address the environment (8.13) than they did about how their own community is using traditional knowledge to address the environment (7.76), although both show fairly strong agreement. This difference is likely due to visitors feeling they are already aware of these efforts in their own community.

**Table 8: Community-related scales, with 1 being "not at all" and 10 being "very much"**

| Statements | Mean | SD |
|---|---|---|
| I am more aware of how other communities are using traditional knowledge to address the environment | 8.13 | 2.345 |
| I feel that my community is reflected in this exhibit | 8.12 | 2.483 |
| I am more aware of how my community is using traditional knowledge to address the environment | 7.76 | 2.081 |
| The Roots of Wisdom exhibit is relevant to me and/or my family | 7.21 | 3.409 |

n=38

*Alignment of Visitor Take-Aways with Intended Outcomes - Qualitative*

In order to understand the extent to which visitors' interpretations of the exhibition's main messages aligned with the intended messages, an additional rubric of four meta-codes were created as follows: 1) not at all aligned; 2) a little bit aligned; 3) somewhat aligned; and 4) very aligned. The intended outcomes were based on the exhibit logic model, as described on p. 7 above.

Keeping in mind that these are relatively complex concepts to grasp, and that they were measured emergently rather than through closed-choice responses, **visitors demonstrated a moderately**

**high alignment with the intended main messages, suggesting that the exhibition did a good job of conveying these ideas to visitors**. Visitors demonstrating high awareness of the exhibition's main messages (16.8%; n=45), referenced at least two of the main messages above, or just one of the main messages but in greater depth. These visitors did not necessarily use the term "TEK" as this is not a widely-known term and was not used anywhere in the exhibition. Instead, visitors used terms like "native knowledge, traditions, cultures," or "Indigenous knowledge" or "Native American practices" in relationship to how they are used today; and/or in relationship to Western science.

**Almost one-third of the visitor responses (28.7%; n=77) were somewhat aligned with the exhibition's main ideas**, which meant that the visitor referenced one of the main ideas, but not in depth. These included responses that did not necessarily mention "Traditional Ecological Knowledge" but included at least some reference to how "different cultures" understand the natural world or environment.

**More than one-third of visitor responses (36.9%; n=99) were a little bit aligned with the exhibition's main ideas**, which meant that the visitor referenced a couple of key words, such as "sustainability" or "Native cultures" but did not expound or describe a message in a clear way.

**A fairly high number of visitor responses (17.5%; n=47) were not at all aligned with the main messages of the exhibition**. These were either unclear or unrelated responses, or in some cases so vague that it was hard to interpret meaning (e.g. "fish and rivers"). This category was also higher than might be expected because of the proximity of ROW to the rest of the exhibits in the Earth Science Hall at OMSI, which led some visitors to conflate *Roots of Wisdom* with other surrounding exhibitions.

*Support for Learning Outcomes*

**When asked to articulate what supported their learning outcomes, or what aspects of the exhibition best conveyed the main take-aways, visitors primarily referenced the interactive nature of the exhibition.** More than half the visitors (51.0%, n=128) mentioned either a specific interactive or interactivity/hands-on nature of the exhibition in general. The most often mentioned specific interactives were *Passing a Tradition* (12.0%; n=30) and *Food: Medicine of the Land* (10.0%; n=25). About one-fifth (19.5%, n=49) stated that it was the videos (either in general or specifically) that best supported their learning. Other components were mentioned by less than 10% of the visitors.

## Visitor Attitudes around Bridging IK and WS

**Summary of Key Findings for Full Exhibition: Attitudes around Bridging IK and WS**

At the outset of the project, it was not a given that visitors to OMSI would support the inclusion of indigenous perspectives in an exhibition featured at a science museum, nor was it a given that visitors to tribal museums would feel positive about including Western science in an environment focused on tribal history and culture.

The study shows that *OMSI visitors were highly supportive of the idea to feature Indigenous perspectives in the science museum.* The vast majority of respondents shared positive opinions, with nearly half of the visitors expressing general, positive remarks and more than one-quarter of visitors stating more specifically that they enjoyed learning about Native cultures and perspectives, and 14.7% enjoying the inclusion of multiple perspectives of science (e.g. Indigenous ways of knowing and Western science) Only a small percentage of respondents (8.4%) provided more equivocal responses, expressing some hesitation within a generally positive perspective.

*Visitors to the tribal museums generally felt positively about the idea of featuring science, including Native science, in a tribal or cultural museum.* Almost half shared a general, positive response, and one-fifth felt that this could help connect people to their cultural knowledge. Some simply enjoyed learning about science and felt that a focus on Native science was well aligned with the museum's goals. Only a small minority of respondents expressed an equivocal perspective on including an exhibit of this nature at a tribal museum.

Due to the innovative nature of the *Roots of Wisdom* exhibition, summative evaluation included an open-ended question to understand how visitors felt about featuring traditional Native knowledge in a science museum (specifically, OMSI) or featuring science in a tribal/culture museum (Tamástslikt and Hibulb). In general, **science museum visitors (OMSI) were highly supportive of the idea to feature Indigenous perspectives in the science museum**, with the vast majority of participants sharing a positive opinion (see Table 9).

Table 9. Visitor attitudes around having indigenous knowledge featured in a science museum

| Theme | Count | % of Total |
|---|---|---|
| Positive – Interesting, enjoyable, fascinating, etc. (General) | 84 | 44.2% |
| Positive – likes having both Native and scientific knowledge, or adding Native perspectives to science | 28 | 14.7% |
| Positive – learning and appreciating Native knowledge; or importance of Native knowledge | 52 | 27.4% |
| Suggestions for improvement | 19 | 10.0% |
| Disagrees – not a new idea | 2 | 1.1% |
| Equivocal (yes, but…) | 16 | 8.4% |
| Negative – not a good idea | 1 | 0.5% |
| Unclear, unrelated, confused with other exhibit | 8 | 4.2% |
| Other | 3 | 1.6% |

N=190

These positive responses ranged in complexity. **Nearly half of the visitors (44.2%; n=84) shared a general, positive remark without providing a reason for their perspective**. Following are a few examples in this category:

> *I love it, is a great idea.*
>
> *Put down 10 stars! I'm so down with that. On a scale of 1 to 10 put down a 10!*
>
> *Thought it was a great idea!*
>
> *I think it is good to have in a science museum.*

**A similar number of visitors (42.1%; n=80) shared that they felt it was a good idea because they enjoyed learning about Native cultures and perspectives, which some felt would otherwise not be there.** This category included references to the idea that Native knowledge is science (e.g. observing, experimenting, adapting, etc.); that it is important and/or adds to our understanding and perspectives (about Native knowledge or science); and the importance of learning more about different cultural perspectives on the world. Following are a few representative comments to help illustrate this area:

> *I love the idea of traditional Native knowledge being at the science museum. The Natives were scientists, too. They explored, designed, experimented just like the well-known scientists.*
>
> *I think it is a good idea because it is important to know our ancestors' knowledge.*
>
> *It should always be a given considering we were the first stewards of the land and that we knew of science in our own teachings only we didn't call it that.*
>
> *Native knowledge is important and should be shared if possible.*
>
> *Amazing!!! We need more of a celebration of Indigenous knowledge, and a greater understanding that the science around us has been understood over many, many generations of studying and interpreting it.*

**A small percentage of visitors (8.4%; n=16) provided an equivocal response, saying they liked the idea *but* also shared some hesitation or discomfort**– for example, it's not really for them, or it depends on the person, or they prefer "science" to Native knowledge. These were generally responses that aren't explicitly supportive of the idea, as the following comments from visitors suggest:

> *I think using all knowledge wherever it is generated is a good idea -- however, I don't think one needs to emphasize where the knowledge came from necessarily. Nor should we push one (type of) knowledge over others, but have it as 'knowledge' not 'Native Knowledge' or 'White people knowledge.*
>
> *As a scientist, I find all factual and historical things valuable. To this point there were several aspects that appealed to me. With this said, I found a portion of the information presented to be from a subjective standpoint, and as such I didn't feel that it contributed well to a scientific atmosphere.*

Though not explicitly sought in the interviews, some visitors (10.0%) provided suggestions for improving the exhibition, particularly around the bridging of Indigenous knowledge and Western science. This perspective came almost exclusively from visitors who did not self-identify as Native. Following are a few representative comments:

> *Invite speakers from the local native communities.*
>
> *OMSI's was a good start, albeit a little on the small side, should be expanded.*
>
> *It is interesting to know about the natives of this country. They do get overlooked in the school systems as a lesser subject of importance, however the exhibit would be improved if there were more tribes to learn from. Ex. Blackfoot, etc.*
>
> *I think it's a good idea, though I would prefer more context and less of a (to me) naïve idealization of "native knowledge" in terms of providing solutions for 21st century problems.*

**Visitors to the tribal museums generally felt positively about the idea of featuring science, including Native science, in a tribal or cultural museum.** Nearly all visitors felt this was a good idea, and many felt the content was seamless with the rest of the museum (see Table 10). Nearly half (45.0%) shared a general, positive response, with no reason for their perspective, such as "*Yes, very educational"* and *"Love the idea!"* One-fifth (21.7%) supported the idea because it could help connect people to their cultural knowledge. Smaller groups (13.3% each) shared that they enjoyed learning about science and that the focus on Native science seemed well-aligned with the museum's goals. The following comments help illustrate these two areas:

> *I really enjoyed the science aspect.*
>
> *I think it's great- we Native people don't think of science.*
>
> *Fits with what the museum is trying to do.*
>
> *[It] felt really seamless from the permanent content; relevant [to] learn about salmon in the other room- then to learn what they're doing now to preserve it.*

Table 10. Visitor attitudes around having indigenous knowledge featured in a science museum

| Theme | Count | % of Total |
|---|---|---|
| Positive (general) | 27 | 45.0% |
| Positive – connects to cultural knowledge, local community | 13 | 21.7% |
| Positive – goes together well, fits with museum and culture | 8 | 13.3% |
| Positive – learning and appreciating | 8 | 13.3% |
| Equivocal (yes, but…) | 4 | 6.7% |
| Other | 2 | 3.3% |

N=60

Only four visitors (5.7%) expressed an equivocal perspective on including an exhibition of this nature at a tribal museum. For example, one visitor expressed their views this way: "*I think it's ok if it's about the native land or people but it's a tribal museum not a science museum.*"

## Banner Exhibit / Website

### Demographics of Participants

The same demographic information was gathered from Banner exhibit participants as from the full exhibition, in order to understand who was participating in the study. A convenience sample was used to get feedback on the Banner exhibit, as the nature of the Banner exhibit is far different than the full exhibition (e.g. lacking interactive components) and not likely highly appealing to youth and their families.

Overall, 34 adults participated in an exit interview for the Banner exhibit study; only 2 youth participated, largely due to limited visitation by this group. The majority of participants (78.0%; n=32) self-identified as White. In addition, 3 participants identified as Asian, 2 as African-American, and 1 as Latina(o) or Hispanic. No participants identified as Native American or Native Hawaiian/Pacific Islander. Two participants indicated that they preferred not to answer this question. Participants could select multiple categories, so responses total more than 100%. Sixty percent of respondents (n=23) identified as female and 40% (n=16) as male. No one identified as "other" in this category.

Target audiences for the Banner exhibit were not defined differently from the full exhibition. However, it is clear that an exhibition that relies mostly on text/image for interpretation (rather than interactives, games, and manipulatives) will primarily be attended by adults. Unfortunately the site for the banner exhibit data collection did not attract Native American visitors during the short window of data collection.

### Use and Engagement

Overall, **stops at individual exhibit components (banners) in the banner exhibit was extremely high**, with all but one banner (*Cross-Cultural Collaboration*) being attended by more than two-thirds of visitors participating in the study. This may be due to a self-selection bias toward "label readers," since the banner exhibit is primarily comprised of text and images – unlike the full

exhibition which includes many interactives, manipulatives, and computer-based games. In addition, due to low visitation in the area, roughly two-thirds of the visitors (n=26) were invited to review the banner exhibit. They were told to spend as little or much time as they would on their own; but visitors may have looked at more of the banners than they would have normally, without cuing.

**The most visited banners were in the Tulalip Tribes section**, ranging from 82.1% to 84.6% visitation. A few visitors mentioned being familiar with Tulalip Tribes and conveyed that they were interested because of its proximity to Bend (although CTUIR is technically closer). The remaining banners were all visited at a similar rate, ranging from 71.8% to 76.9%. The only two banners that were slightly less visited were the *Introduction* (69.2%) and *Cross-Cultural Collaboration* (61.5%), suggesting that visitors were more interested in the "content" aspect of the banner exhibit than the project background.


**Figure 7: Banner exhibit at the High Desert Museum (Bend, OR)**

Taken together, **data indicate that for a certain niche audience of adults (without children) who like to read information, the banner exhibit was highly appealing.** It also helped that the banner exhibit was placed in hallways with benches down the middle, so many visitors sat on the benches while *viewing* the banners, and thus some visitors encountered the banners "incidentally" because they wanted to take a break at the benches.

**Banner exhibit visitors were highly satisfied with their experience** (see Table 11), rating their enjoyment at 8.7, on average, on a 10-point scale, and also strongly suggesting that they would like to see more exhibitions like *Roots of Wisdom* (8.7), and to a slightly lesser degree, that they understood the main messages of the exhibition. They were only moderately likely to have conversations about the exhibition with others in their group (7.1).

**Table 11. Banner exhibit – satisfaction scales**

| | Mean | SD |
|---|---|---|
| **Enjoyed the exhibit** | 8.8 | 1.913 |
| **See more exhibitions like this one** | 8.7 | 1.821 |
| **Understood the main messages** | 8.2 | 2.583 |
| **Conversed with others in my group** | 7.1 | 3.365 |

n=39

## Intended Outcomes

### *Visitor Awareness around Exhibit Main Ideas (Qualitative responses)*

Similar to the full exhibition, banner exhibit participants were asked in an open-ended question to describe what they saw as the main messages or take-aways from *Roots of Wisdom*. **Almost half (43.6%; n=17) clearly picked up on one of the exhibit's primary intended themes - that Native or Indigenous approaches to sustainability and addressing environmental issues are in use today** (see Table 11). Another 43.6% of banner exhibit visitors (n=17) felt the main messages related to Native cultures and preservation of cultural traditions in general.

**One-fourth (25.6%; n=10) of the banner exhibit visitors saw the main message as primarily about the environment and sustainability in general**, with no specific mention of Native cultures, traditions, or practices. This suggests that these visitors engaged with the banner exhibit in a broad way, without picking up on the threads around traditional Native knowledge or cultural practices. In addition, **a few of the banner exhibit visitors (10.3%; n=5) articulated the main messages as involving both Native knowledge and Western scientific practice.**

**Table 12. Main messages described by visitors to the banner exhibit**

| Theme | Count | % of Total |
|---|---|---|
| TEK - Native approaches to sustainability | 17 | 43.6% |
| General - Native cultures, preservation of traditions | 17 | 43.6% |
| Environment/Nature/Sustain | 10 | 25.6% |
| Showing traditional Native knowledge and WS together, or how traditional Native knowledge can enhance science | 5 | 12.8% |
| Western science misusing Native knowledge | 1 | 2.6% |
| Other - related to exhibit | 1 | 2.6% |
| Focus on Native cultures today | 1 | 2.6% |

N=39

Note: Visitors provided multiple responses, so totals equal more than 100%

### *Alignment with Intended Messages*

In terms of overall alignment to the intended messages, the open-ended responses were then coded into four categories: 1) not at all aligned; 2) a little bit aligned; 3) somewhat aligned; and 4) highly aligned. **The majority of banner exhibit visitors (56.4%; n=22) shared messages that were well-aligned with intended messages**, which meant they articulated at least one of the messages in some depth, or a couple messages in a general way. This was notably higher than for the full exhibition, likely because the banner exhibition attracted primarily adult-only groups who spent time reading the text, with many of them reporting that they attended to all or almost all of the banners. **One-fourth of the visitor responses (25.6%; n=10) were somewhat aligned; and 15.4% (n=6) were a little bit aligned**, meaning they referenced a couple of the key words/ideas of the exhibit, such as "Native cultures" or "environmental sustainability" (see Table 13 below).

**Table 13: Frequency of main messages received aligned with intended messages.**

| | Count | % of Total |
|---|---|---|
| **Very much aligned** | 22 | 56.4% |
| **Somewhat aligned** | 10 | 25.6% |
| **Aligned a little** | 6 | 15.4% |
| **Not at all aligned** | 1 | 2.6% |

N=39

## Website

Attempts to get visitor feedback on the website during the Banner Exhibit data collection were unsuccessful. Despite cuing visitors to use the website during their visit, none of the 39 visitors interviewed actually did so. Reasons for this included: 1) intermittent and slow Internet connection during the time of data collection; and 2) the use of a small, unappealing laptop computer rather than a computer kiosk. Since the website is comprised of the four community videos and two video games (as well as the Education Resources, which are addressed in the next section), relevant data on the use and engagement with videos in the full exhibition are useful here, as a way of understanding how engaging the videos were to visitors more broadly. In general, the videos in the full exhibition were moderately to highly attended (from 44.7% to 72.1% attendance), and were more of a draw for adults than for youth. For those visitors who did watch the videos, they found them fairly interesting, rating them from 2.52 to 2.73 on a 3-point scale (not at all interesting, somewhat interesting, very interesting).

In addition, data from the banner exhibit study suggested that while visitors enjoyed and learned from the exhibit, they wanted and expected something more interactive and hands-on, especially given the location (High Desert Museum, which includes a great deal of interactive components in their exhibits). In this way, data suggests that including the videos via the project website through a large, attractive touch screen would enhance the visitor experience of the banner exhibit.

## Youth Activity Kit

**Summary of Key Findings for Youth Activities**

Data gathered for the summative evaluation for the youth activities /educational resources suggest that **participants generally enjoyed and learned from the activities**. For museum visitors, the floor activities added to their experience and allowed for a hands-on exploration of the exhibition concepts. Overall, the activities seem more effective in supporting awareness of Indigenous knowledge and practices, with a need to link to the scientific process a bit more if that is the goal. The Natural Dyes activity was seen as the most effective in the area of supporting science process skills. One educator felt the activities bridged Indigenous knowledge and Western science well; while others felt this either wasn't necessary, or that there would need to be more specific instruction and facilitation for students to make this connection.

Educators felt the activities were **well designed, easy to follow, and valuable** for students in a variety of ways. For example, one educator noted: "[I like] having all the resources in general, lay out is easy and they give you all the information to start the project. It really is a nice resource kit. The way the kits were put together thoughtfully and it doesn't involve a lot of cost for students or teachers." Another educator commented: "It was well organized and visually engaging. The suggested scripts were shaded and made it easy for working through with students. (The activities were) well laid out for time, format, supplies, and preparation. If I'm looking at it to use in the classroom, it has good assets."

General **suggestions** included starting with the Voices in our Community activity as a foundation for the rest of the activities. One educator commented: "The first I read was the voices in our community. If they're done in order that should be the first, because it gives the grounding and then you can go to other areas. That is one of the main pieces that becomes important, and it was one of the things I appreciated the most." Another educator noted that the ROW team needs to consider technology issues – specifically, the fact that not all teachers/educators will have the same access, particularly in some tribal communities.

There were six activities developed for the ROW educational resources, intended primarily to implement with Native youth (age 11–14). The resource guides were designed for the educators who serve this target audience, both in formal classroom, afterschool, and museum settings. The activities are divided into three areas based on context as follows: 1) museum floor activities, meant to be used with any walk-in visitor or school group; 2) afterschool activities, meant for community organizations and other afterschool programs; and 3) classroom activities, which are longer activities designed for use in the classroom.

## Museum Floor Activities

### *Natural Dyes Demo*

This activity was well-received by general visitors and students. Both groups rated it **high on interest level** (2.93 out of 3). Approximately **three-quarters (74%) of visitors stopped** at the activity when it was on the floor during data collection.

Students were also asked to describe what they felt the activity was about; they generally described the activity as learning about what comes from nature, as well as connecting to nature and culture. Example quotes from students about the Natural Dyes activity include:

> *The big idea is to show how we can use natural resources for making things.*
>
> *To know how that painting came to the culture.*
>
> *What our ancestors did w/ some plants they found.*

In addition, two educators reviewed this activity on the survey. These educators rated this activity a bit lower than the other activities overall. On a 10-point scale, they rated the activity as follows:

- Instructions were clear and easy to follow (9.00)
- Likelihood to use with youth (8.5)
- Likelihood to recommend to other educators (8.5)
- Appropriate for youth age 11–14 (8.5)
- Interesting and engaging for youth (8.0)

One of the educators felt the activity could achieve both intended outcomes well – awareness of TEK and Western science as both valuable for understanding the natural world, as well as gaining science process skills – particularly for non-Native audiences:

> *[The activity] Get the general public thinking about how they too use color to represent their moods or their local affiliations.... Many times traditional ecological knowledge can seem so foreign and distant to our western society, but it really isn't!*

*One **suggestion for improvement** was to include ideas on how to store the dyes so that they don't dry out quickly. A couple of museum educators suggested that the activity took too much time to prepare; and thus was not practical for them to use as a museum floor activity. Native Origins Match Card Game*

The Native Origins Match Card activity was far less attended than the Natural Dyes activity. **Less than half (44%) of visitors stopped at this activity** when it was made available on the museum floor. Data collectors observed that if there is not a facilitator, visitors tend to only glance at the cards and move on; it did not seem appealing as a self-facilitated activity, likely because it takes some time to read and understand the instructions, and visitors may not have the patience or interest – especially when there are other, hands-on interactives available, e.g. computer and video games, and the rest of the museum to visit in a short time.

On the other hand, the few visitors who did use this activity (n=8) rated it **fairly high on interest level** (2.75 out of three), suggesting that when visitors did engage in the Match Card game, they found it engaging. Data from the overall exhibition evaluation would suggest that this is due to learning new and interesting facts about where current, everyday products come from.

The Match Card game was also tested with Native and non-Native youth as a facilitated museum floor activity. Youth who experienced the game at Tamástslikt found it very interesting overall; and picked up on the main ideas easily. Youth at Hibulb found the activity less interesting, though they did understand the main messages. The difference may be due to the nature of the facilitation at each site. Following are some example responses about the activity's main ideas:

> *To show that Natives were the first to come up with these ideas.*
>
> *To teach us about how native people adapted to their land.*
>
> *Learning the origins of modern-day objects.*
>
> *It is to learn the native origins of modern items.*
>
> *To understand that natives created things still used today.*

In addition, three educators reviewed this activity in the online survey. Educators **rated this activity slightly lower** in all the areas compared to the other activities, as indicated below:

- Instructions were clear and easy to follow (9.00)
- Likelihood to recommend to other educators (8.67)
- Appropriate for youth age 11–14 (8.67)
- Likelihood to use with youth (8.33)
- Interesting and engaging for youth (8.0)

Educators felt that the Match Card Game **could somewhat achieve the intended outcome of increased awareness** of TEK and Western science as valuable ways of understanding the natural world (avg = 8.0). For example, one educator felt the activity could only accomplish this with a facilitator helping to make those connections for students or visitors. Another educator shared this comment:

> *By using the knowledge the youth have obtained through this material I feel they have gained awareness of the traditional knowledge and also what science uses to continue the usage discovered long ago.*

Educators felt that the Match Card Game **would not likely achieve the intended outcome of increased skills** of the scientific process (avg = 5.67). Educators felt the **main benefit of this activity was to show the value of Native knowledge** and how it is still being used today. For example, one educator commented that the activity could help Native youth "gain knowledge and awareness of what their ancestors discovered and how valuable that discovery was since it is still being used. The benefit being appreciation for their culture and ancestors knowledge of their immediate environment and how valuable that knowledge was to the sustainability of the Natives."

The only **suggestion** shared for this activity was the following: "Perhaps the youth can create their own cards to match based on research and stories from home."

## Afterschool Activities

### *Weaving*

Three educators reviewed this activity. Overall, they **rated it highly** (above 9) on a 10-point scale in all areas, listed below from highest to lowest:

- Instructions were clear and easy to follow (9.33)
- Interesting and engaging for youth (9.33)
- Likelihood to recommend to other educators (9.33)
- Appropriate for youth age 11–14 (9.0)
- Likelihood to use with youth (9.0)

Educators felt **fairly confident that the project could accomplish the intended outcome of increasing awareness** in youth that TEK and Western science offer complementary and valuable ways of understanding the natural world (average rating of 8.0), though comments suggested that the project might increase awareness around TEK more than it could around Western science. For example, one educator noted: "The connection of math and patterns is present but could be stronger."

Educators felt **less confident that the project could accomplish the intended outcome of increasing science process skills** (average rating of 6.0). Comments from teachers in this area included:

> *The concepts would have to be reinforced and pointed out otherwise it may seem like a craft project with yarn.*
>
> *I think that through specific examples, you can tie in the scientific process, but it's certainly not a main take-away from this activity.*
>
> *Not as much directly related to the scientific process (predicting, measuring) but valuable nonetheless.*

Overall, **educators found the activity to be of potential valuable to students**. This included hands-on learning, connecting youth to their culture, as well as potentially supporting outcomes such as "analytical skills development, pattern recognition, and mathematical analysis," if the teacher emphasizes these areas.

**Suggestions for improvement** included a stronger emphasis on patterns and pattern structures, providing some sample weavings (or suggesting that to instructors) that students can touch and feel; show weaving examples from multiple communities, and show examples of finished weaving products. One educator felt that the "intricacy of indigenous weaving is so much more complex than what is shown" in the activity.

*Exploring Natural Dyes*

Three educators reviewed this activity. Overall, they **rated this activity highly in all areas**, listed below from highest to lowest, on a 10-point scale:

- Instructions were clear and easy to follow (9.67)
- Likelihood to use with youth (9.5)
- Interesting and engaging for youth (9.33)
- Likelihood to recommend to other educators (9.33)
- Appropriate for youth age 11–14 (9.33)

Educators had **mixed reactions to whether this activity could achieve the intended outcome around awareness** of TEK and Western science as complementary and valuable (avg. = 8.0). One educator felt this activity was "Not as powerful as other activities in enhancing an understanding of the two different way of understanding our world." While another felt it was the best example of connecting the two ways of knowing.

On the other hand, **educators agreed that this activity could support the intended outcome around gaining skills in the scientific process**, rating this area 9.0 (out of 10) on average. Comments to support this perspective included:

> *This activity seems the most suited to the scientific process with the materials needed for the activity collecting, predicting, and measuring.*
>
> *Great at getting kids to observe and draw conclusions from observations and data. The activity also does a great job at getting kids to think about how native peoples might have figured out which plants and animals should be used for dyes and paper/clothing. A discussion about this topic is a great way to discuss the scientific method and how native peoples used these same concepts as western scientists do.*
>
> *Scientifically it's great and speaks to sustainability, it can go in biology, chemistry…. Here's natural dyes – that people figured out and take it into chemistry and this is what happens with the molecules and chemical process to engage in the history of the land. It bridges the gap within science that gets isolated and draws in the story element and brings in the why. Here's the reason why the people have done with this.*

Educators felt the main value of this activity was in its ability to **connect students to natural materials**, to **explore how Indigenous cultures used plants** and animals for creating colors, and to learn "**real world skills** through exploration of Indigenous-based knowledge and practices."

The only **suggestion for improvement** was to involve students in collecting materials and preparing the dyes.

## Classroom Activities

*Restoration Project Poster Boards*

Two educators reviewed this activity. Overall, they **rated it highly** (between 8 and 10) on a 10-point scale, shown below from highest to lowest:

- Appropriate for youth age 11–14 (9.5)
- Instructions were clear and easy to follow (9.0)
- Likelihood to recommend to other educators (9.0)
- Likelihood to use with youth (8.5)
- Interesting and engaging for youth (8.5)

Educators felt **fairly confident that the project could accomplish the intended outcome of increasing awareness** in youth that TEK and Western science offer complementary and valuable ways of understanding the natural world (8.0 out of 10). For example, one educator commented:

> *The whole concept and practice of ecological restoration is a GREAT way to incorporate both ways of understanding the natural world because I think that a lot of students (and adults!) don't realize how much our environment (and the way we interact with our environment) has changed in the past few centuries.*

Educators felt **less confident that the project could achieve the intended outcome of gaining skills of the scientific process** (5.5 out of 10). The lower rating was due to one educator feeling that this would be too much for one activity; while the other felt that having youth conduct an actual restoration project would be more effective in achieving these outcomes.

Educators overall felt this was a **valuable comparative project**. For example, one educator commented:

> *Despite what many may think, I think it's really hard to understand WHAT traditional knowledge means and how it differs from western science. Examples are great, BUT, I think the best way to understand the difference between the two and value of both is to have students choose specific examples and really research and dive into those specific examples. This project does a great job at that.*

**Suggestions for improvement** included having an introductory piece that defines native/non-native/invasive species, suggesting that the meaning of these terms are not well understood; and "conducting and chronicling actual work that students could do, rather than just research."

*Voices from Our Community*

Three educators reviewed this activity. Overall, they **rated it highly** in the following areas, listed from highest to lowest:

- Appropriate for youth age 11–14 (10.0)
- Likelihood to recommend to other educators (10.0)
- Instructions were clear and easy to follow (9.33)
- Interesting and engaging for youth (8.67)
- Likelihood to use with youth (8.33)

Educators **strongly agreed** that the activity would support the intended outcome of increasing awareness that TEK and Western science are complementary, valuable ways of understanding the natural world (avg = 8.67). For example, one educator commented:

> *Hearing from the elders and having students compare that with science professionals grounds the work and activity in stories which is a way to ensure long-term knowledge retention.*

Educators **minimally agreed** that the activity would support the intended outcome of supporting skills in the scientific process (avg = 6.67). One felt the opportunity to gain science skills wasn't present in the activity, and two educators felt these skills would need to be specifically addressed and supported by the instructor. One educator noted that aspects of listening, observing, and comparing were present in the activity.

Overall, educators thought this was a **valuable learning experience for both Native and non-Native youth**. They particularly appreciated the importance of connecting youth to their community and to elders, as well as learning the skills to really listen to and learn from them. The following comments reflect this perspective:

> *Grounding students in the oral tradition and helping to discipline the mind and body to take the time to listen, compare, and articulate learnings is critical for youth development.*

> *A wonderful connection to the students community member. An understanding of an elders worldview an eye opening first hand glimpse of how life was and the values and traditions that are still active in today's society. With the science interview career opportunities, understanding of how their work might impact the community in which the students live. Connection to adults in the community.*

> *What an awesome activity! I wish I had done this activity in middle school! I think this is a GREAT way for students to understand how two different ways of knowing can both offer valuable tools to understanding our natural world.*

The only **suggestion for improvement** was to include a completed interview as an example.

# Conclusions

The Roots of Wisdom summative evaluation was designed to answer five evaluation questions related to intended outcomes, visitor experience and perceptions in the areas of Traditional Ecological Knowledge and Western science. This framework posed objectives and intended outcomes utilizing four tribal community-based stories of environmental restoration to enhance awareness and understanding of how traditional ways of knowing and Western science are being used today. Five evaluation questions emerged from these objectives and intended outcomes. Key conclusions from the evaluation of three primary deliverables (full exhibition, banner exhibition/website, and youth activity kit) are outlined by evaluation question below.

1. *How do visitors experience and interact with the exhibition and other deliverables? What aspects and components are most/least engaging and why?*

**Overall, target audiences experienced both the full and banner exhibitions very positively**. The majority of visitors could be considered "diligent visitors" in terms of the high attendance to the majority of components in each exhibition. Visitors found the individual exhibit components moderately to highly interesting, particularly those with interactive or hands-on components, and they rated their enjoyment and satisfaction with both exhibitions very highly. Youth were more likely to engage with and appreciate the interactive and computer-based games than the panel-only components, suggesting that the full exhibition's design strategy was successful for this audience, in that it kept youth engaged in the experience. Adults also appreciated the interactives, but were more likely than youth to use and enjoy the videos and panels as well.

In addition, **it appears that a project that bridges Indigenous ways of knowing and Western science was well-accepted by a diverse range of audiences.** Audiences in all settings found it a positive idea to feature Indigenous ways of knowing in a science museum, and Native and Western science in a tribal museum. There was potential for resistance and disagreement, but that occurred at a low rate and with a very moderate and polite perspective.

2. *To what extent and in what ways do the exhibition and other deliverables achieve intended outcomes (awareness, attitudes, and skill-building related to TEK and conventional science)? What aspects best support the intended outcomes of the project?*

**Overall the exhibition provided an environment for visitors to deepen their knowledge and awareness around Indigenous ways of knowing or TEK, and the environmental well-being of the earth.** The various tools and strategies to share this knowledge were key to the positive outcomes of the exhibition. These tools and strategies amplified positive experiences for holistic learners and visitors with multiple learning styles, and aligned well to Indigenous knowledge systems. Roots of Wisdom can be used as a positive example for meeting everyone's learning styles, from both Native and non-Native perspectives.

**Audiences responded positively to all of the Roots of Wisdoms deliverables (exhibitions and activities). They enjoyed their experiences, and seemed to have taken away key ideas, even if at a very basic level for some.** The exhibition made them think, sometimes just by the very fact of

having it there, and increased awareness around Native cultures and ways of knowing in particular. It does not matter as much whether these ideas are entirely new or were latent already, but the exhibitions and activities provided multiple ways to engage with these ideas, and deepen knowledge, interest, and awareness around Native cultures, practices and approaches to living in the natural world, and how science and TEK can work together. There seemed to be less potential for gain around "science skills "[19] if interpreted in the strictest sense of Western science; educators saw the most potential for increasing the science skills of observation, prediction, measuring, and testing to be brought out in the Natural Dyes activities, but felt that teachers would need more guidance or examples for how to make those links.

**The aspects and components that seemed to best support visitor outcomes were the engaging interactives and game components, and to some degree videos and panels.** Grounding the learning in specific, place-based communities was also effective in engaging visitor attention, especially communities that are local, regional, or otherwise familiar to the visitor. Some visitors particularly appreciated being exposed to new information and ideas related to specific Native communities, cultures, and traditional practices. Overall, the approach of using specific community stories as the interpretive framework, and engaging learners through interactive, hands-on experiences, was effective.

3. *What are unanticipated impacts, uses, and benefits of the ROW project and deliverables for public audiences?*

**Several "unanticipated"[20] or unintended impacts and benefits of the ROW project emerged during the course of the study**. **For Native youth and adults, there was a deepening connection to their cultural ways of knowing, and a sense of pride in seeing their community reflected in the exhibition or activities.** For all audiences, it seemed that awareness increased at a broader level than anticipated, with many visitors focusing on new learning around Indigenous cultures, ways of knowing, and traditional practices beyond the articulated outcomes focused on the natural world and environmental issues. Some of this is due to the severe lack of knowledge and awareness that many non-Native, western visitors may have; so their take-aways tended to focus more on basic awareness of the tribal communities rather than on a deeper awareness of sustainable environmental practices.

4. *How do visitors interpret the main messages or "big idea" of the exhibition[21]? To what extent does the exhibition help people see connections between TEK (or Indigenous ways of knowing) and conventional science? What components best support these connections?*

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[19] These outcomes were intended for Youth Activity Kit only

[20] The term "unanticipated" refers to impacts that were not articulated in the original logic model; this does not mean that the project team members, partners, or evaluation team could not have predicted these types of outcomes or impacts. It would be more accurate to refer to these as "unintended" impacts.

[21] This question was answered for both the full and banner exhibitions; findings for both are summarized here.

**Visitors interpreted the main messages in a variety of ways and degrees of complexity, and the vast majority grasped some part of the exhibition's key ideas.** While only 10% of visitors specifically articulated ideas around both Indigenous ways of knowing and Western science, visitors may not be separating these two worldviews as much as anticipated. For example, many visitors took away ideas about how humans relate to nature and learn to adapt to environments in which they live, and how the tribal communities featured in the exhibition are using traditional practices in modern-day contexts to address problems today. In this way, visitors are walking away with real-world stories and examples of environmental and cultural restoration, and it may not matter as much that they are not separating Indigenous science from "Western" science. In fact, it may be that the more holistic, emergent approach of the exhibition—which used story, language, and even arts to communicate ideas—influenced a more holistic understanding of key messages.

Visitors articulated the main ideas of the exhibition in several broad areas: 1) How the environment and nature have been used to sustain human life, including how past connections with the environment can shape the future of how we connect to and care for the environment (sustainable practices); 2) Native cultures and practices, and how Native communities are restoring their environment and culture through traditional knowledge (Indigenous ways of knowing); 3) Relationship between science and culture, or how there are multiple, valuable cultural perspectives on nature and science. Finally, a small group of visitors convey a kind of "disconnect" in their responses, either because their understanding of the exhibition is not related to the content or themes; or because their comments show an individual paradigm of viewing Native people and Native knowledge in the past tense, with no connection to the present.

5. *To what extent and in what ways do Native youth see themselves or their community reflected in the exhibition?*

**The *Roots of Wisdom* exhibition supports Native youth in expressing cultural pride in having their community story represented in the exhibition. This experience opens up a different level of identity as they learn that their cultural knowledge is also valid from a scientific perspective, or that their community knowledge is embedded with science.** In addition to seeing themselves and their community reflected in the exhibition, Native youth are reminded about the vastness and variety of Native communities, and that the historical/traditional past is also very alive and well in today's communities around the area of sustainability.

**Finally, Roots of Wisdom offers a set of complementary activities and products suitable to the target audience of Native youth.** The youth activities provide effective and valuable ways to engage Native youth in cultural knowledge, learning more about their community, and to some extent, experiencing the scientific process. Through interactive and hands-on experiences, the exhibition itself was well-suited to youth participation and engagement with community stories of environmental and cultural restoration.

# Recommendations

For ease of use and accessibility, recommendations are outlined below by deliverables. Note that recommendations do not necessarily mean these areas weren't addressed in Roots of Wisdom, but rather are meant to provide guidance and highlight important lessons learned for future exhibition projects of this type. While some of the recommendations listed in this report do relate to the professional audience collaboration, more holistic recommendations for the Roots of Wisdom collaboration are shared in the Professional Audience Impacts report (Stein and Valdez, 2015).

## Recommendations for Full Exhibition

- Support in-depth, ongoing, and frequent communication with tribal liaisons and partners when developing exhibitions that feature Indigenous knowledge; allow for much face-to-face time and phone conversations to build relationship, trust, and to minimize misunderstanding.
- Continue to find other ways to build relationships and grow the partnerships; that is, the doors cannot be closed to the partnering communities now that they have been opened.
- Start small by narrowing the lens of partnering to 1-2 local or regional tribal communities. Building relationships with multiple geographically-distant partners and communities at the same time makes it challenging to develop the depth of relationship and trust needed.
- Ensure that processes for decision-making are going through appropriate tribal protocols for the community being engaged. For example, it is possible in cases where there is only one main contact, or where the contact is someone not embedded in the tribal community, that the information shared may not be accurate or officially approved through the tribal nation's structures. This can lead to misinformation. Another example is that some tribes will also require approval from the tribal IRB to work on research within community boundaries.
- Be aware that timelines and budgets coming from western/federal institutions don't always align with the Native worldview, which is all about relationship. Building relationship and trust takes a great deal of time and commitment, and partnerships between science museums and tribal communities will not be as successful if they are rushed or neglected.
- If the goal is for visitors to explicitly understand principles of TEK or Indigenous ways of knowing in comparison or in relation to western science, the interpretation may need to be more explicit in using this vocabulary and calling visitors' attention to these areas. As is, visitors did take meaning from the community stories and got a sense for what TEK or Indigenous ways of knowing look like, but it was harder for visitors (especially from a western perspective) to identify the scientific aspects embedded in the cultural practices.
- Help visitors make sense of the interactives and games by more clearly articulating the learning goal or tying it to the overall themes of the exhibition. One way is through exhibit and panel titles. Exhibit titles that were more clear (e.g. "Saving an Ancient Fish") likely helped convey the key messages more than titles that were more obscure to visitors.

## Recommendations for Banner Exhibition / Website

- Recognize that a banner exhibit is more suitable to adult audiences, as youth are far less likely to read text in the exhibit setting, particularly when not connected to an interactive or game. This is particularly challenging in large museum settings, where interactives and other engaging experiences are available. The banner exhibit may be more suited for a library or community organization, where there aren't other competing exhibitions.
- Place the banner exhibit in an area where there is a higher chance of "incidental" encounters, such as an area where there is high traffic, or where people might be waiting. Having a comfortable environment, such as benches for sitting, will likely increase the chances of visitors engaging with the material.
- Where possible, use the banner exhibit in conjunction with website/videos because this adds the authentic voice and interactive opportunities that are currently missing in the banner exhibit. This could be done on a large computer screen, but there would need to be staff available to start videos when visitors are present, or have clear indication that videos are available to the visitor, such as through large and attractive signage.

## Recommendations for Youth Activity Kit

- Create alternative ways for teachers and community-based educators to utilize the activity guides, as technology access and ability vary in tribal settings.
- Provide examples of completed activities (e.g. interviews, poster boards, etc.) whenever possible.
- Make links to scientific process skills more explicit and/or provide ways for educators to make these connections more clear.
- Avoid terms like "ancient" or "distant" – any vocabulary words that can place Indigenous peoples in the past, rather than as vibrant, living cultures.
- Use reference to specific Native cultures whenever possible.

*Natural Dyes Demo*

- Instruct facilitators to use clear plastic cups so that visitors are more attracted to the activity.
- Include more inquiry-based questions in the script – e.g. how do you use colors to represent certain ideas? Can you think of examples of colors that have a specific meaning in your culture?
- Encourage facilitators to find local examples of color significance from Indigenous cultures.

*Native Origins Match Card Game*

- Make it clear in the guidelines that only 5-10 cards should be used with any one group.
- Suggest that students alternate reading the definitions, so they stay involved in the activity.
- Minimize the use of complex vocabulary, especially Latin terms; or, if included, also include phonetic pronunciation for the facilitator or student who is reading the cards out loud.
- Reference specific tribal communities as much as possible; rather than "Native Americans" in general, to avoid reinforcing stereotypes about the homogeneity of Indigenous peoples.
- For a longer afterschool or classroom extension, add an activity in which students could research and present on other products that derive from Indigenous knowledge.

*Exploring Natural Dyes*

- Suggest in the activity guide that educators have students collect materials to use in dyeing activities, and make predictions (science process skill) about what colors will turn out like.
- Encourage educators to find local examples of color significance from locally-based Indigenous cultures.

*Weaving*

- Suggest that educators provide examples of weaving that students can touch and feel, especially those from local Native cultures.
- Increase emphasis on patterns and pattern structures, and provide more examples of complex weaving patterns from diverse Native cultures.
- Encourage educators to find local stories or weaving traditions, even if a Native elder is not available to present to the class.

*Restoration Project Poster Boards*

- Where possible, educators could consider involving students in an actual restoration project, in addition to researching a project as suggested in this activity.
- Have a discussion around terms such as "native" and "non-native" and "invasive" species, and what these terms really reference.

*Voices from Our Community*

- Provide an example interview for students to read for inspiration and modeling.
- Suggest that students ask elders to tell a story related to their topic of interest, rather than just asking questions; this is also a way to explore the idea of cultural protocols and different communication styles.
- Some of the tips could take into account communication styles a bit more (e.g. "make your interviewee talk!" could say "Allow your interviewee time to reflect, share, and tell their story in their own way.").
- Suggest that educators draw specific attention to the skills of interviewing as a social science; that is, defining a research question, interviewing people, listening, observing, and analyzing the responses are part of the scientific process.

## Evaluators' Reflections

This section is written from the lens of the evaluation team, while the rest of the report reflects the responses of visitors and users of the ROW exhibition and other deliverables. Together they create the balance of the participatory evaluation process, as modeled through the evaluation activities. Because the model of evaluation for ROW was to include the summative evaluation team (LLG and Native Pathways) from the early stages of the project, there is important learning to be shared. In order to contribute to this ongoing learning process, we would like to share the following reflections:

- In retrospect, it would have created a more holistic process to bring together the evaluations for the professional audience (collaboration) and the public audience impacts. These two areas are woven together and interconnected; as is, these two areas were separated into silos from the beginning of the evaluation process, which doesn't reflect the essence of the ROW collaboration.
- Because of the geographically dispersed locations of the project partners, it was challenging for the evaluation team to build relationship with all the partners in order to create a deeper participatory evaluation process. There was minimal continuity in relationship beyond the three partner meetings, and there were not enough time and resources to include two of the partner communities in the evaluation for public impacts.
- Due to time and budget constraints to produce the exhibition and other deliverables, the main portal of communication and decision-making was through OMSI, as opposed to having a cross-pollination of communication among all the partners, including evaluation. Ideally, that would have allowed for more growth and a deeper collaboration and evaluation process, even for the public audiences.
- The uniqueness and genuine need for this type of project is clear; it is crossing boundaries in terms of collaborating with science-focused museums and cultural centers. These types of collaborations are needed to strengthen the voices of Native communities within STEM fields. The cultural museums and Native communities need allies in order to create a deeper awareness and understanding around Indigenous science and Traditional Ecological Knowledge of the environment.
- The evaluation process modeled the worldview of collaboration as each member of the evaluation team brought their own strengths and worldviews. In order to bring these together, it became important to write the narrative collaboratively. We each created our own interpretations, but then needed to find space and time to collaboratively process and write the report.
- Language is key to the cross-cultural evaluation process, and a shared understanding of language around main messages and outcomes is extremely important. Throughout the project, all of our learning has deepened. In retrospect, the intended outcomes were framed in a more western way, separating out "TEK" from "Western science," so the evaluation was developed around measuring outcomes in this way. As the project team and partners

developed their stories for the exhibition, the approach was more holistic, highlighting the science embedded in Indigenous knowledge and practices. Outcomes that might better reflect this holistic approach would be around *increasing awareness of the science embedded in traditional Indigenous practices* or *increasing appreciation around the importance of Native science in supporting environmental sustainability.* Ultimately, there was a slight disconnect between the more "western" language of the outcomes and the more Indigenous approach of the exhibition itself – which used story, voice, and real-world examples to illustrate place-based science in practice.

## References


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# The Story Area Summative Evaluation

Supplement to the *Roots of Wisdom* Public Audiences Summative Evaluation

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# PROJECT BACKGROUND

*Roots of Wisdom* (RoW, also known as "Generations of Knowledge") was a project funded by the National Science Foundation from 2010-2016 to engage Native and non-Native youth (ages 11 to 14) and their families in Traditional Ecological Knowledge (TEK) and Western science within culturally relevant contexts that present both worldviews as valuable, complementary ways of knowing, understanding and caring for the natural world. The Oregon Museum of Science and Industry (OMSI) and its partner organizations, The Indigenous Education Institute (IEI), The National Museum of the American Indian (NMAI), the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Tulalip Tribes, Pacific American Foundation and Waikalua Loko Fishpond Preservation Society (Native Hawaiians), and Eastern Band of Cherokee Indians worked collaboratively to develop all aspects of the project, which included the following deliverables: (a) a 2,000-square-foot full traveling exhibition, (b) a 150-linear-foot traveling graphic panel exhibition, (c) a website, (d) an activity kit for Native youth in informal and formal settings, and (e) opportunities and resources for reciprocal collaboration between Informal Science Education (ISE) and Native American partners.

The OMSI Research and Evaluation team conducted a remedial evaluation study of the exhibition with visitors when it was first on display at OMSI to inform changes and improvements. A few months later, external evaluators from the Lifelong Learning Group (Columbus, OH), in collaboration with Native Pathways (Laguna, NM), conducted a summative evaluation of the impacts of the exhibition with public audiences as part of a larger effort to evaluate the impacts of the project in the final year. During these phases the project team also heard from Indigenous partners and advisors that traditional stories from the four Native communities represented in the exhibition be given greater presence and be available as audio stories told by Native elders. It was identified that the original Story Area of the exhibition, containing a seating area and text versions of the stories, had the potential to be much more attractive, engaging, and a more effective space for this type of activity. It was also identified as a space which could better introduce visitors to TEK in an immersive and culturally appropriate way, while bringing out the universality of exhibition messages by bringing together the four Native communities featured in RoW. As such, OMSI sought and received supplemental funding from NSF to ensure that project goals could be met and that culturally appropriate remediation of the Story Area of the exhibition could be completed.

Redeveloped with project partners, the remediated space includes audio recordings of stories told by elders from each of the four Native communities featured in the exhibition and a replicated outdoor storytelling environment. Visitors gather around a simulated campfire and are surrounded by banners depicting the night sky. Within the Story Area are story cards with printed versions of the audio stories for visitors to read and weaving activities (taken from the RoW exhibition's educator activity kit) for visitors to engage with. A comment board from the larger RoW exhibition is located within the Story Area and includes questions specific to the space for visitors to contemplate. The intent was to create an attractive conceptual centerpiece that draws visitors into the storytelling circle and echoed the oral tradition from Native communities of transmitting environmental knowledge and cultural values through story.

# SUMMATIVE EVALUATION PROCESS

## COLLABORATIVE EVALUATION

The Story Area Summative Evaluation was led by the OMSI Research and Evaluation team. To continue building on the efforts of the project's previous evaluation studies and collaborative and culturally responsive approaches, during the development and implementation of this evaluation plan the OMSI Research and Evaluation team worked with external evaluation advisors, Jill Stein, from the Lifelong Learning Group (LLG), and Shelly Valdez, of Native Pathways. Stein and Valdez have been leading aspects of the *Roots of Wisdom* evaluation throughout the course of the project, including the summative evaluation of the overall exhibition. The advisors were engaged to provide feedback on evaluation protocols, instruments, measures, and interpretation, as well as insights on how findings relate to their summative study of the full exhibition. OMSI Research and Evaluation also worked collaboratively with the RoW project team and sought their input throughout the process.

## EVALUATION QUESTIONS

Based on conversations with the project team and partners, the following evaluation questions guided the summative evaluation for the Story Area. These questions were intended to build on the summative evaluation conducted across the RoW exhibition, and dive deeper into what the Story Area was able to accomplish.

- To what extent and in what ways does the Story Area achieve intended outcomes?
- What aspects of the Story Area best support the intended outcomes of the project?
- What were the unintended impacts, uses, and benefits of the Story Area to its target audiences?
- Do visitors leave the Story Area aware that Native cultures pass knowledge via oral storytelling in the present day?

## INTENDED IMPACTS

The following intended impacts were used as a guiding framework for this evaluation. Similar to the evaluation questions, these impacts were developed with the project team and partners. These impacts were intended to build on the outcomes of the entire project, and highlight the various ways in which the reimagined Story Area could enhance the overarching RoW exhibition.

As a result of engaging with the Story Area, visitors will have:

- ***awareness*** that Native cultures pass knowledge via traditional stories told orally, and continue to do so today.
- ***awareness*** that stories pass on long-held knowledge about the environment, culture, spiritual beliefs, moral values, history and origins, and other types of information.
- an ***attitude*** that the Story Area is a place for relaxation and reflection on their relationship with themes explored in *Roots of Wisdom*.

# METHODOLOGY

## DATA COLLECTION

Data was collected via an exit survey (Appendix D) after visitors spent time at the Story Area (for the purposes of this study, spending time meant visitors had to appear to interact with at least one exhibit affordance, rather than transition through the space). Following participation with the exhibit component, data collectors approached eligible visitors to participate in a post-experience survey. The purpose, idea, or concept of the exhibit was not explained to visitors prior to survey administration to avoid influencing responses.

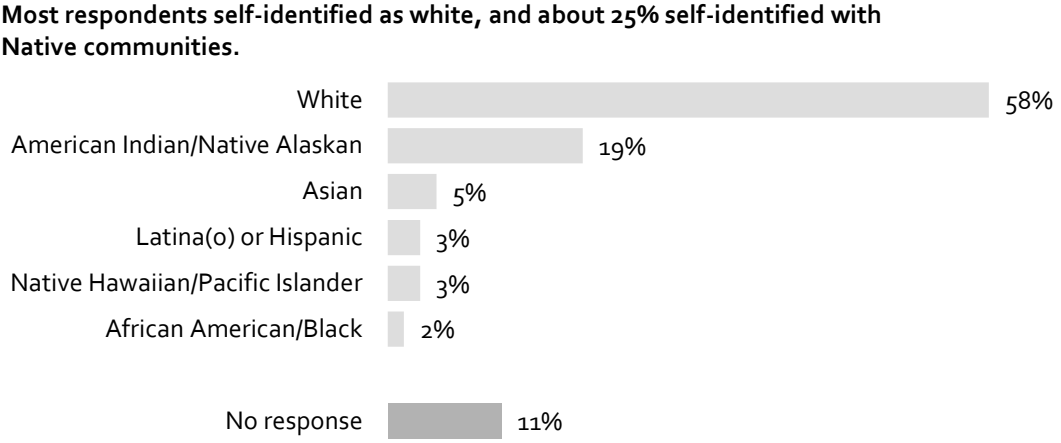
Exit surveys aimed to provide an understanding of how visitors interacted with the space, where they were most/least interested, their understanding of the Story Area's main messages, and which components supported their learning. A total of 60 exit surveys were distributed. Data were collected on various days and times to account for different crowd conditions and group types, between July 19 and July 22, 2016. An additional Native American Family Science Night was scheduled on July 26, 2016 to increase input from Native audiences. This event was promoted through the Portland Public Schools Title VII Indian Education Program, Native American Youth and Family Center (NAYA), and other community partners and organizations reaching the Urban Indian population in Portland.

Across all data collection points, data collectors used a convenience sample of visitors already attending the museum during data collection shifts. Any visitor who appeared to be within the target age range (11 to 14) or older, including adults, was eligible for participation in the study.

## SAMPLE

In addition to the exit survey was an option to provide demographic information. This section began by asking respondents to indicate which racial and ethnic categories they identified with. Respondents could select any option that applied; a total of 53 respondents made 57 selections. This is reflected in percentages below, which exceed 100%.

FIGURE 8: RESPONDENTS' SELF-REPORTED RACIAL AND ETHINIC IDENTITIES, N=60



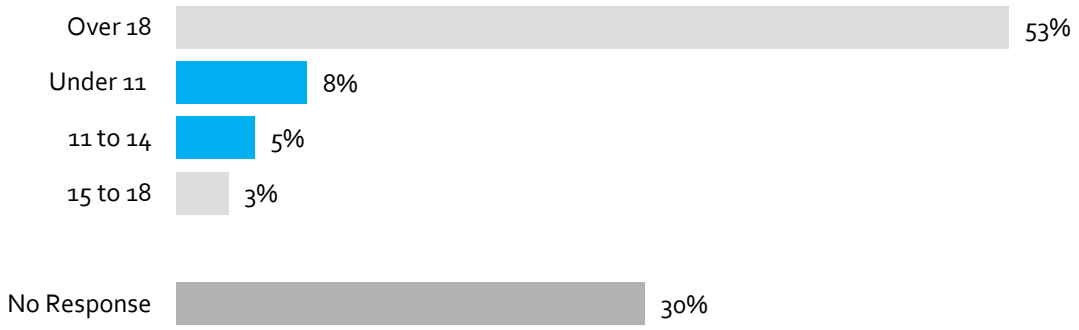
Respondents who indicated that they were "American Indian/Native Alaskan" were provided space to share their tribal affiliation. Some respondents listed more than one tribe, others did not list any. A total of twelve different tribes were represented (listed alphabetically): Cherokee, Choctaw, Confederated Tribes of Warm Springs, Creek, Confederated Tribes of the Umatilla Indian Reservation, Otoe (Missouria), Pawnee, Tlingit, Tribe of Oklahoma, Walker River Paiute, White Mountain Apache, and Yakima Nation.

Visitors were also asked to indicate their gender and provided a selection of four options. Most respondents (78%) indicated they were female. Some (20%) indicated they were male. Two percent of respondents indicated "other," and wrote in they were gender fluid. The final option, "prefer not to answer" was not selected.

The target age range for this exhibit was youth ages 11 to 14 and their families. Visitors were asked to indicate the year they were born, to help ensure that target audiences were being reached. A distribution of age ranges is provided in Figure 9.

FIGURE 9: RESPONDENTS' AGE RANGES, N=60

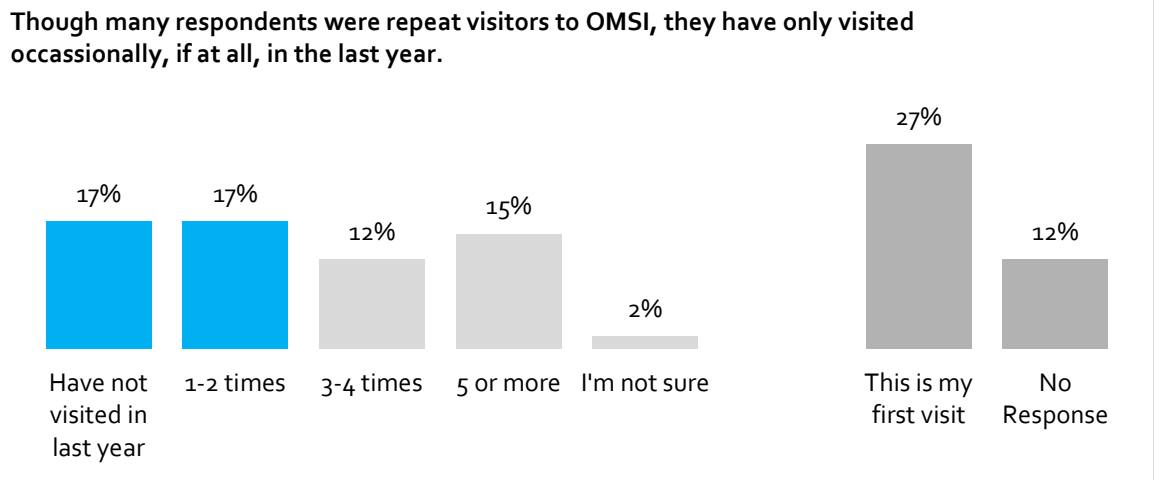
**Among those who provided their age, youth 14 and under make up almost a fifth of respondents.**




As the distribution indicates, the sample includes some youth in the study's target age range, though this amount is minimal. It is worth noting that about one third of respondents opted not to provide their birth year. Participants were asked to provide information about their group sizes, and responses may indicate that respondents were predominately families with younger children. Of the 53 respondents who provided information on group sizes, 74% (n=39) included children under the age of 10. Slightly less than half (45%, n=24) reported having children between ages 11 and 14 in their group.

The demographic questions concluded by asking respondents about their relationship with OMSI. For many visitors (70%, n=37 of 53), this was not their first visit to OMSI. Repeat visitors were asked to share how often they have come to OMSI in the past year. Frequency of visits for repeat visitors is shown in FIGURE 10.

FIGURE 10: FREQUENCY OF RESPONDENT VISITS TO OMSI, N=60




Finally, respondents were asked to share if they held OMSI membership or not. Most respondents (76%, n=38 of 50) were not OMSI members.

## INFORMED CONSENT

All data gathered complied with the Informed Consent policies and practices set forth by OMSI's Human Research Protection Program and as dictated by Ethical and Independent Review Services. An Informed Consent Sign was posted near the Story Area for the duration of data collection. Upon invitation to participate in the interview portion of the study, participants were offered a consent brochure and given the opportunity to consent verbally to participate in the evaluation. Visitors under age 18 were given the opportunity to assent, as long as a consenting parent was present. Interview refusals were logged.

## ANALYSIS

Data were entered into an Excel spreadsheet and analyzed using basic descriptives /frequencies, as well as content analysis of main themes for any open-ended responses. Analysis largely corresponded with guiding summative evaluation questions specific to the Story Area. Themes explored included awareness of and interest in exhibit content, as well as overall perceptions of the space.

# FINDINGS

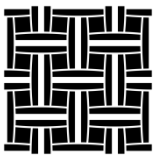
The aim of this summative evaluation was to measure the extent to which the project met its goals to increase participants' awareness of how storytelling continues to be used in Native communities, as well as awareness of types of knowledge and lessons stories can share and transmit. An additional goal of the Story Area that this study sought to measure was the extent to which the space offered a place for relaxation and reflection within RoW.

In the following sections, the findings from across the survey questions are grouped by engagement with the Story Area, and by what respondents learned from being in the space.

## ENGAGING WITH THE STORY AREA

Visitors were asked to indicate which activities, from a predefined list, they engaged with while at the Story Area. Opportunities were broken out by various components of the exhibit (ex: the weaving activity or story cards) and ranged from active participation ("I talked about the story(ies) with someone") to passive ("I watched other visitors interact with the Story Area"). TABLE 14 shows the extent to which participants interacted with each exhibit component and the most popular activity selected for each area. A full distribution of responses for each component area can be seen in Appendix E.

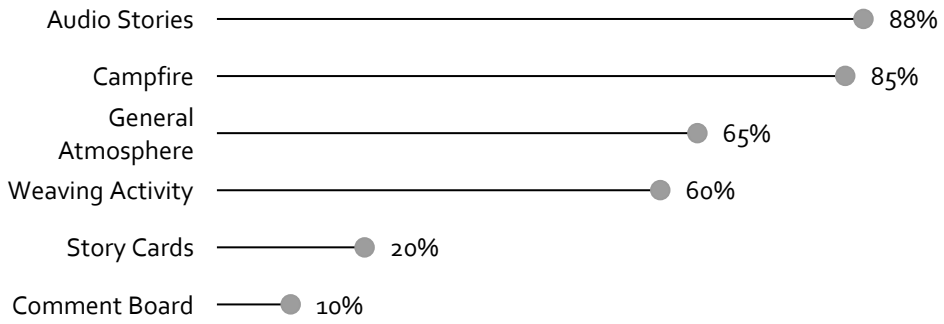
TABLE 14: SELF-REPORTED INTERACTIONS WITH COMPONENTS AT THE STORY AREA, N=60

| |  |  |  |  |  |
|---|---|---|---|---|---|
| | **Campfire and Audio Stories** | **Comment Board** | **General Atmosphere** | **Story Cards** | **Weaving** |
| **Interaction** | All but one respondent interacted with the campfire and audio stories. | Slightly more than half of respondents (53%) interacted with the comment board. | All but three respondents reflected on or responded to the general atmosphere of the space. | Exactly half of respondents interacted with the story cards. | Slightly more than half of respondents (58%) interacted with the weaving activity. |
| **Activity most selected for each component** | "I played at least one story" | "I read at least one other comment" | "I enjoyed being in a relaxing, immersive space" | "I talked about the story/stories with someone" | "I did the weaving activity" |
| | **76%** n=45 of 59 | **81%** n=26 of 32 | **81%** n=46 of 57 | **47%** n=14 of 30 | **69%** n=24 of 35 |

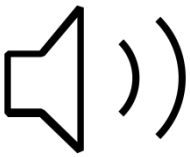
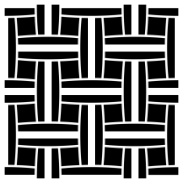
Respondents were given a list of all six components and asked to rank them in order from 1 (most interesting) to 6 (least interesting). Some respondents had a hard time ranking (ex: assigning "1" to all components, rather than what they felt was most interesting) or skipped the question entirely, which may indicate that directions on how to rank components may not have been very clear on the survey. Only 40 of the 60 respondents provided a clear 1 to 6 ranking. Given the difficulties in getting consistent responses, responses were considered in aggregate rather than weighted. Analysis in FIGURE 11 shows cumulative high-interest rankings (1, 2, or 3) a component received (ex: 88% of the rankings assigned for "Audio Stories" were a 1, 2, or 3, the highest volume of any component).

FIGURE 11: THE STORY AREA COMPONENTS RANKED BY INTEREST, N=40

**Listening to stories was the most interesting part of the Story Area, while reading and writing-based activities were of little interest.**




Visitors were then asked to explain the reason for their selection for most interesting. Responses for the first and fourth ranked interest areas (audio stories and weaving components) were rich and detailed active engagement with those components:

| | **Why did you decide to engage with this part? What attracted you to it?** |
|---|---|
|  **Audio Stories** | *"There was a story already playing. I thought it was an educational thing so I decided to listen for a second. When I discovered it was a story, I listened to a few."*<br><br>*"Just that it's calm. Don't know how to explain it. You could tell they were telling true stories. I like them because they were about salmon. My mother is Tlingit and they are the salmon people."*<br><br>*"The oral stories. I enjoy listening to how other cultures interpret and express the world around them."* |
|  **Weaving** | *"Weaving a pattern. Kind of like a puzzle."*<br><br>*"I engaged in the weaving, but the look of the atmosphere was awesome."*<br><br>*"The weaving was fun to create."* |

Respondents who selected "campfire," the second most interesting aspect of the Story Area, tended to provide responses which indicated that their primary reason for coming to the exhibit was because of a young child(ren) in their group. However, some of those respondents shared that after following the child(ren) into the story area and watching them press buttons, they did enjoy the look of the campfire, the audio stories, and a place to relax.

Paired with why they chose to engage with those parts of the exhibit, visitors were asked to share what they learned from that experience. Many (46, or 77%) respondents opted to provide this feedback, though they did not often relate this response to their selection for most interesting. As such, analysis for responses were coded using the Story Area's intended impacts; emergent codes were also applied. TABLE 15 indicates the types of knowledge and experiences respondents were leaving the Story Area with.

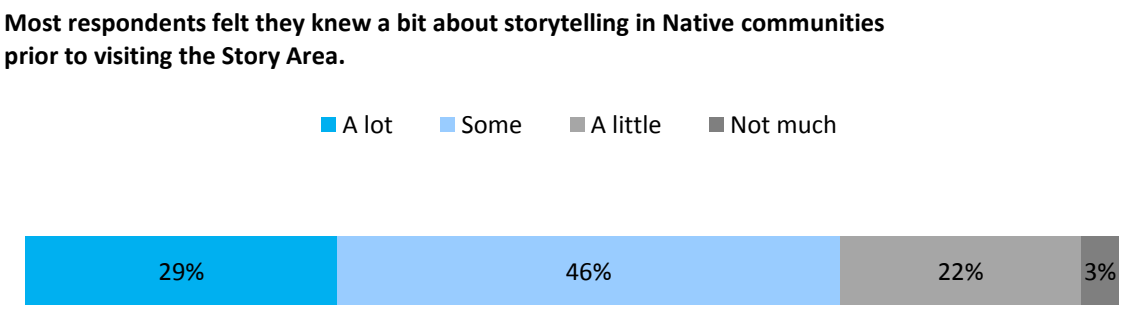
TABLE 15: INTENDED AND EMERGENT IMPACTS THE STORY AREA HAD ON RESPONDENTS, N=46

| | | % of Comments | Example Response |
|---|---|---|---|
| **Intended Impacts** | Awareness of the types of knowledge storytelling can pass on | 31% | *"I liked the stories. It taught me to be nice to the water and not be greedy."* |
| | Perceived the Story Area to be a place for rest and relaxation | 17% | *"It was nice to have a moment of quiet with the kids sitting and listening."* |
| | Awareness that storytelling is used to pass on traditional knowledge, even in present day | 12% | *"That stories are important to pass on."* |
| **Emergent Impacts** | General awareness of storytelling in Native communities | 28% | *"Learned new native stories."* |
| | Awareness of and/or experience with the weaving activity | 12% | *"Weaving is not an easy task!"* |

## LEARNING ABOUT STORYTELLING

A key finding from formative evaluation of the Story Area was that some respondents felt the exhibit reiterated, to varying extents, what they felt they already knew about storytelling. The team sought to explore this further in summative evaluation by asking respondents to share how being in the space either provided them with new knowledge, or deepened what they knew about storytelling in Native communities. To establish a baseline, respondents were asked to indicate on a 4-point scale how much they felt they knew about storytelling as it relates to Native communities prior to their visit. Responses are provided in FIGURE 12.

FIGURE 12: HOW KNOWLEDGABLE RESPONDENTS FELT ABOUT STORYTELLING IN NATIVE COMMUNITIES PRIOR TO VISITING THE STORY AREA, N=59




This was immediately followed with a question asking visitors to describe in what ways interacting with the Story Area changed, increased, or challenged what they knew about storytelling. Twenty-nine respondents provided feedback. Responses were coded using the two intended impacts which focused on awareness; emergent codes were also applied. TABLE 16 shows the ways in which engaging with the Story Area impacted what respondents knew about storytelling in Native communities. Multiple codes could be applied, which is why percentages exceed 100.

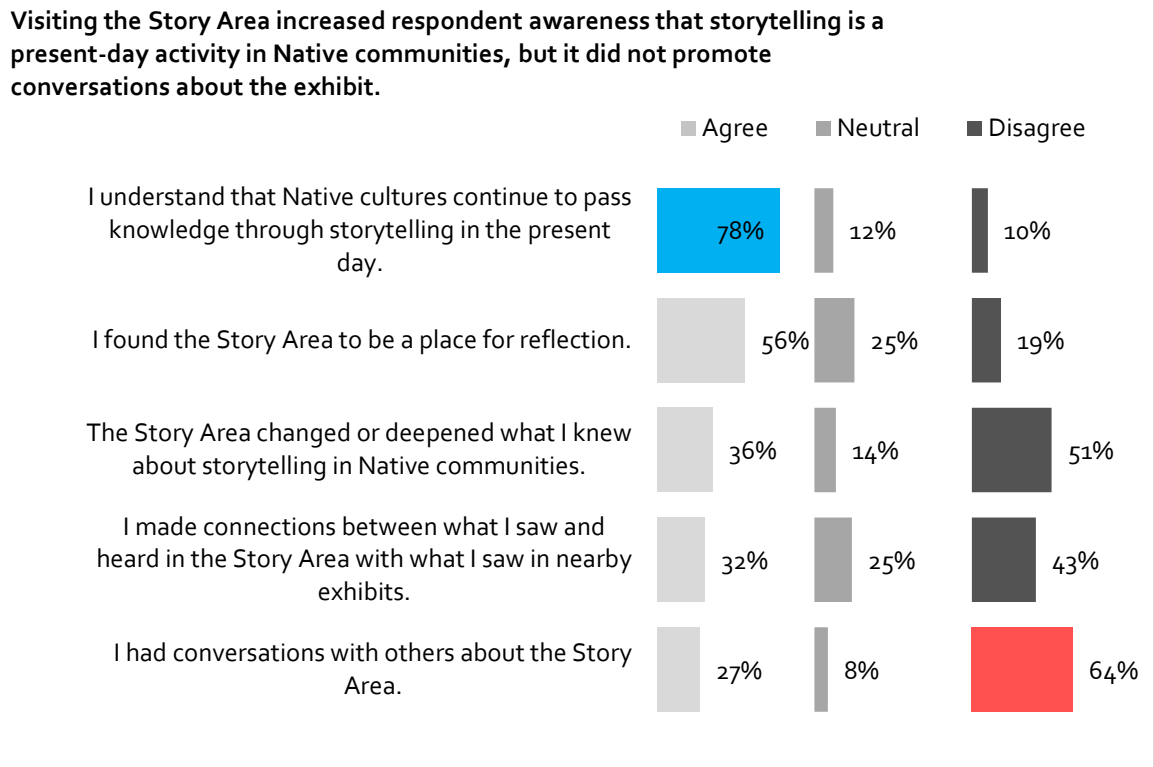
TABLE 16: WAYS RESPONDENTS DEEPENED KNOWLEDGE OF STORYTELLING IN NATIVE COMMUNITIES, N=29

| | | % of Comments | Example Response |
|---|---|---|---|
| **Intended Impacts** | Awareness of the types of knowledge storytelling can pass on | 17% | *It reminded me of the importance of storytelling in the Native American culture.* |
| | Awareness that storytelling is used to pass on traditional knowledge, even in present day | 10% | *I know that some people told stories to teach their kids a lesson.* |
| **Emergent Impacts** | General exposure of self and others to a new story, without mention of content | 45% | *I listened and learned about those stories in particular.* |
| | Other (Mentioned weaving or sense of familiarity) | 7% | *It was a great reminder of being home.* |
| **No Impact** | Respondents indicated there was no change in knowledge about storytelling | 28% | |

There was also an interest in learning what kind of knowledge gains respondents were having after their time in the Story Area. To measure this, respondents were asked to indicate to what extent they agreed with a series of statements which described key learning goals and desired interactions with the space. Each statement was paired with an agreement scale, from 1 (Not at all) to 7 (A lot). The data

presented in FIGURE 13 reflects the cumulative totals for agree (5, 6, or 7), neutral (4), and disagree (1, 2, and 3). Averages and means for each statement can be found in Appendix F.

FIGURE 13: RESPONDENT AGREEMENT WITH KEY LEARNING GOALS AND DESIRED INTERACTIONS, N=59[22]




The 64% of respondents who indicated that being in the space did not spur conversations are worth additional consideration. While the project team valued conversation in the Story Area as a means of reflection, this may not have always been an achievable goal. Anecdotal notes from data collectors share that though many visitors were visiting OMSI with others, they may have been in the Story Area by themselves. While this was not systematically tracked, it may be that visitors were not engaging in conversations with others, because others in their groups may not have been with them. Additionally, respondents were being asked about conversations immediately after leaving the space. It may be that they were reminded of the Story Area later on during their visit to OMSI, or even after, and went on to discuss what they saw, did, or heard long after their visit.

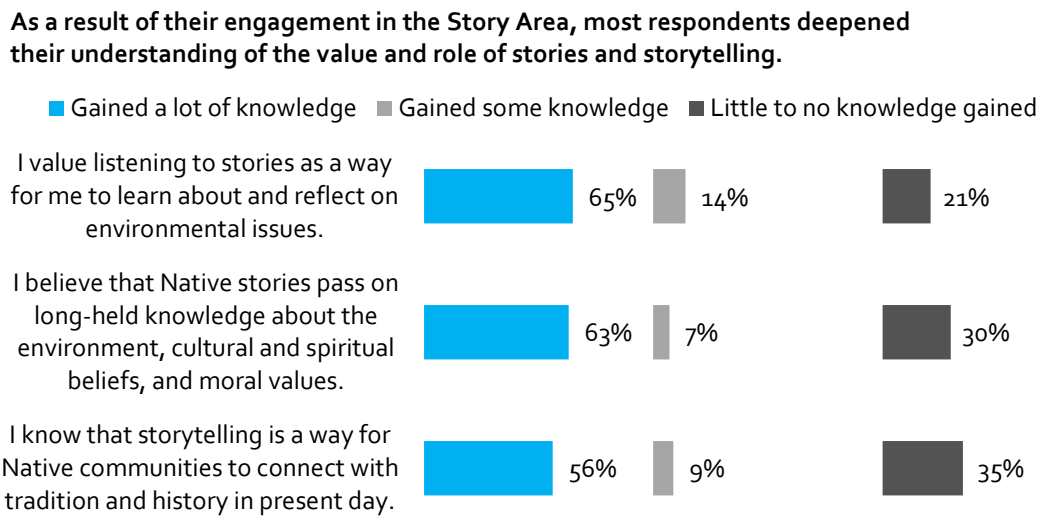
Though 32% of respondents indicated that they were able to make connections between the Story Area and nearby exhibits, only 4 opted to articulate these connections. Two respondents referenced the "Saving Streams and Wildlife" exhibit, which was located nearby, and connected it to the content of the Tulalip Tribes' "Salmon Story" with this exhibit. One respondent mentioned the "Re-establishing a

[22] The fourth statement, "I made connections between what I saw and heard in the Story Area with what I saw in nearby exhibits" had a sample size of 56. Percentages reported in this graph for that statement reflect this slightly smaller sample size.

Native Plant" exhibit, which also had a weaving activity (the respondent commented on this). One respondent mentioned the "Restoring Fish Ponds" exhibit, and noted that it was an exhibit featuring Hawaiians.

Respondents were also asked to consider statements about storytelling in Native communities and to indicate how much knowledge they gained respective to each statement, using a scale from 1 (Gained no new knowledge) to 7 (Gained a great deal). The data presented in FIGURE 14 reflects the cumulative totals for 5-7 (Gained a lot of knowledge), 4 (Gained some knowledge), and 1-3 (Little to no knowledge gained). Averages and means for each statement can be found in Appendix G.

FIGURE 14: KNOWLEDGE GAINED FROM INTERACTING WITH THE STORY AREA, N=57



# CONCLUSIONS

This summative evaluation study of the updated Story Area of the *Roots of Wisdom* exhibition was designed to answer four evaluation questions related to intended outcomes, visitor experience, and perceptions of storytelling in Native communities. Given the overlap between evaluation questions and intended outcomes, key conclusions from the evaluation of the Story Area are outlined by intended outcomes and will include thoughts on how the exhibit components worked to achieve them. Additional conclusions related to emergent outcomes will also be shared.

## INTENDED OUTCOMES

| | |
|---|---|
| **Intended Outcome:** | ***Awareness*** that stories pass on long-held knowledge about the environment, culture, spiritual beliefs, moral values, history and origins, and other types of information. |
| **Key Finding:** | *The audio stories are not only what respondents claim to be the most interesting part of the exhibit, they may also be the most effective tool for increasing visitor awareness of the types of knowledge oral stories pass on.* |

The Story Area was effective at communicating the kinds of stories told in Native communities and their purposes. The greatest asset in communicating this appears to be the audio stories (versus story cards, the comment board, or other text-based parts of the exhibit). This is interesting when considering the full summative evaluation of the RoW exhibition, in which there were no audio stories, and also little engagement or learning around the stories via story cards. Findings from summative evaluation of the Story Area also showed that audio stories were considered to be the most interesting part of the exhibit, in part because they were educational, felt authentic, and exposed respondents to new ways of thinking about their environment. Additionally, a few visitors were able to make explicit connections between the stories and their immediate environment: the traditional knowledge being shared in RoW. In fact, for the two open-ended questions which sought to understand what exactly visitors were getting out of the experience, both times it was the awareness of the types of stories passed on that was most frequently commented on. Not only were respondents commenting on the types of information oral stories can pass on, a small number were able to make concrete connections between story content and the Traditional Ecological Knowledge being represented in nearby RoW exhibits. As a standalone exhibit, and as part of the larger RoW exhibition, the Story Area shares with visitors varying types of long-held knowledge from Native communities.

| | |
|---|---|
| **Intended Outcome:** | ***Awareness*** that Native cultures pass knowledge via traditional stories told orally, and continue to do so today. |
| **Key Finding:** | *Regardless of how much visitors reported knowledge about storytelling prior to their visits, they leave the Story Area with increased awareness of how storytelling continues on in present day Native communities.* |

Respondents were asked directly to detail how being in the Story Area impacted what they know about storytelling in Native communities. Even though many respondents felt they knew about it prior to their visit, more than half still reported an increase in awareness. Almost all agreed, to varying extents, that a key function of storytelling is for passing along knowledge in present day. Even when not being

directly asked about current storytelling activities, some respondents volunteered that this was their key takeaway from the exhibit. Regardless of prior knowledge, the Story Area was able to increase awareness of the role of storytelling in Native communities today.

| | |
|---|---|
| **Intended Outcome:** | An ***attitude*** that the Story Area as a place for relaxation and for reflection on their relationship with themes explored in *Roots of Wisdom*. |
| **Key Finding:** | *Visitors view the Story Area as an enjoyable place for relaxation, and used the space for reflection, either alone or in conversation with others.* |

Respondents found the Story Area to be an engaging exhibit. At least half of respondents interacted with each exhibit component, which was a big improvement over findings on engagement with this space in the full RoW exhibition. All exhibit components elicited reflective experiences, to varying degrees, on either the stories, the Story Area, and/or nearby RoW exhibits. Additionally, many respondents reported it to be a place they enjoyed relaxing in. Notions of relaxation were more often associated with the weaving activity, campfire, and in regards to the general atmosphere. Stories (audio or written), the comment board, the weaving activity, and the general atmosphere all contributed to acts of reflection and/or engaging in dialogue with others about their experiences.

## EMERGENT OUTCOMES

| | |
|---|---|
| **Key Finding:** | *Visitors enjoyed engaging with the weaving activity, but it was not effective as a reflective tool within the Story Area.* |

The weaving activity added value to respondents' time in the Story Area, but in ways which surprised the project team. The general function of the weaving boards in the exhibit was to give visitors something to do with their hands while listening to stories, with the assumption that it would aid in visitor reflection. Over half of respondents engaged with it, and it was among the most popular of the area's four interactive components (initiating audio stories, reading the story cards, and responding to the comment board). However, few respondents were able to articulate connections between the weaving activity and the exhibit, or how it was a reflective aid. Generally, respondents confirmed the initial assumption that the activity provided something for them to do in the exhibit space, and revealed an unexpected, additional use as an educational tool which teaches visitors about the necessary skills for weaving. Only one respondent was able to connect the activity to any part of RoW, and that was because they had seen the activity elsewhere within the exhibition. Considering these findings, a potential reason that the weaving activity was not effective as a reflective aid is the high level of concentration that visitors appear to need to fully engage with it, which in turn limits their mental bandwidth to listen to the story at the same time.

| | |
|---|---|
| **Key Finding:** | *The Story Area is an exhibit that visitors tend to enjoy alone rather than with others.* |

The Story Area affords visitors many opportunities to deepen engagement by interacting with others in the space (reading story cards out loud, working on a weaving together), yet respondent feedback to the surveys highlighted a more solitary experience in the space. Reasons for this are unclear. Groups may have collectively enjoyed the space, and the various ways to engage with it, but respondents often

spoke to their own experiences rather than their groups' experiences in the Story Area. Youth respondents tended to deeply personalize their experience, highlighting only ways they interacted with the exhibit. A few adult respondents, particularly those in the Story Area with youth, sometimes highlighted in open-ended responses the ways they felt the space was beneficial for visitors, but when directly asked about component usage or interest focused on how they were using it as a space to relax. Further, while activities like listening to a story, reading a story, doing the weaving activity, or responding to the comment board are certainly open-ended enough to allow for multiple people to engage together, that is not a requirement for engagement.

# Appendix A: Instruments[23]

[23] Some of the original formatting of instruments has been altered for ease of use within the report template. Where there were multiple formats used (e.g. online and paper/pencil), only one version is included.

Roots of Wisdom
Native Knowledge. Shared Science.

Thank you for giving us a few minutes of time to give the OMSI some feedback. OMSI and its partners are very interested in knowing what you think of the Roots of Wisdom exhibition.

First, we would like to get a sense of what you did in the Roots of Wisdom exhibition. We will show you images of all the exhibit components; and ask you to pull out the images of exhibits you stopped at during your visit today. Then, please tell us how interesting you found each exhibit you visited. (Facilitator shows visitor images using cards or online survey format).

| | Attend | Interest | Uses |
|---|---|---|---|
| Introduction to the ***Roots of Wisdom*** exhibition | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | |
| ***Cross-Cultural Collaboration:*** describes the partners who worked together to make the exhibition | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | |

| | Attend | Interest | Uses |
|---|---|---|---|
| ***Native Origins:*** About the many products used today that come from native knowledge and native discoveries | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | |
| ***Biopiracy:*** About taking traditional knowledge and resources from Native people for profit (such as quinoa) | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | |
| ***Message Board:*** Read and write responses to posted questions | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | ☐ I wrote a response<br>☐ I read other visitors' responses<br>☐ Other: |
| ***Story Area:*** Story boards with indigenous stories and indigenous weaving activity | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | ☐ I read a story to myself<br>☐ I read a story to others<br>☐ I did the weaving activity<br>☐ I watched other visitors |

| | Attend | Interest | Uses |
|---|---|---|---|
| | | | ☐ I relaxed on the benches<br>☐ Other: |
| ***Native Hawaiians:*** Restoring the Native Hawaiian fish ponds | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | |
| ***Aloho 'Āina: Love of the Land:*** Exhibit and puzzle game about the Native Hawaiian land system (ahupua'a) from the mountains to the ocean | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | ☐ I read the panel<br>☐ I played the puzzle game<br>☐ I read the information in the puzzle game<br>☐ I watched other visitors<br>☐ Other: |
| ***Hawaiian Fish Ponds:*** Information and computer game about Native Hawaiian fish ponds | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | ☐ I read the panel<br>☐ I played the computer game<br>☐ I watched other visitors<br>☐ Other: |

| | Attend | Interest | Uses |
|---|---|---|---|
| ***Eastern Band of Cherokee Indians*** video about restoring the river cane in Cherokee | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | |
| ***Passing a Tradition*** about Eastern Band of Cherokee weaving traditions | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | ☐ I read the panel<br>☐ I watched the video<br>☐ I did the weaving activity<br>☐ I looked at the basket display<br>☐ I watched other visitors<br>☐ Other: |
| ***River Cane Ecology*** exhibit about the restoration of river cane in Cherokee, North Carolina | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | ☐ I read the exhibit panel<br>☐ I played the river cane/runoff game<br>☐ I watched other visitors |

| | Attend | Interest | Uses |
|---|---|---|---|
| | | | ☐ Other: |
| ***Tulalip Tribes*** video about gathering natural resources on the Tulalip Reservation | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | |
| ***Food: Medicine of the Land*** exhibit about traditional plants used by the Tulalip Tribes | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | ☐ I read the exhibit panel<br>☐ I listened to the audio using the "garden hose"<br>☐ I watched other visitors<br>☐ Other: |
| ***Connected to the Land*** exhibit about the importance of having access to natural resources | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | ☐ I read the Connected to the Land panel<br>☐ I played the computer game<br>☐ I watched other visitors<br>☐ Other: |

| | Attend | Interest | Uses |
|---|---|---|---|
| ***Confederated Tribes of the Umatilla Indian Reservation*** lamprey restoration video | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | |
| ***Healthy Streams, Returning Salmon:*** About restoration of streams by the Tribes of the Umatilla | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | ☐ I read an exhibit panel<br>☐ I played the *Healthy Stream* game<br>☐ I watched other visitors<br>☐ Other: |
| ***Protecting an Ancient Fish:*** About traditions and harvest of lamprey in CTUIR culture. | ☐ I visited this exhibit | ☐ Not very interesting<br>☐ Somewhat interesting<br>☐ Very interesting | ☐ I read the exhibit panel<br>☐ I scanned or played with the lamprey<br>☐ I watched other visitors<br>☐ Other: |

**Please look back over all the exhibits with which you were very engaged, and select the two that you liked the best.**

**Favorite exhibit:**

Why did you decide to stop at this component? (→ What attracted you to it?)

What did you get out of using this exhibit? (→ What did you learn or take away?)

**Second favorite exhibit:**

Why did you decide to stop at this component? (→ What attracted you to it?)

What did you get out of using this exhibit? (→ What did you learn or take away?)

**Please rate the following statements on a scale of 1 and 10, with 1 being "not at all" and 10 being "a lot"**

| | Not at all | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A lot |
|---|---|---|---|---|---|---|---|---|---|---|
| I would like to see more exhibitions on traditional Native knowledge. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I understood the main messages of the exhibition. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I enjoyed visiting the Roots of Wisdom exhibition. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I had conversations with others about the exhibit or activities. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

**On a scale from 0-10, how likely are you to recommend the Roots of Wisdom exhibition to a friend or colleague?**

| Not at all | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Extremely |
|---|---|---|---|---|---|---|---|---|---|
| ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

**Please rate yourself on the following statements for BOTH <u>before</u> and <u>after</u> visiting the Roots of Wisdom exhibition. Mark Not at all; Somewhat; A fair amount or Very much**

| | Before | | | | After | | | |
|---|---|---|---|---|---|---|---|---|
| | Not At All | Some | A fair amount | Very much | Not At All | Some | A fair amount | Very much |
| My knowledge of Native ways of knowing. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| My knowledge of western science. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| My interest in Native ways of knowing. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| My interest in western science. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe that Native knowledge and western science are both valuable for addressing environmental issues. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe that Native knowledge and western science are both valuable for understanding the world. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

**And a few last questions about you . . .**

What race/ethnicity do you consider yourself? (Please check all that apply)

- ❑ African American/Black
- ❑ American Indian/Native Alaskan (if so, with what tribe are you affiliated? _____
- ❑ Asian
- ❑ Latina(o) or HIspanic
- ❑ Native Hawaiian/Pacific Islander
- ❑ White

How would you best describe yourself?

- ❍ Male
- ❍ Female
- ❍ I prefer not to answer

What year were you born? (example: 1975).

Including yourself, how many people are in your group today?

| | Enter count here |
|---|---|
| **Children 10 and Under** | |
| **Youth 11-17** | |
| **Adults 18 and over** | |

Is this your first visit to OMSI?

- ❍ Yes
- ❍ No

If no, how many times have you visited OMSI in the past 12 months?

- ❍ None
- ❍ 1-2 times
- ❍ 3-4 times
- ❍ 5 or more
- ❍ I'm not sure

Are you a member of OMSI?

- ❍ Yes
- ❍ No
- ❍ Not sure

Roots of Wisdom
Native Knowledge. Shared Science.

Thank you for giving us a few minutes of time to share your thoughts on this exhibit. The Hibulb Cultural Center and its partners are very interested in knowing what *you* think about Roots of Wisdom and what you got out of visiting it. There are no right or wrong answers, and you may skip any questions that you'd like.

1. **What did you think were the <u>main ideas</u> of the Roots of Wisdom exhibit? What was it about?**

2. **What parts of the exhibit do you think best conveyed those <u>main ideas</u>?**

3. **What was the most valuable or interesting aspect of the exhibit for you and/or your group?**

4. **What do you think of the idea to feature science in a tribal/cultural museum?**

5. **How likely are you to <u>recommend Roots of Wisdom</u> to others (0 is "not at all" and 10 is "extremely")?**

**0 1 2 3 4 5 6 7 8 9 10**

### 6. Please rate the following statements from 1 and 10 with 1 being "not at all" and 10 being "a lot"

| | Not at all 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Very much 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| I would like to see more exhibitions like this one. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I understood the main messages of the exhibition. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I enjoyed visiting the Roots of Wisdom exhibition. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I talked with others about the exhibit or activities. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| The Roots of Wisdom exhibit is relevant to me and/or my family | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I feel that my community is reflected in this exhibit | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| As a result of visiting Roots of Wisdom… | Not at all 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Very much 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| I am more aware of how traditional Native knowledge is being used today | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am more aware of how my community is using traditional knowledge to address the environment | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am more aware of how other communities are using traditional knowledge to address the environment | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe that traditional Native knowledge and western science can be used together to help the environment | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe that traditional Native knowledge and western science are both valuable and relevant | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

***Finally, we have a few questions about yourself, so we know who is visiting the exhibit…***

**What race/ethnicity do you consider yourself? (Please check all that apply)**

- ❑ African American/Black
- ❑ American Indian/Native Alaskan (if so, with what tribe are you affiliated? _____)
- ❑ Asian
- ❑ Latina(o) or Hispanic
- ❑ Native Hawaiian/Pacific Islander
- ❑ White
- ❑ I prefer not to answer
- ❑ I prefer to describe my heritage/lineage as _____

**How would you best describe yourself?**

- ❍ Male
- ❍ Female
- ❍ I prefer not to answer

**What year were you born? (example: 1985)**

___ ___ ___ ___

**How many people are in your group today, <u>including yourself</u>?**

| | Number in group |
|---|---|
| **Children 10 and Under** | |
| **Youth 11-14** | |
| **Youth 15-17** | |
| **Adults 18 and over** | |

**Is this your first visit to Hibulb Cultural Center?**

- ❍ Yes
- ❍ No
- ❍ I'm not sure

➔ **If no, how many times have you visited Hibulb Cultural Center in the past 12 months?**

- ❍ None
- ❍ 1-2 times
- ❍ 3-4 times
- ❍ 5 or more
- ❍ I'm not sure

**Are you a member of Hibulb Cultural Center?**

- ○ Yes
- ○ No
- ○ I'm not sure

## Thank you very much for your feedback!

Thank you for giving us a few minutes of time to share your thoughts on this banner exhibit. We are very interested in knowing what *you* think about the Roots of Wisdom exhibit and what you got out of visiting it. There are no right or wrong answers, and you may skip any questions that you'd like.

1. **First, we'd like to get a sense of what you looked at in the banner exhibit. Looking at the <u>images provided</u>, which of the following banners did you <u>stop</u> at? (check all that apply)**

   - ☐ Introduction – 1
   - ☐ Collaboration – 2
   - ☐ Cross-cultural Collaboration – 3
   - ☐ Native Origins – 4
   - ☐ Biopiracy – 5
   - ☐ Taking Care of Homelands and Culture – 6
   - ☐ Native Hawaiians Introduction – 7
   - ☐ Aloha Aina: Love of the Land - 8
   - ☐ Hawaiian Fish Ponds – 9
   - ☐ Eastern Band of Cherokee Nation Intro – 10
   - ☐ Passing a Tradition – 11
   - ☐ River Cane Ecology – 12
   - ☐ Tulalip Tribes Introduction – 13
   - ☐ Connected to the Land – 14
   - ☐ Food: Medicine of the Land – 15
   - ☐ Confederated Tribes of Umatilla Intro – 16
   - ☐ Healthy Streams, Returning Salmon – 17
   - ☐ Protecting an Ancient Fish – 18
   - ☐ Taking Care of Homelands - 19

2. **What did you think were the <u>main ideas</u> of the Roots of Wisdom exhibit? What was it about?**

3. **Which exhibit banners do you think best conveyed those <u>main ideas</u>? Why?**

4. **What was the most valuable or interesting part of the banner exhibit for you? Why?**

5. **How likely are you to <u>recommend</u> this exhibit to others (0 is "not at all likely" and 10 is "extremely likely")?**

6. **Did you have a chance to use the computer interactive/website at all? (check one)**

**[ ]** Yes
**[ ]** No (skip to #6)
**[ ]** No, but I watched other visitors use it (skip to #6)

➔ **If yes,** which format did you use?

**[ ]** The laptop computer provided

**[ ]** A smartphone

**[ ]** Another mobile device (Please specify: _____)

➔ What did you do? (please check <u>all that apply</u>)

**[ ]** Played a game
**[ ]** Watched a video
**[ ]** Read one of the stories
**[ ]** Read some of the text, labels
**[ ]** Just browsed, glanced at it
**[ ]** Other

_____

7. **How <u>interesting</u> did you find the website? (please check <u>one</u>)**

**[ ]** Not very interesting
**[ ]** Somewhat interesting
**[ ]** Very interesting

**Please explain your rating:**

**What did the website add to your experience of the exhibit, if anything?**

**8. Please rate the following statements from 1 to 10, with 1 being "not at all" and 10 being "very much."**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| I would like to see more exhibitions on traditional Native knowledge. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I understood the main messages of the exhibition. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I enjoyed visiting the Roots of Wisdom exhibition. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I had conversations with others about the exhibit. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

**9. Please rate yourself on the following statements for <u>before</u> and <u>after</u> visiting the Roots of Wisdom exhibit.**

| | Before the exhibit | | | | After the exhibit | | | |
|---|---|---|---|---|---|---|---|---|
| | Not At All | Some | A fair amount | Very much | Not At All | Some | A fair amount | Very much |
| My knowledge of Native ways of knowing | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| My knowledge of conventional science | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| My interest in Native ways of knowing | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| My interest in conventional science | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe Native knowledge and conventional science are both valuable for addressing environmental issues. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I believe Native knowledge and conventional science are both valuable for understanding the natural world. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

## Roots of Wisdom Activity Kit - Teacher Interview Guide

| |
|---|
| Name: |
| Date: |
| Organization/School: |
| Location: |

Recruitment and Informed consent

The evaluation team will work with OMSI and two local partners (Tamástslikt Cultural Institute and Hibulb Cultural Center) to identify and recruit teachers and educators who are willing to review and provide feedback on the ROW Activity Kit. Our focus will be on educators who work primarily with Native youth (age 11–14), both from tribal nations and urban settings. As described in the evaluation plan, we aim to include 6-8 teachers in this component. Once we've identified potential teachers, we will send an initial email and then follow up by phone.

Interview Questions

"*Thank you for taking time to take part in this interview today. I am part of the external evaluation team for the Roots of Wisdom (ROW) Project. This interview should take ~45 minutes and your participation is voluntary so let me know if there are any questions you do not wish to answer. The results of the interview will be used to help strengthen the ROW activity kit and for reporting impacts to the project's funding agency, the National Science Foundation. To honor your involvement in the project, your name will not be used in any reporting or documentation. There are no right or wrong answers – we just want your honest opinions on the kit.*

*I will be taking notes and recording the conversation today and I need to see if you're ok with being recorded. It's ok if you decline to be recorded; I will make alternative arrangements with you to capture your voice. There is no penalty for declining and this will not impact your involvement in the ROW Project. Are you ok with being recorded (I need a verbal response)?*

NOTE: [If there are any individuals who decline to be recorded, the evaluator will arrange for alternative methods to capture their voice].

We will be using questions that target the overall goals of the ROW Project and the activity kit. There are a total of 16 questions. Before we begin can you clarify the following areas:

| Teacher Background |
|---|
| Teacher Name: |
| Grade Level: |
| Number of Students: |
| Activities used: |
| Numbers of years teaching: |

Ok, are you ready to begin? [turn on recorder and begin interview].

**ROW Activity Kit – General**

1. Thinking about the activity guides as a whole, what do you see as the main value of these activities for your students (or for youth in general)?

2. The activities were intended to support students' awareness that Traditional Ecological Knowledge and Western science offer complementary ways of understanding the natural world. In what ways do you feel the activities could accomplish this, if at all?

3. The activities were also intended to support students' science processing skills, such as observing or predicting, using culturally appropriate activities. In what ways do you think the activities could support this area, if at all?

4. What recommendations, if any, would you suggest to improve the ROW educational kits?

**Implementation and Effectiveness of the activities**

5. If you were able to, which activity(ies) did you implement?

6. Was the activity easy to implement?
    a. If yes, what about the activity kit made it easy?
    b. If no, can you share challenges of why it wasn't?

7. In what ways did the activity support your classroom curriculum (or your teaching goals)?
    Probe: If applicable, what content areas and standards of your existing classroom curriculum did the lesson apply to?

8. In what ways did piloting this activity help to develop or deepen your appreciation of TEK and conventional science?

**Student Impacts**

9. What were the students' overall reactions to the activities?

10. As a result of their participation in the ROW activities, do you think students gained new perspectives on TEK and indigenous cultures? Did they gain new perspectives or skills related to science?

11. What components of the activity were most valuable for students? Please provide examples of why these areas were the most valuable.

Roots of Wisdom - Youth Activities Review – Online Survey

Welcome to the Roots of Wisdom Youth Activity Kit survey! We are looking forward to your feedback. It should take approximately 15-20 minutes to complete, depending on how many activities you review. We will then follow up with you to set up a brief phone interview, and to get information for sending you a $50 gift card or stipend. Note: Your responses will be saved in case you need to exit the survey and return to it later. Roots of Wisdom (NSF-DRL# 1010559) is supported by funding from the National Science Foundation.

Q1. Please select which activities you are reviewing. (please check all that apply)

- ❑ Restoration Project Poster Boards (classroom)
- ❑ Voices from our Community (classroom)
- ❑ Weaving (after school)
- ❑ Exploring Natural Dyes (after school)
- ❑ Natural Dyes Demonstration (museum)
- ❑ Native Origins Match Card Game (museum)

EXAMPLE: Thinking about the Restoration Project Poster Boards activity, please rate the following statements on a scale of 1-10, with 1 being "not at all" and 10 being "very much".

| | 1 - not at all | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Very much - 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| The activity instructions were clear and easy to follow | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am likely to use this activity with students or youth | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I would recommend this activity to other teachers or educators | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| This activity seems appropriate for youth age 11-14 | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| This activity seems engaging and interesting for youth age 11-14 | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Q3. One of the intended outcomes of the Roots of Wisdom activity kit was for youth to gain awareness that Traditional Ecological Knowledge (or Indigenous knowledge) and Western science offer valuable and complementary ways of understanding the natural world. To what extent do

you think the Restoration Project Poster Boards activity could accomplish that goal? (with 1 being "not at all" and 10 being "very much")

Q4 Please explain your rating here:

Q5 Another intended outcome of the Roots of Wisdom activity kit was for youth to gain skills of the scientific process, such as predicting or measuring, to understand the natural world. To what extent do you think the Restoration Project Poster Boards activity could accomplish that goal? (with 1 being "not at all" and 10 being "very much")

Q6 Please explain your rating here:

Q7 What do you see as the potential value or benefit of the Restoration Project Poster Board activity for students or youth?

Q8 What is one thing you would suggest to improve the Restoration Project Poster Boards activity?

## Appendix B: Data Tables

## Additional Attendance and Interest Data for Full Exhibit

**Table 17: Participants in full exhibition evaluation by tribal affiliation (self-report)**

| | N |
|---|---|
| Arapaho | 2 |
| Athabaskan | 1 |
| Cayuse | 6 |
| Cherokee | 1 |
| Cheyenne | 1 |
| Chippewa | 1 |
| Choctaw | 2 |
| Coos | 1 |
| Haida | 2 |
| Lakota | 2 |
| Miwok | 1 |
| Mono | 1 |
| Navajo | 5 |
| Nez Perce | 2 |
| Otoe Missouria | 1 |
| Port Gamble S'Klallam Tribe | 1 |
| Siletz | 1 |
| Seminole | 1 |
| Sioux | 1 |
| Suquamish | 1 |
| Tlingit | 3 |
| Tslalaki | 1 |
| Tulalip tribes | 7 |
| Umatilla | 5 |
| Walla Walla | 2 |
| Yakima | 2 |

**Table 18: Sex/gender (self-report)**

| How would you best describe yourself? | N | Percent |
|---|---|---|
| Male | 102 | 38.3% |
| Female | 156 | 58.6% |
| Prefer not to answer | 8 | 3.0% |
| TOTAL | 266 | 100% |

Table 19: Attendance by age (youth/adult)

| Exhibit component | Adult N | Adult % of Total | Youth N | Youth % of Total |
|---|---|---|---|---|
| Introduction | 82 | 75.8% | 25 | 43.8% |
| Collaboration | 69 | 62.7% | 18 | 33.3% |
| Native Origins | 85 | 83.3% | 38 | 68.8% |
| Biopiracy | 84 | 83.6% | 22 | 40.4% |
| Message Board | 34 | 41.8% | 29 | 53.2% |
| Story Area | 42 | 47.8% | 31 | 58.7% |
| Hawaiian Video | 89 | 79.1% | 41 | 68.8% |
| Hawaiian Aloha ‘Aina | 80 | 69.7% | 44 | 77.1% |
| Hawaiian Fish Ponds Game | 78 | 62.1% | 47 | 87.2% |
| Cherokee Video | 74 | 64.2% | 24 | 37.5% |
| Cherokee River Cane | 86 | 76.1% | 39 | 69.6% |
| Cherokee Passing a Tradition | 88 | 74.6% | 47 | 84.8% |
| Tulalip Video | 72 | 53.7% | 21 | 30.4% |
| Tulalip Medicine of the Land | 88 | 76.1% | 44 | 79.2% |
| Tulalip Connected to the Land | 82 | 63.1% | 36 | 58.3% |
| CTUIR Video | 72 | 60.6% | 25 | 39.6% |
| CTUIR Healthy Streams | 82 | 73.8% | 44 | 78.7% |
| CTUIR Protecting an Ancient Fish | 73 | 61.5% | 44 | 77.1% |
| Taking Care of Homelands Map | 31 | 34.3% | 18 | 34.3% |

Table 20: Interest by age (youth/adult)

| Exhibit component | Adult N | Adult Mean | Youth N | Youth Mean |
|---|---|---|---|---|
| Introduction | 50 | 2.52 | 21 | 2.19 |
| Collaboration | 42 | 2.48 | 16 | 2.13 |
| Native Origins | 55 | 2.71 | 33 | 2.58 |
| Biopiracy | 56 | 2.71 | 19 | 2.26 |
| Message Board | 28 | 2.29 | 25 | 2.72 |
| Story Area | 32 | 2.59 | 27 | 2.81 |
| Hawaiian Video | 53 | 2.79 | 33 | 2.39 |
| Hawaiian Aloha ‘Aina | 46 | 2.67 | 37 | 2.78 |
| Hawaiian Fish Ponds Game | 41 | 2.78 | 41 | 2.88 |
| Cherokee Video | 43 | 2.63 | 18 | 2.28 |
| Cherokee River Cane | 51 | 2.71 | 32 | 2.59 |
| Cherokee Passing a Tradition | 50 | 2.64 | 39 | 2.77 |
| Tulalip Video | 36 | 2.69 | 14 | 2.50 |
| Tulalip Medicine of the Land | 51 | 2.61 | 38 | 2.45 |
| Tulalip Connected to the Land | 41 | 2.78 | 28 | 2.57 |
| CTUIR Video | 40 | 2.65 | 19 | 2.89 |
| CTUIR Healthy Streams | 48 | 2.73 | 37 | 2.68 |
| CTUIR Protecting an Ancient Fish | 40 | 2.65 | 37 | 2.81 |

## Additional Attendance Data for Banner Exhibit

**Table 21: Percentage attended banner exhibit stops**

| Exhibit component | N | % of Total Respondents |
|---|---|---|
| **Introduction** | 27 | 69.2% |
| **Collaboration** | 24 | 61.5% |
| **Native Origins** | 30 | 76.9% |
| **Biopiracy** | 30 | 76.9% |
| **Hawaiian Intro** | 30 | 76.9% |
| **Hawaiian Aloha 'Aina** | 30 | 76.9% |
| **Hawaiian Fish Ponds** | 29 | 74.4% |
| **Cherokee Intro** | 26 | 66.7% |
| **Cherokee River Cane** | 29 | 74.4% |
| **Cherokee Passing a Tradition** | 29 | 74.4% |
| **Tulalip Intro** | 32 | 82.1% |
| **Tulalip Medicine of the Land** | 33 | 84.6% |
| **Tulalip Connected to the Land** | 33 | 84.6% |
| **CTUIR Intro** | 28 | 71.8% |
| **CTUIR Healthy Streams** | 29 | 74.4% |
| **CTUIR Protecting an Ancient Fish** | 29 | 74.4% |
| **Taking Care of Homelands Map** | 30 | 76.9% |

## Appendix C: Exhibit Snapshots

# Orientation / General Panels

## Introduction


**Attendance:** Medium, 58.1% (n=97)

**Interest:** Moderate, 2.43 average (out of 3)[24]

**Uses/Highlights:** Adult visitors were significantly more likely to stop at the introduction panel, and significantly more likely to find it interesting, than were youth. This suggests that messaging to youth must be embedded elsewhere in the exhibition in order to reach them.

## Collaboration


**Attendance:** Medium, 45.2% (n=76)

**Interest:** Moderate, 2.41 average (out of 3)

**Uses/Highlights;** Adult visitors were significantly more likely to stop at the Collaboration panel, and significantly more likely to find it interesting, than were youth.

## Taking Care of Homelands Map


**Attendance:** Low, 35.1% (n=26)[25]

**Interest:** Medium, 2.08 average (out of 3)

**Uses/Highlights**: Due to the late addition of this component, the sample size was much smaller, and the majority of respondents were youth. This limited data suggests, however, that the map was not broadly appealing to youth.

---

[24] Moderate interest is defined as 2.00-2.50, and High interest is defined as 2.51-3.00. Low interest is below 2.00

[25] Only 74 visitors had the option of seeing this component, as it was not added until after the OMSI data collection was completed.

## Biopiracy


**Attendance:** Medium, 52.7% (n=87)

**Interest:** High, 2.61 average (out of 3)

**Uses/Highlights:** Adults were significantly more likely to stop at this panel (and to find it interesting) than were youth. This was cited by adults as one of their favorites.

## Native Origins


**Attendance:** High, 70.7% (n=118)

**Interest:** High, 2.68 on average (out of 3)

**Uses/Highlights:** *Native Origins* was the only panel (non-interactive) exhibit that was highly attended by visitors. This may be due to its title, or the bright images of familiar objects, and relatively little text.

## Story Area

**Attendance:** Medium, 54.9%

**Interest:** High, 2.68 on average (out of 3)

**Uses/Highlights:** This area was primarily used for sitting/relaxing and for doing the weaving activity. Visitors were far less likely to read the stories (to others or to themselves).

# Native Hawaiians

## Video


**Attendance:** High, 72.1% (n=119)

**Interest:** High, 2.65 on average (out of 3)

**Uses/Highlights:** Adults were significantly more likely to watch the video than were youth; but both groups found it highly interesting when they did watch it.

## ʻAloha ʻAina: Love of the Land


**Attendance:** High, 70.7% (n=118)

**Interest:** High, 2.68 on average (out of 3)

**Uses/Highlights:** Both adults and youth visited this area at a high rate, and found it very interesting.

## Fish Ponds

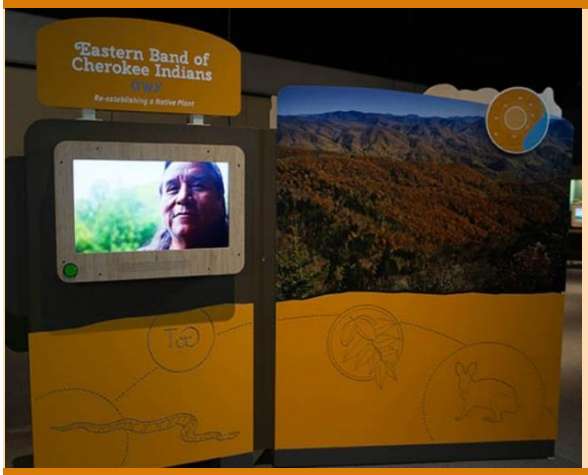

**Attendance:** High, 68.7% (n=114)

**Interest:** High, 2.79 on average (out of 3)

**Uses/Highlights:** Visitors found this to be among the most interesting components of the exhibition. Youth were significantly more likely to use the game and watch others use it.

# Eastern Band of Cherokee Indians

## Video




**Attendance:** Medium, 53.3% (n=89)

**Interest:** High, 2.52 average (out of 3)

**Uses/Highlights:** As with all videos, adults were more likely watch the video and to find it more interesting than did youth, who were more focused on interactives.

## River Cane Ecology


**Attendance:** High, 81% (n=132)

**Interest:** High, 2.70 average (out of 3)

**Uses/Highlights:** This interactive exhibit was reported as the most highly attended of all the exhibit components in *Roots of Wisdom*, and was rated as one of the most interesting.

## Passing a Tradition

**Attendance:** High, 73.2% (n=120)

**Interest:** High, 2.61 on average (out of 3)

**Uses/Highlights:** This exhibit was highly attended and highly interesting to both youth and adults; and visitors were just as likely to look at the baskets as play a game or use an interactive. The hands-on weaving activity was also extremely popular.

# Tulalip Tribes

## Video


**Attendance:** Medium, 44.7% (n=72)

**Interest:** High, 2.62 on average (out of 3)

**Uses/Highlights:** While the Tulalip video was one of the least attended exhibit components, those who watched it found it very interesting.

## Food: Medicine of the Land


**Attendance:** High, 73.9% (n=122)

**Interest:** Moderate, 2.50 on average (out of 3)

**Uses/Highlights:** This exhibit was highly attended by both adults and youth. It was particularly appreciated by families with younger children, who could play with the interactive while the parent read and listened to the audio.

## Connected to the Land


**Attendance:** High, 65% (n=106

**Interest:** High, 2.72 on average (out of 3)

**Uses/Highlights:** Rated by adults and youth as one of the most interesting exhibits, though not as well attended as others.

# Confederated Tribes of the Umatilla Indian Reservation

## Video


**Attendance:** Medium, 51.8% (n=85)

**Interest:** High, 2.73 on average (out out 3)

**Uses/Highlights:** While not among the most highly attended, this video was considered one of the most interesting components by both youth and adult visitors.

## Healthy Streams, Returning Salmon


**Attendance:** High, 76.5% (n=124)

**Interest:** High, 2.66 on average (out out 3)

**Uses/Highlights:** This interactive was one of the most highly attended components in the exhibition.

## Protecting an Ancient Fish


**Attendance:** High, 68.7% (n=114)

**Interest:** High, 2.73 on average (out out 3)

**Uses/Highlights:** This was a very popular exhibit with youth in particular. Almost all youth who stopped reported using the interactive scanning activity.

Roots of Wisdom
Native Knowledge. Shared Science.

# Exit Survey: the Story Area

Thank you for taking a few minutes to give us some feedback on one of our new exhibits. This survey will help us understand how you used the Story Area, what interested you, and what you got out of it.

***Please circle as many of the activities below that you did for the corresponding exhibit feature. There are no right or wrong answers - we just want to hear about your experiences and thoughts!***

| | | | | | |
|---|---|---|---|---|---|
| ***Campfire and Audio Stories*** | I played at least one story | I actively listened to at least one story | I stopped or changed a story being played | I reflected on the story(ies) I listened to | I talked about the story(ies) with someone |
| ***Comment Board*** | I responded to the question | The prompt encouraged me to reflect on things I saw or experienced in the Story Area | I read at least one other comment | | |
| ***General Atmosphere*** | I was able to reflect on things I saw or experienced in nearby exhibits | I enjoyed being in a relaxing, immersive space | *If others are in the space with you…* I watched other visitors interact with the Story Area | | |
| ***Story Cards*** | I read a story silently to myself | I read a story out loud to others | I listened to someone read a story out loud | I reflected on the story(ies) I read/being read | I talked about the story/stories with someone |
| ***Weaving Activitiy*** | I did the weaving activity | I did the weaving activity with someone else | I reflected on something from the Story Area while doing the weaving activity | | |

***Please rank each of the following exhibit aspects in order of interest, with 1 being the most interesting part to 6 being the least interesting part of the exhibit.***

| | |
|---|---|
| ***Audio Stories*** | |
| ***Campfire*** | |
| ***Comment Board*** | |
| ***General Atmosphere*** | |
| ***Story Cards*** | |
| ***Weaving Activitiy*** | |

**Please look back over at the part of the Story Area which you indicated was most interesting, and tell us more about it.**

1. Why did you decide to engage with this part? What attracted you to it?

2. What did you get out of this interaction? What did you learn or take away?

***Thinking about the entire Story Area now, please indicate your <u>current</u> level of agreement with the following statements.***

| | Not at all | 2 | 3 | 4 | 5 | 6 | A lot |
|---|---|---|---|---|---|---|---|
| *The Story Area changed or deepened what I knew about storytelling in Native communities.* | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| *I understand that Native cultures continue to pass knowledge through storytelling in the present day.* | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| *I found the Story Area to be a place for reflection.* | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| *I had conversations with others about the Story Area.* | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| *I made connections between what I saw and heard in the Story Area with what I saw in nearby exhibits.** | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

**Can you tell us more about what kind of connections you were able to make?*

***Please indicate how much knowledge you gained for each of the statements below about storytelling in Native communities <u>after</u> your time in the Story Area.***

| | Gained no new knowledge | 2 | 3 | 4 | 5 | 6 | Gained a great deal |
|---|---|---|---|---|---|---|---|
| *I know that storytelling is a way for Native communities to connect with tradition and history in present day.* | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| *I believe that Native stories pass on long-held knowledge about the environment, cultural and spiritual beliefs, and moral values.* | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| *I value listening to stories as a way for me to learn about and reflect on environmental issues.* | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

***Thinking back to before you visited the Story Area, how much would you say you knew about storytelling in Native communities? (Select one)***

❍ Not much ❍ A little ❍ Some ❍ A lot

***In what ways did the Story Area change, increase, or challenge what you knew about storytelling?***

**And a few last questions about you (optional)**

*What race/ethnicity do you consider yourself? (Please check all that apply)*

- ❍ African American/Black
- ❍ American Indian/Native Alaskan (if so, with what tribe are you affiliated? _____
- ❍ Asian
- ❍ Latina(o) or Hispanic
- ❍ Native Hawaiian/Pacific Islander
- ❍ White

*How would you best describe yourself?*

- ❍ Male
- ❍ Female
- ❍ Other: _____
- ❍ I prefer not to answer

*What year were you born? (example: 1975).*

*Including yourself, how many people are in your group today?*

| | Enter count here |
|---|---|
| **Children 10 and Under** | |
| **Youth 11-17** | |
| **Adults 18 and over** | |

*Is this your first visit to OMSI?*

- ❍ Yes
- ❍ No

*If no, how many times have you visited OMSI in the past 12 months?*

- ❍ None
- ❍ 1-2 times
- ❍ 3-4 times
- ❍ 5 or more
- ❍ I'm not sure

*Are you a member of OMSI?*

- ❍ Yes
- ❍ No
- ❍ Not sure

# APPENDIX E: DISTIRBUTION OF RESPONSES FOR ACTIVITIES AT EACH EXHIBIT COMPONENT

Each graph below showcases the distribution of responses for activities survey participants engaged with at each of the Story Area components.

FIGURE 15: DISTRIBUTION OF RESPONDENT ENGAGEMENT WITH THE CAMPFIRE AND AUDIO STORIES, N=59

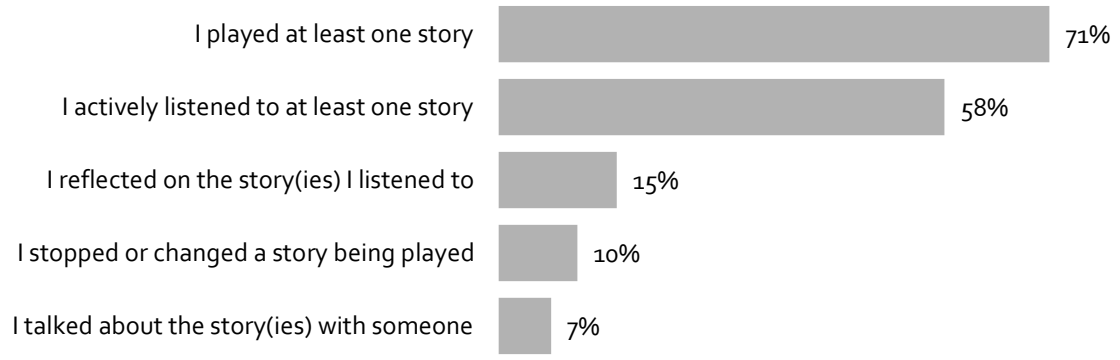



FIGURE 16: DISTRIBUTION OF RESPONDENT ENGAGEMENT WITH THE COMMENT BOARD, N=32

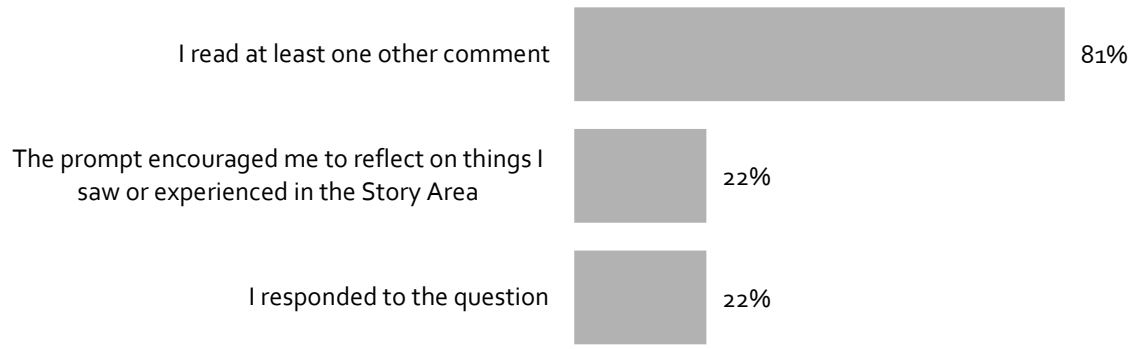


FIGURE 17: DISTRIBUTION OF RESPONDENT ENGAGEMENT WITH THE GENERAL ATMOSPHERE, N=57

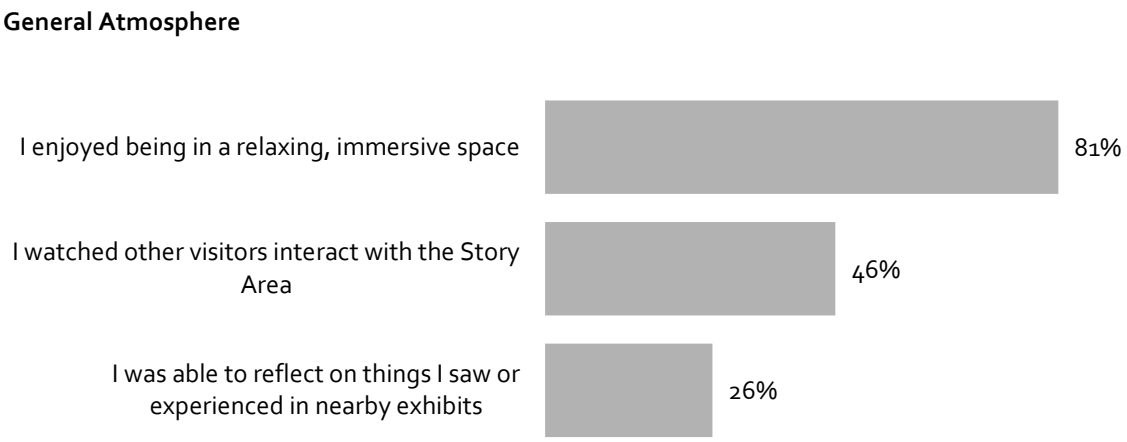



FIGURE 18: DISTRIBUTION OF RESPONDENT ENGAGEMENT WITH THE STORY CARDS, N=30

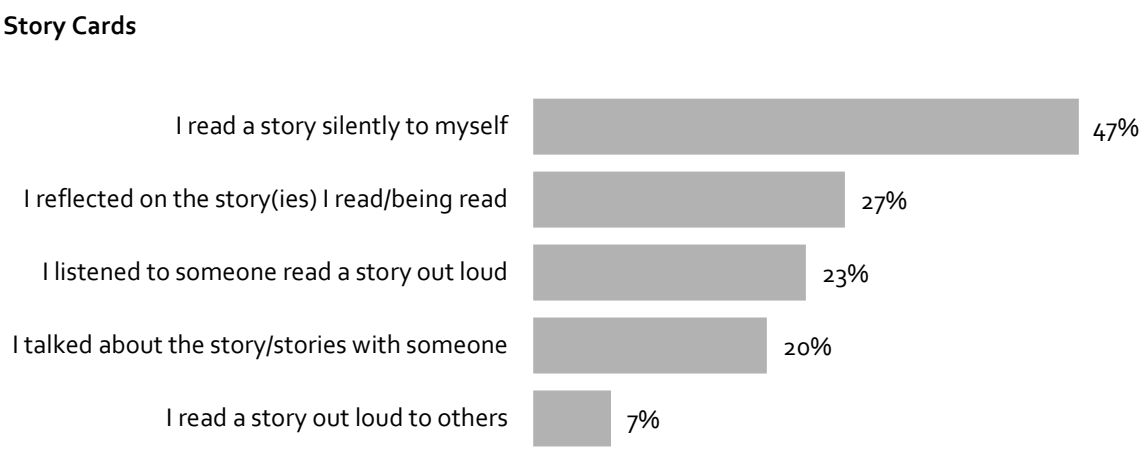
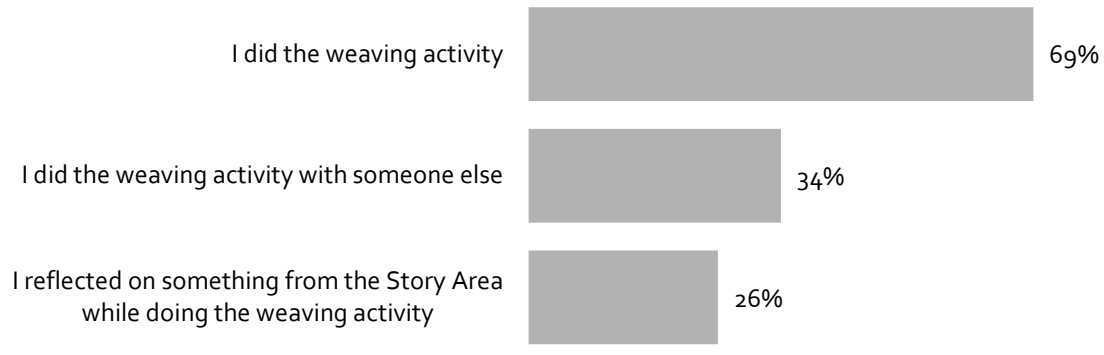



FIGURE 19: DISTRIBUTION OF RESPODNENT ENGAGEMENT WITH THE WEAVING ACTIVITY, N=35



# APPENDIX F: AVERAGES AND MEANS, AGREEMENT STATEMENTS

The table below showcases the averages and means responses for each agreement statement. Respondents indicated their level of agreement using a 7-point scale, from 1 (Not at all) to 7 (A lot).

TABLE 22: AVERAGES AND MEANS FOR RESPONDENT AGREEMENT WITH STATEMENTS

| Statement | Average | Median | Sample |
|---|---|---|---|
| *I understand that Native cultures continue to pass knowledge through storytelling in the present day.* | 5.7 | 6 | 59 |
| *I found the Story Area to be a place for reflection.* | 4.8 | 5 | 59 |
| *I made connections between what I saw and heard in the Story Area with what I saw in nearby exhibits.* | 3.7 | 4 | 56 |
| *The Story Area changed or deepened what I knew about storytelling in Native communities.* | 3.5 | 3 | 59 |
| *I had conversations with others about the Story Area.* | 2.8 | 2 | 59 |

# APPENDIX G: AVERAGES AND MEANS, KNOWLEDEGE STATEMENTS

The table below showcases the averages and means responses for each knowledge statement. Respondents indicated the extent to which their knowledge on these statements deepened using a scale from 1 (Gained no new knowledge) to 7 (Gained a great deal).

TABLE 23: AVERAGES AND MEANS FOR RESPONDENT KNOWLEDGE GAINED

| Statement | Average | Median | Sample |
|---|---|---|---|
| *I value listening to stories as a way for me to learn about and reflect on environmental issues.* | 5 | 6 | 57 |
| *I believe that Native stories pass on long-held knowledge about the environment, cultural and spiritual beliefs, and moral values.* | 4.7 | 5 | 57 |
| *EI know that storytelling is a way for Native communities to connect with tradition and history in present day.* | 4.4 | 5 | 57 |