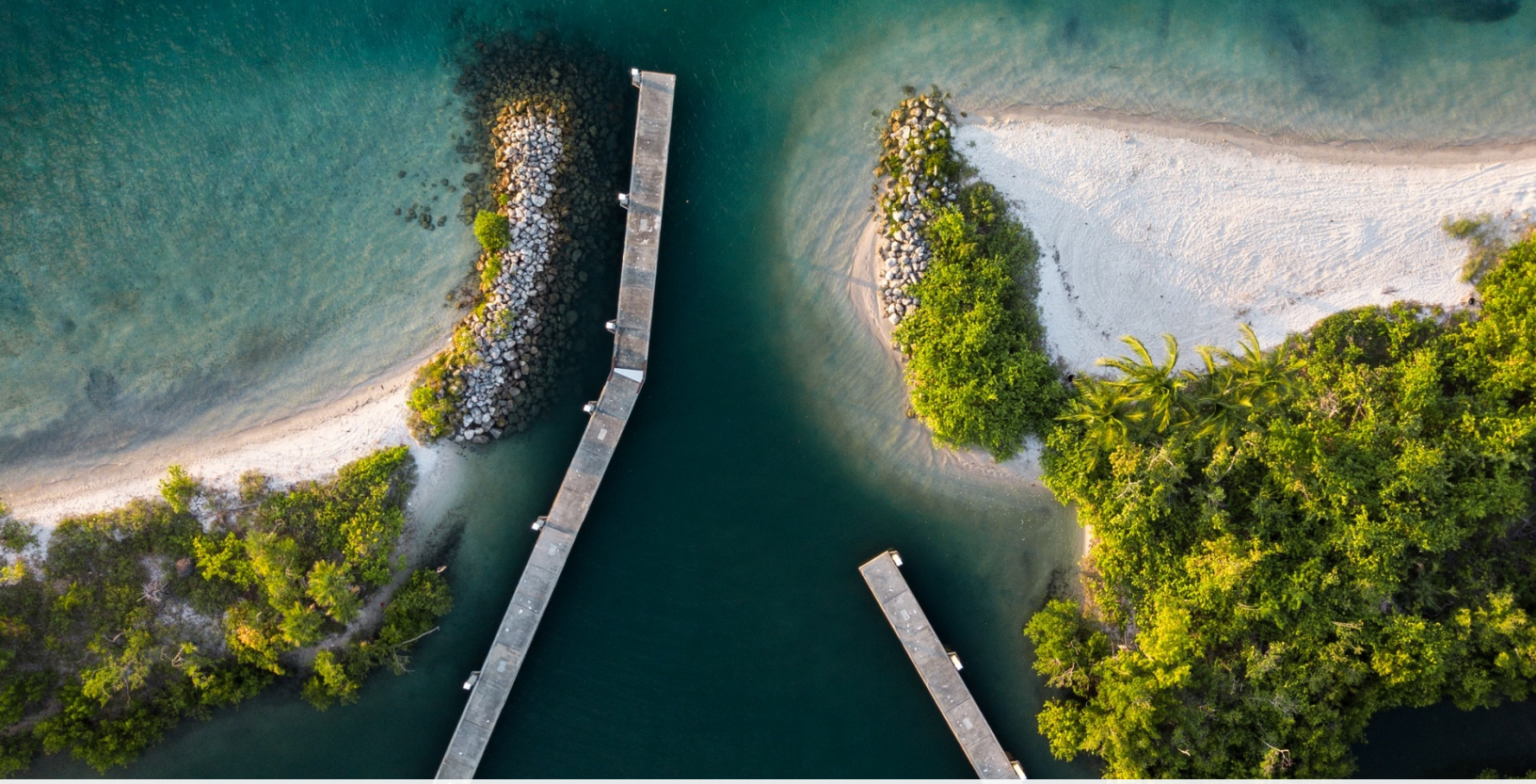
Support at the Intersections: Reframing Ocean-Climate Science and Solutions

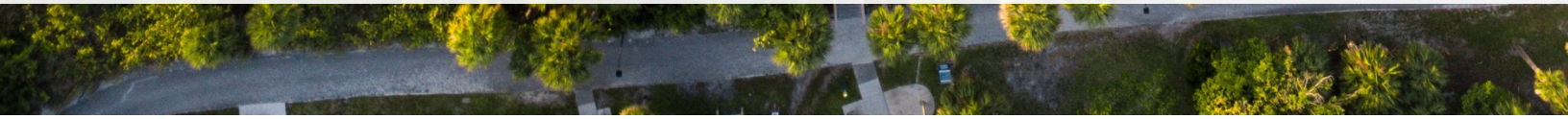


Proceedings and Recommendations from Advancing Ocean-Climate Scientific Leadership Along the U.S. West Coast

COMPASS

CALIFORNIA OCEAN SCIENCE TRUST

Convened by COMPASS and California Ocean Science Trust



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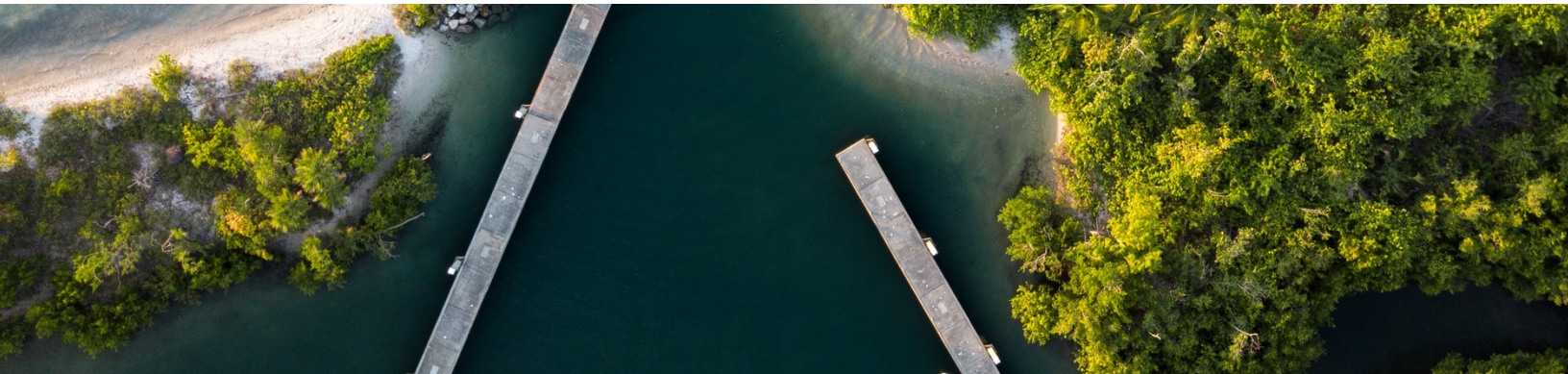

Executive Summary

On June 22-23, 2020, COMPASS and the California Ocean Science Trust (OST), with funding from the David and Lucile Packard Foundation, convened twenty leaders in ocean and climate science, conservation, and society to discuss pressing issues at the intersections of their collective expertise. The original convening goals, which included creating a shared understanding of major research efforts along the West Coast and considering future directions and needs within the nexus of ocean-climate science, were adapted to include racial equity and justice as a focusing lens for the initial plenary session as well as the five subsequent breakout sessions throughout the fall.

It must be acknowledged upfront that the participants for this engagement were originally gathered for their expertise and leadership within the ocean-climate field, rather than specific experience addressing diversity, equity, and inclusion issues. While these varied experiences brought a diverse range of knowledge and perspectives to the event, it also put participants with more experience and training in navigating issues of equity in a teaching role - a role, it must be said, that people of color often end up playing in their personal and professional interactions. However, we recognize that we cannot talk about the future of ocean science without centering equity within the future of ocean science. For many of the scientists involved, they know this but are grappling with, on multiple levels, how to do this concretely and what actions to take.

The arc of this engagement was therefore intended to help this group of ocean-climate science leaders grapple with the ways they could incorporate equity issues into their research, more critically examine their work through an equity lens, and inspire equity in research more broadly through the many roles that scientists often play - as funding reviewers, panelists, editors, educators and mentors, and authors of research priority documents. An analysis of the key issues and points made throughout these discussions yielded a three-pronged framework of self, science, and society as lenses through which to view the challenges and opportunities that were raised:

- **Self:** As individuals and scientists, there are opportunities and choices about how to develop research, how to execute it, who to collaborate with, and how and with whom we share it. Specific recommendations focused on evaluating the research and design process, considering how coproduction influences outputs and beneficiaries, actively cultivating partnerships and inclusion, and embracing reflection and self-evaluation as central to the process.
- **Science:** As members of and participants in the institution of science, scientists and researchers are both creators of and subject to the norms of science. Changing the norms around the culture and power of science, interdisciplinary research, and how, for and by whom science is used were identified as priority areas for further action.
- **Society:** Power dynamics at all levels of society can create barriers to equitable solutions, though opportunities exist to change this through a comprehensive evaluation of the distribution of power and capacity across systems & processes, a reframing of the conversation, a focus on funding what's necessary, and investing in people.

In addition to the framework noted on the previous page, two overarching recommendations emerged from these discussions. The first is to ***support, build on, and create spaces for support*** by joining, promoting, engaging with, and forming action groups to keep fighting against systemic racism in science, academia, government and society as spaces to partner in tangible opportunities for change. The second is to ***create individual and collective paths forward*** by developing a "roadmap" for how to integrate the natural and social sciences into ocean management, policy, and conservation, with a decisive centering around equity; and highlighting principles and case studies, so people can reflect and think about how they can incorporate change into their own lives, practices, and collaborations.

The questions, recommendations, and observations summarized in this report are not necessarily novel nor comprehensive, but rather are intended to reflect the broad spectrum of conversations that took place. It is our hope, however, that by contributing to a dialogue and support system, we can help inform individual actions, re-shape institutions, and re-frame scientific information entering public dialogues.

Introduction

On June 22-23, 2020, COMPASS and the California Ocean Science Trust (OST), with funding from the David and Lucile Packard Foundation, convened twenty leaders in ocean and climate science, conservation, and society to discuss pressing issues at the intersections of their collective expertise. The original intent of this event was to provide this group of scientific leaders with an opportunity for relationship building and a space for thoughtful and timely discussions focused on climate and ocean research, with the twin goals of creating a shared understanding of major research efforts along the West Coast and to consider future directions and needs within the nexus of ocean-climate science.

A few weeks before the event began, however, the murder of George Floyd sparked a summer of protests against racism and police brutality across the United States. This prompted difficult conversations within organizations of every kind about how to live into their intentions around justice, equity, diversity, and inclusion. After taking a long, hard look at the expressed values and commitments that COMPASS, OST, the Packard Foundation, and many of the institutions and organizations represented in the workshop, we realized it was impossible, and even unethical, to ignore this shift in societal discourse and attention and carry on with the event as planned. Working within the tight time constraints left to us, we rapidly reorganized the workshop to try and meet the moment.

The group gathered as planned on June 22-23 to discuss their research, explore common themes, and lay the groundwork for an arc of engagement that would continue through the Fall in five topical breakout groups (see Appendices A & B for full descriptions). The dialogue, however, now focused not only on the future of ocean-climate science on the West Coast, but specifically emphasized the confluence of racial equity, climate, and ocean science, with a goal of creating a better sense of ways to incorporate, acknowledge, and improve issues of equity within policy-oriented ocean-climate research.

With this change in focus, discussing “what the future of ocean-climate science looks like” certainly took on a new meaning. At the outset of this engagement, we recognized that we cannot talk about the future of ocean science without centering equity within the future of ocean science. For many of the scientists involved, they know this but are grappling with, on multiple levels, how to do this concretely and what actions to take.

It must be acknowledged upfront that the participants were originally gathered for their expertise and leadership within the ocean-climate field, rather than specific experience addressing diversity, equity, and inclusion issues. While these varied experiences brought a diverse range of knowledge and perspectives to the event, it also put participants with more experience and training in navigating issues of equity in a teaching role - a role, it must be said, that people of color often end up playing in their personal and professional interactions. The questions, recommendations, and observations summarized in this report are not necessarily novel or comprehensive, but

rather are intended to reflect the broad spectrum of conversations that took place. In the spirit of the community building intent of the original planned meeting, it is our sincere hope that by creating this space for thoughtful dialogue amongst colleagues, the central value in convening leaders in the ocean-climate science field to promote collaboration and nurture change from within remained intact, and will serve to further ocean science and conservation along the West Coast.

Findings

This series of discussions was designed to try to help this group of ocean-climate science leaders grapple with the ways in which they could incorporate equity issues into their research or begin to more critically examine their work through an equity lens. Our hope was that this layering approach would help deconstruct the incredibly complex subject of equity in ocean-climate science and that individuals would be able to find specific actions they could take or concrete questions they could ask or incorporate into research. Over the course of the engagement, however, we found that participants kept coming up against limitations and constraints they experienced at the societal or institutional level as individually-insurmountable barriers to effecting change.

The conversations themselves were multi-pronged, often tangled, and sometimes circular. They raised far more questions than they answered. As we stated in our community agreement at the outset of the plenary, there was often a sense of unfinishedness at the end of each session.

After all of the sessions had concluded, we were able to take a step back and find patterns of gaps and challenges, opportunities, possible solutions, and open questions within the layers of ***self***, ***science***, and ***society***, and have used this as an organizing framework for this report. These layers are, of course, nested, interconnected, and reinforce each other; for example, decisions made around individual research design (self) creating tension with the culture of science or current norms of interdisciplinary research. If enough individual decisions are made that challenge certain norms, those unwritten rules may begin to change. Conversely, if active efforts are made to change cultural norms, that may then influence different decisions to be made at the individual level. We cannot solve issues of equity and racial injustice, within ocean-climate science or beyond, individually. But individuals are thinking about and want to know what kind of actions they can begin to take, thus the helpful framing of self, science, and society.

Particular themes that emerged during the course of each breakout session included:

A. Integrating social & natural science to evaluate complex socio-environmental problems
    - *Interdisciplinary challenges, institutional incentives, comprehensive roadmap to integrate social and natural sciences*

B. Approaches to antiracist ocean & climate science
    - *Antiracism, communities of practice and support, critical examination of science*
C. Climate solutions for coastal communities along the West Coast that are equitable and reduce vulnerability
    - *Power dynamics, connecting the dots, building coalitions*
D. Integrating solutions to multiple climate stressors
    - *Equity, vulnerability, and policy*
E. Exploring your role in working against structural racism in institutions
    - *Culture, process, pathways*

Although this workshop report is organized around common themes that emerged throughout the series of discussions, from the plenary session in June through the five breakout sessions, other insights surfaced as well, which are more specific to ocean-climate science and the breakout session topics (see Appendix B).

Self

As individuals and scientists, we have options in how we move through the world - how we develop our research, how we execute it, who we collaborate with, and how we share it. These considerations are critical for creating more equitable research, data, and solutions at the intersection of climate, ocean, and people. And yet as individual scientists, there are different roles we play within that identity that can reinforce inequity and racism - but that also present opportunities to approach the process of science in an antiracist way.

Research Design, Process, & Results

How scientists go about conducting research itself received a high level of emphasis across conversations. Seemingly innocuous steps within the scientific process hold potential for supporting discrimination and inequity. For example, research assumptions at the outset of a project and research methods employed that are based on structural forms of racism can, and do, contribute to policy outcomes that furthers structural racism. The very framing of research questions is limited by the experiences of the individual, which can lead to racist recommendations and conclusions. Even the scale of research matters; it was noted, for example, that applied ecosystem science at too coarse a scale risks excluding voices at the margins.

These challenges are not insurmountable, however, and individual action can address many of them. Any researcher can start doing antiracist science right away. Solutions that came up over the course of conversation included:

- Evaluate research design & process:
    - Embedding the 3 Rs of Ethical Research: Reciprocity, Relationships, Responsibility
    - Designing research to explicitly address bias and power inequities
    - Adding a step to research to assess what goals and objectives the research is serving, and what goals, objectives, and voices are being overlooked
- Consider the outputs:
    - Meaningfully sharing data with communities who can use it
    - Prioritize use-inspired and applied science
    - Put more effort into the co-production of knowledge
- Partnership & inclusion:
    - Meaningfully include communities and indigenous voices in our research
    - Cultivate long-term partnerships
- Self-reflection & evaluation:
    - Identify your own inherent biases in ideas, data interpretation
    - Recognize that doing research itself is also a power-related activity
    - Put ourselves into non-expert roles to come up with ideas and solutions
    - Have shared knowledge among expertise so that we can listen to others more

Lab/Workplace Dynamics

Separate from their role as an individual researcher, we also engage with colleagues, students, and other coworkers as part of a lab or other workspace. There are almost always strong power dynamics at play within these relationships and workplace environments. There are also biases in recruitment within labs and universities, and in turn there are biases within promotion decisions at all levels. These power structures can be exclusionary and are often advanced through individual actions, but conversely they also feel overwhelming for one person to address alone.

Within our discussions, a need was identified for tools to support speaking up and taking action in service to diversity, equity, inclusion, and justice efforts, as well as for accountability and transparency. Proposed actions and solutions to address some of these dynamics and potential sources of racism include:

- Be an example:
    - Serve in leadership roles
    - Model these conversations within institutions - don’t wait for permission
    - Acknowledge our roles as not just scientists but also mentors, gatekeepers, funders

    - Recognize the possibilities where we have access to influence positive outcomes or where we are the cause of barriers
- Find ways to take action:
    - Build diversity, equity, and inclusion into our work plans and our supervisees' work plans, and making sure they have the time to do the work
    - Develop local communities of learning and practice to center diversity, equity, inclusion and justice in research
    - Use our skills as scientists to dive into the literature on diversity, equity, inclusion and justice

Science

As members of and participants in the institution of science, scientists and researchers are both creators of and subject to the norms of science, whether they be advantages or barriers. As such, individuals play a role in challenging and changing norms, making scientists themselves accountable for shifting different aspects of the culture of science. Three themes emerged from our discussions that articulate where there are particular obstacles, as well as opportunities, to create more inclusive and equitable ocean climate science. These themes centered around the culture of science, interdisciplinary research, and how science is used.

Culture of Science

When examining the culture of science, challenges to more equitable and inclusive ocean and climate science were articulated around funding, institutions (e.g., universities), and training. Participants noted that funding cycles and project timeframes aren't in alignment with needs for inclusion and equity, and that funding opportunities (and therefore research incentives) are dictated by people who already have power. At the institutional level, there is generally a lack of recognition of how past actions have led to current impacts, as well as a lack of support to do research informed by identity, or to change institutional policies to center on diversity, equity, inclusion, and justice.

In terms of how scientists themselves operate within the culture of science, there is increasing recognition of the paradigm of false objectivity created and fostered by colonial STEM training, which teaches that science can't be objective if the researcher (and the researchers' identities) are included or acknowledged in the research. In this instance, changes within the internal or interpersonal perceptions or actions of individual researchers have the potential to collectively spark change within the broader institution of science culture. As identity is more actively incorporated into research, it may be that the disconnect seen between "worthy" research topics and the people who are impacted by ocean and climate change are lessened.

Actions and steps brought up throughout our discussions that researchers can take to facilitate change within the culture of science included:

- Acknowledge the past:
    - Truth before reconciliation - understand and acknowledge the harm scientific fields have caused (and that still impacts people today)
    - Education needs to own and teach equity and inclusiveness
    - Critical reading of historical context of foundational text of work in each scientific field, and think about how that has affected the development of the field
- Create inclusive community:
    - Creating codes of conduct for labs, departments, scientific societies, awards and honors review committees, etc.
    - Design and facilitate equitable classrooms
    - Make work towards equity and justice and engaged scholarship (via teaching, research, or service) explicitly valued in tenure and promotion evaluation
    - Surround yourself with others doing this work
    - Identify and try to neutralize power dynamics
- Shift your mindset:
    - If you are not already doing so, think about the frame or context of your research question and ask that question with social justice in mind
    - Pay attention to, learn from, and emulate the actions of colleagues who are “putting in the work”

Interdisciplinary Research

Social science can tell us a lot about how to identify and address factors that promote and perpetuate issues of equity, making it that much more critical to even the most natural science-oriented questions in ocean-climate science. However, numerous barriers exist to realizing interdisciplinary work that could further equity and inclusion. This is not a new observation; there is a considerable body of existing literature on these barriers, as well as ideas for how to achieve interdisciplinary science, some of which were echoed in our conversations.

Institutional barriers within universities tend to be some of the most challenging that scientists come up against, including department structures, rigid hiring processes, lack of support for training interdisciplinary students, and lack of incentives within institutions for doing interdisciplinary work. While the value of interdisciplinary research continues to be overlooked, the true cost of interdisciplinary collaboration is also continually underestimated by departments, institutions, and funders alike. This is in part because researchers don’t always have the time and skills required to facilitate and organize interdisciplinary teams, thus requiring more time than anticipated to do the

work or enlisting outside help at additional cost. Even more fundamentally, there remain difficult-to-bridge gaps between the language and methods of social and natural sciences, taking more time, expertise, and resources to successfully conduct interdisciplinary research.

There is also a tension between the fact that science is slow, and people experiencing the effects of climate change - compounded by racial inequity - don't have the luxury of time. While science and scientists can help facilitate a better understanding of challenges, researchers should be cognizant of working in service to rapid solutions as well. Focusing science and research on *solutions* presents a powerful opportunity, however, because problems and, conversely, solutions in the real world are inherently interdisciplinary.

Solutions to addressing barriers to interdisciplinary research discussed by the group included:

- Funding:
    - Build an equity perspective into ocean-climate science funding decisions, so that new and under-represented PIs are afforded the same opportunities to offer novel perspectives as established scientist leaders typically are
    - Strengthen and increase opportunities for both social science and interdisciplinary work; avoid siloing funding along disciplinary lines
    - Provide fellowships or grants explicitly for early career scientists that do interdisciplinary research
    - Make investments in deep, long-term community engagement
    - Support evaluations along equity lines, and be transparent about the funders' own accountability to equity
- Provide training & opportunities:
    - Train natural scientists in enough social science to facilitate more effective collaboration and bridge fields
    - Hire social scientists at field stations
    - Training students to do interdisciplinary work
    - Create jobs for social scientists and interdisciplinary scientists
- Create space:
    - Create high-profile journals that focus on interdisciplinary work (building on incentives within current system)
    - Creating convening spaces for interdisciplinary work (role for NGOs)
    - Co-design transcendental research that stretches across institutions

How Science is Used

There is a general acknowledgement that ecological science and management since the mid-20th century has prioritized species protection over human survival issues or basic needs. But, as we know, single-species management approaches can ignore unintended consequences. Even as ocean and climate science become more applied, the applications themselves are often fraught. For instance, racial inequity is not included in vulnerability or impact assessments for issues like sea level rise. But the reality is that multiple environmental stressors, particularly when considering those related to climate change, affect physical, biological, and social outcomes for coastal systems and communities (both human and non-human). Scientists working in these systems need to ask themselves: *Who is dependent on these resources for their livelihoods, and for cultural access? How can I consider these end-users (i.e., beyond formal decision-makers) in my research? In what ways can I learn from them, and how can my science align with their knowledge to be more relevant and useful? Who has access to, and who ultimately gains from, my research?*

More equitable and inclusive ocean-climate science offers the opportunity to address vulnerabilities directly by focusing on social inequities while at the same time addressing climate inequities. Ideas discussed for how to take active steps towards taking on some of these challenges included:

- "Right-size" funding:
    - Advocate for getting resources scaled to the challenges
    - A lot of adaptation does not cost us more money, it is about spending money we already spend into things that are applied to all the people in the community and are effective for climate change
- Take the time and make the effort to build bridges:
    - Prioritize finding multi-stakeholder solutions
    - Bust silos and become people-focused/people-centered
    - Join existing coalitions and co-design solutions across stakeholder groups (e.g., public policy, civil society, industry); found these coalitions if none already exist
    - Scientists bring their information and communities bring their own information to find solutions together - and those solutions are not only more applicable, but have a higher likelihood of being successfully implemented
    - Show how things will change in the future - share scenarios that help people come to grips with how things will change and help them take ownership of what will happen in the future; continuing to use the model of designing stakeholder engagement based on what they've witnessed in the past will not help inform their decisions for the climate of the future

- Assess power dynamics and *use* your privilege:
    - Information brokers that are well established should take the risk of saying things that others can't
    - Think strategically about who to enlist among the empowered, and become a constituent

Society

The influence of broad societal factors on equity within science comes from many sources: politics, the economy, power dynamics, and deeply ingrained belief and value systems. In our discussions, some of these were treated "as given," and internalized as barriers that researchers seeking to make positive change are forced to work around; others were identified as elements that scientists may be able to play a beneficial role in directly influencing to effect change. As a result, challenges that fell in the realm of "society" lacked the coherent themes that we found when considering the layers of self and science that emerged through our discussions. Instead, we found patterns around broader subjects, such as policy, power, and economy.

The uptake of science into policy is often circuitous, which can make the effect of science on decisions feel tenuous. Policy choices reflect not only scientific input but also sensitivity to the values and influence of different stakeholders, communities, and constituents. It can therefore feel challenging or unclear to researchers how to effectively improve or participate in the decision-making process, particularly underrepresented voices. Moreover, active participants in policy processes and the management entities making decisions are often unequally composed of the most privileged members of society with the time, resources, and ability to engage, driving decisions towards their preferred priorities. It therefore becomes an imperative that scientists who manage to successfully navigate policy processes use their privilege - in whatever form it may come - to ensure that science and scholarship do not succumb to the pressure to simply follow those privileged priorities.

These challenges are further exacerbated in the realm of climate policy. Despite recent steps forward, the overlap of equity and climate have historically been left out of government discussions. "Colorblind" adaptation planning reinforces vulnerabilities, as do reactive, rather than proactive, measures. Distributional effects created by existing policies and regulations, which have impacted communities in unintended ways or failed to address future threats, contributes to adaptation variability, while the lack of a national climate policy or the lack of political will to change or overcome inequitable policies could also significantly impact West Coast initiatives. Society and governance both broadly trend towards being reactive, not proactive, which can further create winners and losers, as well as exaggerate the disparities between them.

Power dynamics at all levels of society also create barriers to equitable solutions. Basic human rights and the intersectionality of impacts are often not considered as we develop technology, projects, and data to understand and address climate-driven

impacts. Competitive societal classes and structural racism prevent investment in deep community engagement and evaluation. Existing market forces, meanwhile, will protect the status quo and may prevent or delay social change. Those with the "most effective" - or just most easily quantifiable - use of a resource often get prioritized. Developing processes and adapting systems so that they address societal needs for climate solutions more equitably and inclusively is a moral imperative as well as an operational one; simply put, these barriers must be addressed.

These challenges are varied in their expansiveness, prominence, and degree of influence on diversity and equity concerns specifically impacting the ocean-climate field. That such a disparate assortment of societal factors are all contributing, in addition to the individual and institutional challenges already identified, suggests that a broad suite of actions is likewise needed to address or nullify them. Potential solutions and opportunities discussed throughout this convening included:

- Evaluate systems & processes:
    - Create more comprehensive processes and frameworks as part of adaptation planning and policies, to include all aspects of vulnerability
    - Market-based solutions - change incentives of private actors
    - Campaign finance reform
- Fund what's necessary:
    - Fund across legislative/administrative transitions
    - Stipends or other financial support to participate in providing science access to decision-making and "make it part of your paid job"
    - Support long-term engagement with communities
- Reframe the conversation:
    - Call attention to the clear and tangible impacts of climate change in well-documented ways (e.g., by sharing long time series data) that emphasize the racial inequities of climate change impacts
    - Reframe resource competition discussions - "not for the few but for the many"
    - Consistent sharing of solutions and highlighting of what works
    - Work to build trust among actors to combat mis-information
- Invest in people:
    - Empowerment of trusted boundary spanners
    - Increase representation in advisory roles
    - Meaningful, effective, and long-term community engagement
    - Amplify unheard voices in all arenas
    - Greater diversity in the boards of nonprofits
    - Ensuring younger generations are represented on boards and other decision-making positions
    - Capacity building for new and diverse leaders from communities

Concluding Thoughts: Open Questions & Recommendations

Although many within our group of participants have been investing, personally and professionally, in learning more about equity and inclusion, and in fact some have been working in that space for years, we reiterate that this collective group are ocean-climate science experts rather than experts on racial equity. These observations are therefore not intended to be received as novel nor comprehensive, but rather are the needs articulated and observed from the vantage point of this group of experts working in ocean-climate science today. The challenging and complex conversations this group had around equity and ocean-climate science surfaced many questions about themes that traverse the layers of self, science, and society. Many of these questions cut across the various themes that emerged through this dialogue and centered on inclusive processes, priorities, responsibility and ethics, the working culture of science, and definitions. We present these questions and considerations here as possible topics for further inquiry and guidance for future investment.

Within the intersections of self and science, questions of priorities, responsibility, and the working culture of science were raised around research design, process, and results; lab/workplace dynamics; the culture of science; and how science is used:

- Priorities:
    - Further prioritize diversity, equity, inclusion and justice in our individual research. Keep actively pushing others to prioritize diversity, equity, inclusion and justice in their research.
    - Push the culture and institutions of science more broadly to prioritize diversity, equity, inclusion and justice - for example, by changing incentives for recognition, promotion, publication, participation, and inclusion.
    - As individuals and as a collective, prioritize the long-game of scientific inquiry rather than short-term successes. (But highlight and celebrate both!)
- Responsibility & ethics:
    - There are ethical considerations regarding the relationships that scientists have with people and we must consider the responsibility we may bear for the *ideas* that our research may unleash and for the *ways* that other people may use the ideas that we unleash.
- The working culture of science:
    - How can we institutionalize and embed equity work for more science- and research-oriented jobs?
    - In spaces where issues of equity are not openly discussed, how do we work to embed these conversations into our workplaces, and in our working culture?

    - How do we support students, early career professionals, and junior faculty in this climate?

Within the intersections of science and society, questions of how important concepts or issues are defined were raised, both in terms of what the definition comes to be and who is doing the defining. This subject of definitions or determinations touches on many elements of science and society, but specific points in our discussions were raised around:

- Science: There are different forms or types of knowledge and many have roles in climate solutions. What are considered valid and valued forms of science? Who defines this?
- Problems: Who identifies a problem? Whose problem is it? Who caused it and/or is responsible for addressing it?
- Success in addressing inequity: Who is determining success? What is equity?
- Resilience: What makes a community strong and resilient? It's not just about material aspects, but community support, identity, and many other intangibles.

One topic that emerged in several of our conversations, cutting across self, science, and society, was that of inclusive processes. This came up in everything from research design, process, and results to power and policy at the societal level. Inclusivity and work that engages and is engaged with communities is critical for making ocean-climate research successful and relevant. Actions and practices for consideration include:

- Bring 'the community', and the distinct knowledge they hold, into research design;
- Normalize formally working alongside community members and non-scientists as a standard part of research;
- Advocate that training for scientists and students focused on how to work with community groups needs to be a standard part of core research training;
- Ensure that all voices are included in the process. Always ask: *who has a voice, who is most heard, and who aren't we hearing from?*
- Make sure that solutions don't leave anyone behind and be vigilant for unintended consequences;
- Consider what gets lost if we focus on community benefits and adaptation and neglect the individual;
- Ask whether the current public participation process is enough to inject greater equity into policy making;
- Do the active work to remain informed on inclusive process scholarship - there is an entire body of literature on every one of the points above, and like every field it is constantly evolving.

Recommendations

Two specific recommendations came out of our discussions, both of which support many of the opportunities to work towards solutions that are noted in the Self, Science, and Society sections above. Some participants expressed frustration at not knowing what to do around issues of racial equity, not feeling like they had enough power to enact change, or not feeling like they had the support to create those changes. These recommendations speak to the broad challenges voiced by this group of scientists as focal points for how collective forward movement would be best served.

- *Support, build on, and create spaces for support:*
    - Join, promote, and engage with action groups supporting scientists to keep fighting against systemic racism in science, academia, government, and society. These groups exist in many places and forms; seek them out.
    - If the right support network isn't available, create new spaces and groups to partner in tangible opportunities for change.

- *Create individual and collective paths forward*:
    - Develop a "roadmap" for how to integrate the natural and social sciences into ocean management, policy, and conservation, with a decisive centering around equity.
    - Highlight principles and case studies, so people can reflect and think about how they can incorporate change into their own lives, practices, and collaborations.

We recognize that, in this document, we have raised far more questions than we have answered, and that many of these questions have been asked elsewhere before. Our series of conversations, however, made clear that creating and participating in an effective support system would greatly help inform individual actions, re-shape institutions, and re-frame scientific information entering public dialogues such that it breaks down barriers to more just and equitable solutions to ocean change, rather than reinforcing inequalities.

There is a fierce urgency related to climate impacts and ocean change that individuals and communities are feeling *now*, but having built a legacy of unintended consequences, scientists, policymakers, and society as a whole must, above all, appreciate there is no excellence if equity isn't built in from the beginning. Recognizing the experience and expertise of the people who inhabit a particular place is essential, as is reading and learning about the histories of these communities from their perspectives. Communities and community members must be part of the dialogue and scientists can help them build the path to climate resilience and adaptation by walking it with them, but projects have to leave the community with more capacity and greater economic and educational opportunities and growth.

Appendix A: Convening Overview

Six remote sessions were held over the course of five months, beginning with a full-group plenary on June 22nd and 23rd. The first day of this inaugural plenary session was exclusively focused on perspectives on the intersections of race, climate justice, and the environment, which provided an overarching frame of reference for the discussions that followed. The plenary session included a panel discussion featuring Dr. Michael McAfee, President of PolicyLink, and Dr. Aradhna Tripati, Director and Founder of UCLA's Center for Diverse Leadership in Science. The second day of the plenary session provided space for reflection and discussion by participants, as well as a series of participant-led lightning talks designed to give the group a sense of the highlights and recent findings of each researcher's ongoing work in the climate-ocean space.

After the initial meeting, each participant attended two or more additional breakout sessions over the course of the summer and fall. The breakout session topics, determined by surveying the full participant group, were:

A. Integrating social & natural science to evaluate complex socio-environmental problems (September 17)
B. Approaches to antiracist ocean & climate science (September 29)
C. Climate solutions for coastal communities along the West Coast that are equitable and reduce vulnerability (October 12)
D. Integrating solutions to multiple climate stressors (October 22)
E. Exploring your role in working against structural racism in institutions (October 28)
    - Invited speakers and panelists: Dr. Judith Brown Clarke, Vice President of Equity & Inclusion and Chief Diversity Officer at Stonybrook University; and Brandi Colander, Chief Sustainability Officer at Westrock.

The sessions were sequenced, so that individuals could participate in one of the first two topics, broadly focused on "how we do our science", and subsequently one of the second two topics, broadly focused on "what questions are we asking." Our intent, by setting the stage through the plenary sessions' focus on racial equity, was to interweave these themes throughout the subsequent breakout discussions. We acknowledged, upfront, that separating out some of these topics - particularly that of working against structural racism (Topic E) - would create an artificial delineation when the issues are, in reality, deeply entangled with each other. However, there was significant enthusiasm for having dedicated time and space devoted to the topic of structural racism expressed by participants during the plenary session and in subsequent feedback; thus we felt it was important to dedicate time for those conversations to continue.

Appendix B: Breakout session-specific takeaways

This report is organized around common themes that emerged throughout the series of discussions, from the plenary session in June through the five breakout sessions. Other insights surfaced as well, which are more specific to ocean-climate science and the breakout session topics, that we felt were worth including in more detail here.

1. Integrating social & natural science to evaluate complex socio-environmental problems

   This breakout session was an acknowledgement that, despite progress, barriers to harmonizing the natural and social sciences in the ocean-climate field continue to exist. This is a critical gap, as solutions have failed in the past when relevant disciplines were ignored - for example, when human behavior wasn't accounted for in ecosystem management. Moreover, questions of equity and justice are inherent to much of the work done within the social sciences and through interdisciplinary research, and there was a recognition that siloed schools of thought also tend to exclude marginalized voices that exist across these barriers. A lack of incentives to pursue multidisciplinary research, within both academia and funding opportunities, was highlighted as a significant contributor to this challenge. Recognizing, incentivizing, and institutionalizing the emphasis on multidisciplinary collaboration, as well as efforts to educate experts in one field about the strengths of other disciplines, were seen as necessary first steps in changing the existing dynamic.

2. Approaches to antiracist ocean & climate science

   This breakout session was designed to help individuals start thinking about what actions they could take and what changes they could make within their research to be anti racist. The pressure of dominant white culture in science, and the feelings of powerlessness often associated with fighting against structural and institutional racism, came through very acutely during this conversation. Our discussion surfaced a number of profound observations, including that there is no single area of science that is *not* impacted or influenced by historical (or contemporary) issues of race or equity. History is so important because it determines what we see now and we need to understand how history, and with it many policies, have evolved to bring us to where we are now.

   Three key actions and considerations noted by the group were: to think about how to elevate antiracist work so it is valued and appreciated and is not too "risky" for early career scientists pursue; to consider models of science that aren't built on colonialist and capitalist foundations; and to recognize that how they teach theory and concepts is something they can change, even though it requires more work.

3. Climate solutions for coastal communities along the West Coast that are equitable and reduce vulnerability

   This discussion was an opportunity to reflect on how developing climate solutions is a difficult task in its own right, but ensuring those solutions are effective *and* equitable is even more challenging. This led to a discussion about who problems were affecting, who these solutions were working for, and the embedded power dynamics therein. Are there existing solutions that haven't been explored or implemented because of market or political barriers, or because society hasn't yet demanded them? As researchers, we often spend time developing technology, projects, and data that do not take into account basic human rights and the intersectionality of impacts. Yet the role of a scientist goes beyond that of research, and includes serving as mentors, peer-reviewers, panelists, and funding influencers. Scientists therefore can, and do, contribute to many of the barriers to more positive, inclusive co-production of solutions - but also have an opportunity to push for change within each of these identities.

   In other conversations about climate futures, there is a tendency to emphasize material impacts over all else. This can silo people working in different contexts when the underlying focus across solutions is community and equity. Coalition building, alongside efforts to co-produce solutions with communities, was strongly emphasized as a path forward.

4. Integrating solutions to multiple climate stressors

   In this discussion, we sought to think about solutions to various climate stressors (e.g., species range shifts; harmful algal blooms; upwelling & current changes) through the lens of previous discussions topics (i.e., integrating social & natural sciences; antiracist science; equity in and vulnerability of coastal communities), as well as the challenges and opportunities presented by different aspects of these solutions. Looking across these challenges and opportunities, we then tried to find commonalities that could be a starting point for integrating solutions. We found that existing market forces and legal frameworks protect the status quo and that solutions would ultimately require amplifying voices, addressing stressors proactively, and following the precautionary principle.

5. Exploring your role in working against structural racism in institutions

   This breakout session examined ways that structural racism shapes science-oriented institutions and explored how individuals can develop and use tools and practices that change or eliminate structures that perpetuate systemic racism. Experts in the diversity, equity, inclusion, and justice field shared perspectives from their experience in academia, nonprofits, and government. Identified barriers included power structures that are unwilling to recognize a problem exists and/or make necessary changes, the high 'cost' of making

change, and the homogeneity of the power structure itself. The solutions discussion focused on ways to lead from the front, the middle and the back and led to tactical suggestions regarding participation in committees or other structures that can help shape change as well as looking at measurements and rubrics regarding what kinds of actions are rewarded, as well as how they are rewarded.

Appendix C: Barriers

Throughout these convenings and conversations, multiple barriers for scientists seeking to actively make change were identified. Further hurdles were identified when considering the challenges to interdisciplinary science and co-production with communities, both of which were highlighted by the group as key elements to developing and implementing science-based solutions to ocean change that further equity and inclusion. Recognizing that an extensive body of literature exists on barriers to effecting change around diversity, equity, inclusion, and justice, we provide this list here in the hopes that the organic way in which they were raised in our conversations further emphasizes their urgency. These barriers have been broadly grouped into three themes, with significant overlap between them: science as an institution; funding; and policy/decision-making processes.

Science

- The system is conservative vis-a-vis interdisciplinary training, despite there being great need for interdisciplinary individuals who can bridge disciplines and cultures
- Power dynamics within academia
- There are still biases in recruitment and promotion at all levels; the “old boys club” still exists
- Implicit, structural, and explicit racism within academia
- It is inherently difficult for institutions to do interdisciplinary work
- Publishing interdisciplinary science can be very challenging, because journals are often disciplinary in focus; editors and reviewers generally want to see deep thinking within their specific disciplines, rather than transdisciplinary thinking, and they have little accountability; and case studies are difficult to publish
- Shared purpose can lead to success, but can be hard to articulate those goals because of different backgrounds, training, and expertise
- Social science spans a very broad area, with many fields, but these disciplines are often lumped together and viewed as interchangeable
- Many scientists default to false objectivity
- Antiracist science can be undervalued and/or deemed “too risky” for early career scientists
- Society judges what counts as “good science” and further filters that science through policy lenses; both of these filters are controlled by people who already hold power
- Funding cycles and project timelines can be a barrier to deeply engaging with communities

Funding

- Many research funding sources, such as NSF, are siloed into disciplines
- Research and other work essential to creating change, such as social science, interdisciplinary, or DEIJ-focused programs, is often most at risk for budget cuts
- Incentive structures for multidisciplinary work like this may not exist in a budget crisis
- There are few research fellowships or grants for early career scientists that explicitly do interdisciplinary research
- There are very real risks for graduate students doing this work and then entering the workforce, where it is undervalued (if at all) as a core career skill
- Funding sources can be so disciplinary in nature they often prevent true integration of social-ecological science
- Power dynamics between funding sources and scientists
- There is a need to grow new sources for social science, since it often gets the "short end of the funding stick" (e.g., NSF Broader Impacts can fall short, and can feel like an add-on)
- Funders often have relatively little (or not visible) accountability to equity
- Lack of investment in deep community engagement
- Lack of investment in evaluation along equity lines

Policy / decision-making

- Politics, policy, and competitive societal caste systems
- Lack of political will to overcome equitable policies
- Overcoming competition over resources: reframing to "not for the few, but for the many"
- Current public participation process not enough to inject greater equity into policymaking
- Need more empathy
- Market forces heavily favor the status quo
- Knowing what the cost of inaction is, especially to disenfranchised people
- Power dynamics in policy creation lead to more barriers to equitable solutions
- Lack of data on anyone other than direct market participants (e.g., license holders in fisheries)
- Implicit, structural, and explicit racism within society
- Changes in political administrations can rapidly undo progress
- Nonprofits typically lack diversity on their Boards
- Younger generations and junior researchers are often excluded from Boards and other decision-making institutions