

Re-envisioning the Collective Voyage for Ocean Exploration

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Vision Statement

By 2032, ocean exploration will have a thriving community of practice that supports development of a diverse workforce, facilitates effective communication, and advances national and community priorities for exploration. These efforts will support a cohesive public value proposition for ocean exploration.

Introduction

Over the next decade, the ocean exploration community has the opportunity to reach unrealized potential and make strides in creating pathways to increase diversity and inclusion in ocean exploration. It is crucial that the future of ocean exploration focuses on developing equitable approaches to include those from marginalized and Indigenous communities who face many historical barriers, one of them being inadequate access to opportunities and resources. A more inclusive ocean exploration community will need to put in the effort to develop authentic equitable collaborations that empower a more diverse workforce. Ultimately, increasing diversity and inclusion in this field will strengthen public engagement and fortify research frameworks that advance national priorities and cultivate innovative solutions to ocean issues such as climate change, sustainable resource management, and biocultural conservation and restoration. Diversity of thought and experience, after all, promotes scientific progress.

Increasingly rising as critical components of the future of ocean exploration and as a renewed commitment amongst many organizations are justice, equity, diversity, and inclusion (JEDI).^{1,2,3,4,5} This is a significant change from 2013 when the first National Ocean Exploration Forum set out to strategize decadal goals for the nation's ocean exploration program without doing so through a JEDI lens.⁶ While the shift is notable and significant – and a subsequent Forum five years later did successfully focus specifically on JEDI topics while broadening the goal-setting conversations to a more inclusive group of participants⁷ – we need to continue to build momentum in these efforts and rise to the challenge of creating a thriving community of practice that sustains a diverse workforce, facilitates effective communication supporting restorative justice, and advances national priorities for exploration.

As we re-envision our blueprint for conducting ocean exploration in the next decade and beyond, it is important that we do it with a lasting openness to learn and share through engaging with Indigenous communities who are severely excluded or omitted from modern ocean exploration efforts, such as Pacific Islanders. Moananuiākea (“the great expansive ocean” in the Hawaiian language) connects these cultures through rich repositories of ancestral knowledge systems and practices passed down from the world's most skillful, innovative, and resourceful ocean experts. For a millennium, they have survived and thrived by sustainably managing their resources through intimate relationships with the ocean and lands that sustained

1 [urgeoscience.org/](https://www.urgeoscience.org/)
2 tos.org/oceanography/assets/docs/34-1_meyer-gutbrod.pdf
3 www.oceandiscoveryleague.org/
4 oceanleadership.org/our-core-values/
5 scripps.ucsd.edu/diversity/
6 oceanexplorer.noaa.gov/national-forum/media/oe2020_report.pdf
7 oceanexplorer.noaa.gov/national-forum/media/noef-2018-report.pdf

them for many generations. Working together and serving a function and purpose for the overall collective benefit of the community are cultural practices found across Pacific Island cultures. To Kānaka 'Ōiwi (Native Hawaiians), this wisdom is often shared and passed from generation to generation through lived experiences and oral traditions such as 'ōlelo no'eau (Hawaiian proverbial sayings) which are used here to provide insight to build a collaborative community of practice to enhance future engagement and impact in ocean exploration.

He wa'a he moku, he moku he wa'a⁸

A canoe is an island, an island is a canoe

The Hawaiian proverb, "He wa'a he moku, he moku he wa'a," reminds us that a wa'a (voyaging canoe) is a reflection of the moku (island) it is built on. Every part of a wa'a comes from the moku and it takes an entire community to harvest and craft these island resources into a vessel that feeds us, connects our island communities, and enables us to travel vast distances across oceans. The journey of inclusivity and equity within diverse collaborations represents an arduous journey to change the status quo of ocean exploration. If we provision our wa'a with the inclusivity of Indigenous peoples and values of diversity, we are grounded with a holistic purpose for why we explore and the wa'a becomes "how we explore," cultivating a community of practice that is rich in alliances reflective of our collective decadal goals for ocean exploration. This journey requires a heightened awareness of our dependency on one another, who is in the wa'a with us, how we have crafted our wa'a, and how our varying strengths contribute to the success of the voyage.

The ocean exploration community at large - including federal, state, nonprofit, philanthropic, academic, educational organizations, and industry - is not as unified as it ought to be, and as a result, our wa'a has been unstable and slow to advance towards the many goals we have collectively identified as a community through venues like the National Ocean Exploration Forums. One of these goals has been to make ocean exploration more accessible to everyone in order to build and sustain a more diverse ocean science community. How do we broaden participation and diversity in the field when we are not rising to the challenge in a unified way?

While there are examples of successful alliances focused on broadening participation in ocean exploration,⁹ the major challenge is coordinating a unified approach instead of a mix of independent initiatives being implemented that often creates missed opportunities. Building stronger partnership-focused approaches can create more accountability for all those involved to shape a mutually beneficial process of collaborating as well as generating the momentum needed for impactful positive progress across the field. Collaboration amongst organizations - especially those that have significant influence on how ocean exploration is conducted and programs that serve as pathways for more people to enter the ocean exploration workforce - is important for us to advance this timely goal at a more rapid pace. These organizations play a major role in setting the example to create pathways for underrepresented groups to pursue careers and make unique contributions to the field. The needs of the growing workforce are emerging from the blue economy, climate change, and the increasing number of active vessels, groups, and autonomous systems contributing to national ocean exploration priorities.

If we truly want to ensure that diversity, equity, and inclusion are involved in recruiting and training the ocean exploration workforce, then we need to incorporate these values into the community practice at large. These must be core values embraced by organizations throughout the community to truly create a safe and equitable space to include Indigenous and marginalized people. We must use our skills in research and analysis to understand the diverse ways that local and Indigenous communities see value in ocean exploration and further understand how the ocean exploration community can align with these community interests and needs. To truly transform how we implement ocean exploration programs, we must act thoughtfully and strategically to build an iterative and sometimes uncomfortable process, to learn from different perspectives and knowledge systems in order to provide major contributions and innovations that grow from a diverse workforce. Year after year, we will then have additional practitioners from varied backgrounds who will contribute in their unique ways for the sake of all. This feedback loop will provide direct and indirect outcomes that benefit ocean exploration and the communities we aim to serve.

8 www.nakalaiwaa.org/

9 mlp.ideo.columbia.edu/stemseas/

‘A‘ohe pau ka ‘ike i ka hālau ho‘okahi¹⁰

Not all knowledge is found in one school

Ocean exploration presents opportunities to work with Indigenous and local coastal communities to conduct ocean exploration in an ethical and accountable way. Within the ocean exploration community, it is imperative to normalize the acceptance and respect of Indigenous knowledge as an equally valuable body of knowledge with western science. This is foundational to creating a permanent space that supports the perpetuation of Indigenous cultures in a way that is meaningful, collaborative, and supportive of JEDI values. We can provide opportunities for Tribal and minority-serving academic institutions to support students as emerging professionals in the field. Establishing strong partnerships with educators serving Indigenous, minority, and/or underserved communities will enhance these efforts. Likewise, empowering Indigenous and minority scientists and professionals is key to positioning these important role models to uplift Indigenous and minority youth and community members. These partnerships also cultivate a chance to learn more about Indigenous science and methodologies for inquiry and ways of knowing. Such positive interactions provide the necessary space for restorative justice of dominant epistemologies and forms of knowledge and education that have marginalized and, in some cases, extinguished various forms of Indigenous knowledge and disrupted Indigenous social institutions.

Furthermore, it is important to understand and be aware of topics such as self-determination and data sovereignty, including Indigenous-led principles such as *Free, Prior, and Informed Consent*¹¹. Collaborating with Tribal nations and Indigenous communities to learn through their traditional and customary ocean territories and resources is a critical step in developing meaningful exchanges and co-creating a shared intention and long-lasting relationships. This may identify important opportunities of significance for Indigenous maritime cultures of the Pacific Islands and for Tribes whose ancestors once inhabited submerged lands on the continental shelf that were exposed during glacial maximums. Two-way exchanges between all people – including local and Indigenous community members, western science researchers, educators, and communication specialists – should be created using best practices for incorporating cultural and Traditional Knowledge holders and their knowledge throughout ocean exploration initiatives so that efforts are relational and not transactional. Due to the unique qualities of Indigenous knowledge systems and the interconnected nature of Indigenous science, values, beliefs, and relationships, there are potentially significant compounding positive impacts that occur from including Indigenous peoples and their unique contributions.

Acknowledging Indigenous peoples, coastal and local communities, and other relationships and connections is necessary. Much like land acknowledgements, ocean and coastal acknowledgements can be co-developed with Indigenous and local communities to establish meaningful points of reflection of who we all are and what we are trying to do together. Through acknowledging Indigenous landscapes and ocean ways, we propose this question for consideration – what action(s) are taken after acknowledgment? Ocean and coastal acknowledgements can be inclusive of other languages such as Spanish and even endangered Indigenous languages, including ‘ōlelo Hawai‘i (the Hawaiian language). Revitalizing critically endangered Indigenous languages is not on the list of urgent public priorities, however, many Native American languages may be extinct in the United States within just a few years. Prioritizing native and Indigenous language revitalization and normalization is a key empowerment tool for Indigenous communities, and these efforts can occur in many ways by working with Indigenous language practitioners.¹² Creating opportunities to tell the story of the expeditions through Indigenous language naming practices is a meaningful step to interpret cultural heritage connections and to co-develop outreach, education, and communication strategies.

It is another major disservice to Indigenous peoples and coastal and local communities if we continue to conduct ocean exploration without meaningful engagement with these cultures who are deeply connected to these spaces. Approaching our work with this mindset, will provide numerous ways for us to collaborate, inform, and inspire a diverse public that is engaged by ocean exploration and its impacts. These collaborative

10 ‘Ōlelo No‘eau #203. Pukui, Mary Kawena. *‘Ōlelo No‘eau: Hawaiian Proverbs & Poetical Sayings*. Honolulu, Hawai‘i: Bishop Museum Press, 1983. Print.

11 www.fao.org/indigenous-peoples/our-pillars/fpic/en/

12 www.culturalsurvival.org/publications/cultural-survival-quarterly/saving-americas-endangered-languages/

efforts will lead to greater inclusivity, attention, and support for exploration activities. It is important to build relationships through respect, reciprocity, and responsibility. Weaving these shared values into community engagement will build lasting relationships that form alliances and durable collaboration networks.

E lauhoe mai nā wa‘a; i ke kā, i ka hoe;
i ka hoe, i ke kā; pae aku i ka ‘āina¹³

*Everybody paddle the canoes together; bail and paddle,
paddle and bail, and the shore will be reached*

All voyages are driven by a collection of paddlers of diverse backgrounds and experiences. This Hawaiian proverb speaks to the purpose and function of each paddler in the wa‘a and the function of each wa‘a in the fleet during the voyage that enables us as a lāhui (nation) to reach our destination and/or goal.

In this analogy, each wa‘a represents an organization of voyagers who carry diverse expertise. The collection of wa‘a represents the lāhui of ocean voyagers that carry the collective diversity of knowledge and expertise needed to explore these spaces.

Every wa‘a, or organization, will have a unique mission. In the following case study, we highlight how various organizations can work together in an ongoing manner to achieve common goals to sustain a proficient “exploration workforce” in dynamic and interconnected social and environmental systems; improve efficiency and effectiveness in planning and executing community public engagement and involvement; and support collective visions for the future of exploration-relevant science, data, and technology.

In late 2021, expeditions sponsored by the National Oceanic and Atmospheric Administration’s Office of National Marine Sanctuaries (NOAA ONMS) and NOAA Ocean Exploration were conducted in the Papahānaumokuākea Marine National Monument (PMNM) aboard Ocean Exploration Trust’s (OET) E/V *Nautilus*. Eight months prior, OET met with PMNM education and Native Hawaiian program team members to discuss ways to meaningfully collaborate and to understand how organizational and management goals and objectives could align for these expeditions. The OET and NOAA ONMS collaborators focused on the cultural significance of Papahānaumokuākea to Native Hawaiians and opportunities to work with Native Hawaiian community members on various initiatives for the *Nautilus* expeditions in PMNM.

The Monument includes the Northwestern Hawaiian Islands (NWHI), which along with the ocean realm, are considered a sacred place important to the history and cultural origins of Native Hawaiians. Furthermore, this region, including the entire geography of Hawai‘i, is connected to Hawaiian cosmology and the religious and spiritual beliefs of Hawaiian people.¹⁴ Today, PMNM is one of the largest fully protected conservation areas in the world. It was created in 2006 to protect an exceptional array of natural and cultural resources. PMNM was inscribed in 2010 as the first (and currently only) natural and cultural World Heritage Site in the United States, encompassing 1,508,870 square kilometers (582,578 square miles) of the Pacific Ocean. The Monument is administered jointly by four co-trustees: the Department of Commerce (through NOAA ONMS and the National Marine Fisheries Service), the Department of the Interior (through the U.S. Fish and Wildlife Service’s National Wildlife Refuge System and Ecological Services), the State of Hawai‘i (through the Department of Land and Natural Resources’ Division of Aquatic Resources and Division for Forestry and Wildlife), and the Office of Hawaiian Affairs (OHA). The mission of the Monument is “to carry out seamless integrated management to ensure ecological integrity and achieve strong, long-term protection and perpetuation of NWHI ecosystems, Native Hawaiian culture, and heritage resources for current and future generations.”¹⁵

13 ‘Ōlelo No‘eau #327. Pukui, Mary Kawena. *‘Ōlelo No‘eau : Hawaiian Proverbs & Poetical Sayings*. Honolulu, Hawai‘i: Bishop Museum Press, 1983. Print.

14 www.researchgate.net/publication/320750400_Papahanaumokuakea_Integrating_Culture_in_the_Design_and_Management_of_one_of_the_World's_Largest_Marine_Protected_Areas/

15 www.papahanaumokuakea.gov/about/

The ocean exploration community has conducted a number of expeditions within PMNM in recent years.^{16,17,18} However, explorations were implemented without formal collaboration with members of the Papahānaumokuākea Native Hawaiian Cultural Working Group (CWG) beyond consultation in the planning process of the expeditions. As a result, there were missed opportunities to incorporate an Indigenous understanding of the value and human history of the Pacific and broaden opportunities for unique engagement with the local ocean exploration community and public audiences. As one of the organizations within the ocean exploration community committed to advancing JEDI priorities of the community at large, OET collaborated with the NOAA ONMS team to work with CWG members to address the need for expeditions conducted aboard *Nautilus* to reflect collaborative approaches inclusive of Hawaiian worldview. The CWG is a volunteer-based group of Native Hawaiian cultural experts, including kūpuna (respected elders) and practitioners, who provide advice and guidance on all management actions affecting Native Hawaiians and cultural resources in PMNM to OHA, one of PMNM's co-trustees. The NOAA ONMS team worked closely with OET to develop informational resources and materials and were eventually invited by OHA to present to the CWG about ways to connect and contribute to the *Nautilus* expeditions. These opportunities included activities such as providing Hawaiian names for the expeditions using traditional naming practices and co-hosting live ship-to-shore interactions with local schools and universities. Although students in the Hawaiian islands are located in a unique ocean setting home to PMNM, Native Hawaiian and Pacific Islander (NHPI) students are still extremely marginalized and underrepresented in STEM¹⁹. These students experience major challenges inherent to being a minority in STEM which also includes limited access to ocean exploration opportunities.

In preparation for the 2021 *Nautilus* deep-sea expeditions in PMNM, team members from the OET, NOAA ONMS, and the CWG collaborated to co-develop meaningful outreach and education opportunities, working with Native Hawaiian and Hawaiian language practitioners, with the intent to appropriately incorporate Hawaiian culture in expeditions, and to provide capacity to co-develop Hawaiian language STEM curricular materials for Hawaiian language immersion schools. These activities included: 1) Hawaiian naming of expeditions²⁰; 2) Supporting storytelling through development of promotional videos in Hawaiian highlighting Hawaiian worldviews of ocean exploration; 3) Creating Hawaiian language flyers²¹ and compiling Hawaiian vocabulary²² for science and technology terms commonly used on the expedition; 4) Broadening outreach to the local Department of Education²³ (DOE), charter, and kula kaiapuni (Hawaiian immersion school)²⁴ networks; and 5) Supporting live "ship-to-shore" interactions²⁵ in Hawaiian and English, which included supporting a paid internship position for a Native Hawaiian student who served as a data logger and a paid position for a CWG representative who served as a Hawaiian language correspondent and cultural liaison on an expedition. For this same expedition, these collaborative and strategic efforts resulted in 77 ship-to-shore interactions with schools, camps, and community event public audiences from 22 U.S. states and Canada, with about 26% of the interactions occurring with schools based in Hawai'i and about 10% represented by Hawaiian language immersion schools overall. Additionally, Hawai'i schools connected with the ship's missions ahead of and after the Lu'uaeahikiikapapakū expedition with 10 of the 26 statewide live interactions (38%) reaching learners at Hawaiian language immersion schools. Since Hawaiian language immersion schools comprise less than 10% of all Hawai'i DOE schools (there are a total of 287), this is a significant outcome and also supports revitalization of Hawaiian and efforts to normalize the language on a modern scientific expedition aboard a vessel conducting ocean exploration. Perhaps these experiences inspired those young Native Hawaiian students to imagine their own ancestors navigating and exploring the ocean long ago. Aia nō i ke kō a ke au - Time will tell.²⁶

16 oceanexplorer.noaa.gov/oceanos/explorations/ex1504/background/plan/welcome.html

17 nautiluslive.org/expeditions/2018/

18 schmidtocean.org/cruise/leg-one-papahanaumokuakea-monument/

19 ncses.nsf.gov/pubs/nsb20197/demographic-attributes-of-s-e-degree-recipients/

20 nautiluslive.org/blog/2021/12/10/whats-expedition-name-building-relationships-between-people-and-place-through-olelo/

21 naut.us/3r3aR02

22 nautiluslive.org/blog/2022/01/10/na-hua-olelo-no-ka-huakai-nautilus/

23 www.hawaiipublicschools.org/TeachingAndLearning/StudentLearning/HawaiianEducation/Pages/home.aspx

24 www.hawaiipublicschools.org/TeachingAndLearning/StudentLearning/HawaiianEducation/Pages/translation.aspx

25 nautiluslive.org/education/ship-to-shore-interactions/

26 'Ōlelo No'ēau #69. Pukui, Mary Kawena. 'Ōlelo No'ēau: Hawaiian Proverbs & Poetical Sayings. Honolulu, Hawai'i: Bishop Museum Press, 1983. Print.

I ka wā ma mua, i ka wā ma hope²⁷

Time in front, time in back (the future is in the past)

NHPI and Indigenous cultures around the world share the mindset of seeking guidance from ancestral knowledge of the past to address current and future issues. Their perspectives, cultural expertise, and respective knowledge systems and disciplines, and most importantly, their service to local communities is extremely vital to building a process for co-creating ethical and reciprocal codes of conduct within ocean exploration. However, NHPI and other groups remain severely underrepresented in STEM, ocean sciences, and maritime careers.

For future ocean exploration expeditions, we recommend researchers, funders, institutions, and vessel operators practice the following guidance, at minimum:

- Understand the social, political, historical, and cultural landscape of ocean exploration research sites in addition to the ecological/geological significance.
- Seek out other meaningful ways to connect with research sites and communities closely connected to “the place.”
- Enable knowledge sharing through purposeful exchange and weaving of cultural and scientific knowledge, and knowledge co-production.
- Provide meaningful opportunities for people from marginalized communities, particularly youth, to experience and participate in ocean exploration.
- Include access to ocean exploration through other languages such as Spanish and Indigenous languages, including the use of Indigenous place names.
- Consider how funding can prevent or enable access to ocean exploration, including approaches to funding and costs associated with access to ocean exploration.
- Recognize that ocean exploration research, education, and communications that include Indigenous knowledge and cultural resources require review and permission from the respective Indigenous communities.
- Recognize that the perpetuation and generation of knowledge about the ocean is a goal shared by many different peoples and communities for diverse reasons and, therefore, it is important to seek meaningful relationships and collaborations for better outcomes for all involved.
- Invest in the time needed to establish partnerships, learn from each other, and practice the guidance above.

The partnership we have described here represents a space for growth when engaging in Indigenous science, methodologies, and multi-disciplinary research to support biocultural management of PMNM, the ancestral islands of Kānaka ‘Ōiwi. This collective effort is laying the foundation for many years of collaboration as OET’s *Nautilus* – and others in the ocean exploration community – continue to operate in the Pacific and elsewhere. We hope that it can serve as an inspiration and foundation for others in the ocean exploration community to build upon.

27 Kame'eleihiwa, Lilikalā. *Native Lands and Foreign Desires: Pehea La e Pono ai? Honolulu, Hawai'i: Bishop Museum Press, 1992, 22.*

CHALLENGES	5-YEAR OPPORTUNITIES	10-YEAR OPPORTUNITIES
Lack of coordination amongst ocean exploration community stakeholders in addressing common goals for increasing diversity in ocean exploration and providing unified entry points/opportunities.	Increasing coordination, capacity, and protocols within organizations and throughout the ocean exploration community to share best practices, lessons learned, and opportunities for increasing diversity in ocean exploration.	Establishing a consortium of multi-disciplinary organizations that collectively move towards a common goal while supporting individual organizational goals.
Varying levels of effort across the ocean exploration community to involve local, Indigenous, and coastal communities in expeditions and research (from planning through interpretation). The current model is that the scientific community leads expeditions while Indigenous communities support them.	Increasing collaborative opportunities, including learning exchanges, training workshops, storytelling, education/outreach, hands-on experiences, and career development internships and opportunities.	Implementing Indigenous-led expeditions with the support of the scientific community, with more Indigenous and local scientists in the next generation to lead expeditions, and diverse roles for Indigenous people in ocean exploration.
Funding for local, Indigenous, and coastal communities to participate in partnership development efforts, expeditions, and research is lacking and/or inconsistent.	Providing support for local, Indigenous, and coastal communities including internships, outreach/education, community-driven ocean research and monitoring efforts, and stipends for expedition participation.	Establishing a practice for federally-funded expeditions to fund and include local, Indigenous and coastal communities in the planning and implementation of ocean exploration expeditions.
Underrepresentation of Native Hawaiian and Pacific Islanders (NHPI) in STEM including ocean exploration.	Working with Native Hawaiian-serving schools, including Hawaiian language immersion schools, to develop a curriculum (e.g., sustained ship-to-shore interactions, internships in the expedition planning through interpretation phases, summer exploration opportunities, bilingual material, and community days). Collaborating with outreach and education programs to support implementation and community sharing/outreach.	Sustaining opportunities, programs, curricula, and partnerships that create multiple entry points and pathways for NHPI students in STEM and ocean exploration.

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