



# Pathways to Justice, Equity, Diversity, and Inclusion in Marine Science and Conservation

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Marine conservation sciences have traditionally been, and remain, non-diverse work environments with many barriers to justice, equity, diversity, and inclusion (JEDI). These barriers disproportionately affect entry of early career scientists and practitioners and limit the success of marine conservation professionals from under-represented, marginalized, and overburdened groups. These groups specifically include women, LGBTQ+, Black, Indigenous, and people of color (BIPOC). However, the issues also arise from the global North/South and East/West divide with under-representation of scientists from the South and East in the global marine conservation and science arena. Persisting inequities in conservation, along with a lack of inclusiveness and diversity, also limit opportunities for innovation, cross-cultural knowledge exchange, and effective implementation of conservation and management policies. As part of its mandate to increase diversity and promote inclusion of underrepresented groups, the Diversity and Inclusion committee of the Society for Conservation Biology-Marine Section (SCB Marine) organized a JEDI focus group at the Sixth International Marine Conservation Congress (IMCC6) which was held virtually. The focus group included a portion of the global cohort of IMCC6 attendees who identified issues affecting JEDI in marine conservation and explored pathways to address those issues. Therefore, the barriers and pathways identified here focus on issues pertinent to participants' global regions and experiences. Several barriers to just, equitable, diverse, and inclusive conservation science and practice were identified. Examples included limited participation of under-represented minorities (URM) in research networks, editorial biases against URM, limited professional development and engagement opportunities for URM and non-English speakers, barriers to inclusion of women, LGBTQ+, and sensory impaired individuals, and financial barriers to inclusion of URM in all aspects of marine conservation and research. In the current policy brief, we explore these barriers, assess how they limit progress in marine conservation

research and practice, and seek to identify initiatives for improvements. We expect the initiatives discussed here to advance practices rooted in principles of JEDI, within SCB Marine and, the broader conservation community. The recommendations and perspectives herein broadly apply to conservation science and practice, and are critical to effective and sustainable conservation and management outcomes.

**Keywords:** equity, diversity, inclusion, conferences, peer-review, bias, marine, conservation

## INTRODUCTION

The lack of diversity in marine sciences and conservation has existed for a while, however its extent, specific causes and impacts are being characterized more recently by scholars and practitioners globally. Overcoming this lack of diversity triggered by systemic inequities and exclusion remains complex and overdue, and can only be achieved by first identifying causative factors and potential pathways to resolution of each. Some efforts to improve equity, diversity, and inclusion are underway, especially within the last decade (Tulloch, 2020). While the overall representation of individuals from marginalized, overburdened, and underrepresented minorities (URM) has seen a modest increase, ethnic, and racial diversity within the marine or ocean sciences has stagnated (Bernard and Cooperdock, 2018). Some of the identified challenges in marine sciences, and more generally in the biophysical sciences, include lack of leadership roles for under-represented groups, access to academic conferences, representation across all communities, and organizational-level changes. To develop the initiatives and support systems that foster diversity and inclusion in STEM, diversity and inclusion in leadership roles are required (Robinson et al., 2013; Abdul-Raheem, 2016). A lack of diversity at the leadership level is often due to an absence of support systems for URM individuals, leading to systemic effects of a non-inclusive and unempathetic environment. There is ample evidence that minority groups in science face multiple barriers that span across the processes of publishing and funding to being hired and tenured. So URMs largely remain URMs with no upward mobility over time.

One barrier is ecology conferences; most do not ensure diversity of plenary speakers or provide support services to include parents with childcare needs and LGBTQ+ individuals (Tulloch, 2020). Many ecology conferences also have high registration fees and travel costs which can exclude many ethnic minorities and early career researchers due to a lack of funding resulting in financial barriers to developing professional connections and collaborations (Niner et al., 2020; Niner and Wassermann, 2021). Another barrier is publication in scientific journals, editors and reviewers are primarily from North America and Europe and identify as male (Preston, 2018). Gender-related barriers also exist. A recent report by Women in Ocean Sciences suggests that 78% of women engaged in marine sciences have experienced sexual harassment in their workplace or learning environment (Sexual Harassment in Marine Science, n.d.). Only 39% of the respondents who experienced sexual harassment reported it, and only one-third had institutional

policies in place to tackle sexual harassment (Sexual Harassment in Marine Science, n.d.). Last, compared to majority groups, gender and racial minorities' novel contributions are recognized at lower rates by other scholars and equally impactful contributions are less likely to result in successful scientific careers (Hofstra et al., 2020).

Equity, diversity, and inclusion in marine sciences are required to ensure representation across all communities in the marine conservation space. This representation ensures the prioritization of justice, stakeholder and rightsholder supportive outcomes, effective communication, and sustainability in conservation measures. Further, diversity is known to foster innovation (Phillips, 2014). Research has demonstrated that groups of people working together who are diverse in terms of race, ethnicity, social status, and gender are more innovative than homogeneous groups; typically generate more productive and innovative solutions to problems; and demonstrate greater critical thinking and analytical skills (Phillips, 2014). Marine conservation has one of the highest complexity indices (Dulvy et al., 2017) due to the inherently complex nature of the issues it encompasses, including the numerous stakeholders and diverse interests involved. Those complexities include, for example, the design and management of conservation for marine organisms and ecosystems, which may often span multiple countries' exclusive economic zones and jurisdictions as well as affect fisheries dependent livelihoods. Marine conservation requires innovative ideas to solve such complex issues, ensure sustainable, and effectively protect marine biodiversity. Marine conservation, therefore, needs to invest and engage in improving diversity and inclusion in the field.

Current efforts to increase diversity of URM students in STEM tend to focus on improving students' academic capabilities and psychological perceptions of STEM. However, a sustained improvement in justice, equity, diversity, and inclusion (JEDI) issues in conservation requires the comprehensive engagement of the marine science community and institutions to identify and address inadequacies hindering JEDI at the organizational level (Grogan, 2019). Transparency on JEDI objectives can help focus the community's efforts, promote relevant initiatives, and allow for accountability in those cases where biases and inequities persist. For instance, in recognition of this challenge more resources have been dedicated to JEDI in marine conservation in the context of the United Nations Decade of Ocean Science for Sustainable Development (Singh et al., 2018).

As part of its mandate to increase diversity and promote inclusion, the Diversity and Inclusion committee of the Society for Conservation Biology-Marine Section (SCB Marine) organized two JEDI focus groups at the virtually held Sixth

International Marine Conservation Congress (IMCC6), August 2020. IMCC6 had an unusually high number of URM participants (Niner and Wassermann, 2021) due to its virtual nature, inclusive environment, and support services, which increased ease of access and reduced the conference's financial burden (Niner and Wassermann, 2021). The diverse backgrounds of a large number of participants enabled us to tap into this group to identify barriers to diversity and inclusion and solutions to improve on these challenges.

In the current policy brief, we discuss barriers to JEDI in marine conservation identified during the focus groups, in particular the systemic barriers and their implications for URM, assess how they limit progress in marine science and conservation, and seek to identify initiatives for improvements. We expect the avenues for improvements discussed in this article to advance policies and initiatives rooted in justice, equity, diversity and inclusion, within the conservation science and practice communities.

## METHODS

We held two focus groups, for 3 hours and 1 hour, respectively, and invited IMCC6 attendees to identify issues affecting JEDI in marine conservation and to explore pathways to addressing the identified issues. Approximately 20 participants attended the first focus group (FG1) and as such the discussions occurred for the entire session in one place instead of dividing participants into breakout groups to discuss different issues. The first part of FG1 included introductions from all participants and enabled a discussion of barriers to JEDI in marine conservation experienced by participants and anyone willing to share their experiences could contribute. The second part of FG1 focused on a group discussion of pathways to addressing barriers to JEDI in marine conservation. FG2 lasted 1 h, was a continuation of FG1, included some new participants and some from FG1, and involved a detailed discussion of pathways to JEDI in response to a subset of key barriers identified in FG1. All points made during both focus groups were recorded as written meeting minutes by the 3 organizers of the focus group. The session was not recorded given the sensitive nature of the topics discussed and to respect the privacy of the participants. The participants' residences and nationalities included locations in North America, Europe, Asia, Africa, Australia, and island regions. The participants identified several barriers to just, equitable, diverse, and inclusive conservation science and practice pertinent to participants' global regions and experiences. Examples of barriers raised during the focus groups included limited participation of URM in research networks, editorial biases against URM, limited professional development and engagement opportunities for URM and non-English speakers, barriers to inclusion of women, LGBTQ+, and sensory impaired individuals, and financial barriers to inclusion of URM in all aspects of marine conservation and research. The issues identified and solutions suggested by participants were submitted to the Society for Conservation Biology marine section as a statement of requests (**Supplementary Figure 1**) via electronic communication. The statement was supported by 110

signatories from broad geographic and institutional affiliations (**Figure 1**). In the current manuscript, we have expanded upon each of the barriers to JEDI identified in the focus groups and included in the Statement of Requests. Each of the themes, including barriers and pathways to improving the respective challenges discussed here, was identified in the focus group and documented in the Statement of Requests.

We acknowledge that the term URM is likely unwieldy and undesirable to some, as has been discussed extensively by Dr. Tiffani Williams<sup>1</sup> and others. However, our use of this term is due to a lack of an all-encompassing term to enable inclusion of all minorities and issues concerning them at a global level, discussed in this piece. Our attempt is not to label minorities as a permanently underrepresented group, but rather to include and recognize all minority groups and define the issues serving as barriers to their inclusion in marine conservation and pathways to remove these barriers, such that there are no URM groups in the future realm of marine conservation.

## JUSTICE, EQUITY, DIVERSITY, AND INCLUSION ISSUES, LESSONS LEARNED, BARRIERS, AND SOLUTIONS

The following sections provide a description of challenges and barriers to JEDI in marine conservation under three main categories: STEMming the leaky pipeline, equity in editorial matters, and support services during events and meetings. These challenges were identified by participants from two JEDI focus group sessions during IMCC6. We also describe potential solutions to address these challenges and barriers in each of the three sections.

### Theme 1: STEMming the Leaky Pipeline Barriers to Retention and Impact on the Field

Barriers to participation in STEM for women, LGBTQ+, and Black, Indigenous, and people of color (BIPOC) students and professionals exist at every stage of learning and career development. This is even more true in marine conservation science, which is white and male-dominated, particularly in leadership and decision making positions. This imbalance is self-perpetuating, as non-white, non-male students and researchers do not feel welcome in the field (or are sometimes intentionally or unintentionally excluded), whether because of active, overt discrimination and sexism; unaddressed microaggressions; lack of recognition and rewards; and/or absence of models of success for URM in the field.

In addition, science and scholarship from Europe and North America dominate conservation science, with the academic reward system creating yet more barriers for academics from non-English speaking countries through publication and citation indices. Similarly, historically, academic conferences,

<sup>1</sup>“Underrepresented Minority” Considered Harmful, Racist Language- a thought-piece by Dr. Tiffani Williams on “Communications of the ACM Blog.” <https://cacm.acm.org/blogs/blog-cacm/245710-underrepresented-minority-considered-harmful-racist-language/fulltext>.



**FIGURE 1 |** Country of work or nationality (A) and affiliation (B) of those who signed the Statement of Requests to SCB Marine Section and chose to share the information.

and opportunities to present research have been hosted in the global North, making attendance difficult for participants from the global South, including students and researchers with limited funding. Breaking down these barriers will take concerted action at every stage of education and professional development. Shifting institutional lock-in and changing power dynamics requires deliberate, reflexive work by those who are currently active in professional and academic networks, including academic societies like SCB (Nocco et al., 2021).

Over the last year, questions of privilege and oppression have come to the fore, with global protests against entrenched racism leading to established organizations like universities, businesses, governments, and NGOs questioning their historical roles in oppression and exclusion of BIPOC students, scholars, and professionals. SCB expressed solidarity with the Black Lives Matter movement (SCB Pledges Solidarity with BLM protests, 2020), with SCB North America section noting, “We cannot ignore our own part in acquiescing to broad scale anti-Black

racism. The historic and continuing research and practice of conservation has consistently contributed to the marginalization of Black people” (Society for Conservation Biology North America (SCBAM), 2020). Moving towards justice and equity will therefore require an “active dismantling” of racist systems, including in conservation.

### How to Address Barriers to Retention and Advancement

Given that barriers exist at every stage of academic and professional training and development, there are several points of entry for addressing these barriers, including for a professional society like SCB. Stemming (or STEMming) the “leaky pipeline”, in particular, is an area where SCB can help. Students and early career professionals require equitable, consistent access to mentorship, educational networking and, opportunities, career development, and advancement. Both participation and career advancement in marine conservation depend on forming



connections and networks that can open doors, support research, and create opportunities for underrepresented and historically marginalized students and professionals.

The recent focus on racial justice has largely coincided with the COVID-19 pandemic, which provides useful lessons and opportunities for advancing new ways of doing more inclusive marine conservation. This includes expanded access to meetings, capacity building, training, mentorship, and professional development opportunities via online meetings and teaching tools (see section three for other suggestions on improving meetings).

### ***Increasing Access***

While there are still challenges with connectivity, online tools can increase access, as the pandemic has made clear. Two years ago, during the UNFCCC COP25,<sup>2</sup> a group of early career researchers developed an online learning series about ocean and climate with speakers from around the world for people who were unable to travel to the COP (#virtualblueCOP, now #VirtualBlueDecade). At the time, focusing on broadening access and limiting carbon emissions by turning to virtual meetings was still a novel idea (Thomsen and Creelman, 2021). Today, it is common enough that we talk about “Zoom fatigue” (e.g., Bailenson, 2021) and people are exploring alternatives and ways to improve online connections (e.g., Wiederhold, 2020). The online format of IMCC6 allowed for the participation of those who would otherwise not have had the chance to meet and develop connections (e.g., Sarabipour, 2020).

Given that in-person networking and dissemination events such as conferences, workshops, and other meetings are key to professional development (Favaro et al., 2016; Oester et al., 2017; Timperley et al., 2020), these changes are welcome. The costs associated with in-person events are often prohibitively high, despite the presence of tiered registration fees that account for one’s career stage or country of origin; for instance, reduced fees or financial support for early career scientists and/or participants from low-income countries. The rotation of the country or region where the conference is hosted, as in the case of the IMCC conference, often helps alleviate some of the financial burden, but does not eliminate the problem.

Additionally, while some institutions financially support students’ participation in such events, students engaged in programs with limited institutional funding are less likely to have access to financial support. They also may not be able to pay up-front costs while waiting to be reimbursed by their institutions. Early career scientists and professionals typically also have limited access to funds and may be engaged in projects that hinder their participation in conferences and meetings. Conditions in academic institutions such as a higher teaching burden compared to senior colleagues and the need to invest time in raising grant funding and pursuing tenure also likely result in limited time for research dissemination and networking that requires travel (Timperley et al., 2020; Niner and Wassermann, 2021).

<sup>2</sup>UNFCCC COP25-25th Conference of the Parties to the United Nations Framework Convention on Climate Change.

### ***Increasing Recognition of Under-Represented Minorities Scholars and Professionals***

Adding to these barriers, gender, race, and ethnicity factors limit opportunities for professional development, as reflected in URM professionals’ participation in conferences and their role therein. For example, they are invited less often for prominent roles such as keynote or plenary speakers (Sardelis and Drew, 2016; King et al., 2018; Timperley et al., 2020; Niner and Wassermann, 2021); their publication record is affected by biases in the editorial and review process (see section two); and their promotion and professional development are limited by other structural equity imbalances (Ginther and Kahn, 2004; Hengel, 2017; Mengel et al., 2019; Doleac et al., 2021; Sarsons et al., 2021). Virtual meetings, because of the lower barriers to participation, may offer opportunities to remedy some of these inequities.

Alternatives to in-person meetings can be used beyond scientific conferences, and scientific societies can take advantage of them to support students and early career professionals, encouraging them to remain in the field. For example, one of the calls developed by the JEDI committee in its regular meetings in advance of the workshop was to create a “marine diversity network,” a global online platform to allow widespread communication, promote transparency, and develop positive collaborations. This is a role for which SCB Marine is well-suited, and that can carry the mission of SCB Marine beyond biennial meetings and publications and into practical engagements and collaborations among members.

In recognition of the multiple issues hindering JEDI, and specifically the barriers to participation in the IMCC conference, SCB Marine introduced a code of conduct in 2016 to promote diversity and inclusion, limit inequity of access to conferences related to one’s personal safety, and avoid possible harassment (Favaro et al., 2016). SCB Marine has also worked to incentivize female leadership, offering preferential fees as a means of attracting increased participation from women (Niner and Wassermann, 2021), and it is likely that the SCB Marine community will continue to support online and hybrid conferences. Nonetheless, structural injustices persist with technological barriers to access affecting primarily professionals from the global South (Niner et al., 2020; Niner and Wassermann, 2021).

### ***Accounting for Unequal Barriers to and Opportunities for Advancement***

Recognizing that underrepresented groups face barriers to reaching senior leadership roles is fundamental in initiatives for professional development. In addition to having to face the “leaky pipeline,” it continues to be difficult for members of underrepresented groups to advance in conservation science. For example, women continue to leave the field more often and have lower promotion rates than men (McGuire et al., 2012). Professional development and support are critical to addressing this imbalance. Professional societies are designed to provide these through activities like conferences, publications, and the recognition and promotion of excellence in research (e.g., National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, 2005). However, there

are still barriers that need to be addressed to ensure that underrepresented members are able to take advantage of these activities.

Structural inequities, such as biases in credit attribution and opportunities for dissemination in academic work and promotion, may hinder the professional development of URMs. There is evidence, for example, from the field of economics that co-authorship matters differently for tenure for men and women (Sarsons et al., 2021), that women are less likely to be invited to present their work in seminars (Doleac et al., 2021), that their work tends to spend longer in the peer-review process compared to men's work (Hengel, 2017), that it is less likely for them to get tenure and takes more time to do so (Ginther and Kahn, 2004), and that they tend to receive systematically lower teaching evaluations compared to their male colleagues, which is driven by the input of male students (Mengel et al., 2019).

Professional societies like SCB can continue to take steps to reduce these barriers. For example, regular, year-round seminar series and workshop opportunities would support ongoing career development, community building, and networking. These activities should specifically ensure the inclusion of early career conservationists from diverse cultural and geographic backgrounds. Addressing systemic discrimination requires a sustained commitment from all facets of society membership. For instance, the labor of leading JEDI initiatives tends to be taken on by URMs, and the long-held, institutionalized nature of discrimination means that it often goes unseen and unacknowledged by unaffected members (Crandall et al., 2021). Leadership and members can take action by recognizing these ongoing inequalities, engaging in education and organizational stock-taking, and by acting as proactive allies (Crandall et al., 2021).

### ***Providing Mentorship and Sponsoring Opportunities***

SCB Marine is also well positioned to provide mentorship opportunities that can help students and early career professionals find community, learn skills, navigate obstacles, and build networks. Given the importance of networks in career success (e.g., Suedkamp Wells et al., 2005), linking students and early career researchers and professionals to mentors who actively open up opportunities for the students and early career professionals they are working with is an opportunity for professional societies like SCB Marine to make a lasting difference for its members.

Having access to a diverse pool of mentors at every learning and career transition is also important for career development and support (Nocco et al., 2021). Further, serving as mentors can itself promote growth and learning, especially at early career stages (Reddick et al., 2012). A good example of matching early career professionals to a range of mentors and mentorship opportunities is the Roger Arliner Young (RAY) Diversity Fellowship Program, a two-year paid fellowship placing recent graduates in marine conservation or energy efficiency and renewable energy positions with NGO and government

partners as part of a cohort of fellows.<sup>3</sup> The RAY Fellowship matches fellows with multiple mentors. Host organizations are encouraged to provide a mentor to each incoming fellow in addition to the fellow's supervisors. Environmental Leadership Program (ELP), which runs the RAY fellowship, matches fellows to past RAY alumni (who benefit by being able to serve as mentors themselves). ELP also matches fellows to mentors from its own network of past ELP fellows. Thus incoming fellows have several mentors, and can also draw on experiences of other fellows in their cohort.

SCB Marine can facilitate these kinds of mentorship matches through creating fellowship and/or mentorship programs. It could establish a (or join an existing) program to create transition fellowships to broaden participation in marine conservation at each level of advancement (e.g., between undergraduate and graduate programs, or between graduate school and professional/academic positions). These could include a peer mentoring component in which the previous year's mentees and fellows return as peer mentors or advisors. It could also set up mentor/mentee programs. A key element would be training mentors and fellowship hosts to ensure they have the skills and tools necessary to be successful. In taking these steps, SCB Marine would help establish a "marine diversity network," as discussed above through a global online platform that allows widespread communication, promotes transparency, creates peer-to-peer networking opportunities, and develops positive collaborations.

*Field Research/Practice.* In addition to barriers to participation in conferences, underrepresented groups can face challenges in conducting fieldwork. These include the aforementioned lack of access to funding, as well as home care responsibilities, which fall more often on women, and a valorization of in-person fieldwork which can affect disabled researchers if accommodations are not made (Moon et al., 2012). Fieldwork can also present challenges such as harassment of underrepresented researchers, including, for example, female scientists on research vessels and in other field settings (Orcutt et al., 2014).

*Concerns for LGBTQ+ Success.* The barriers faced by members of LGBTQ+ communities have received limited attention. Only recently have works begun to bring to light the many concerns of LGBTQ+ scientists with respect to their performance evaluations and, ultimately, their academic careers. While evidence from marine conservation and sciences is largely missing, instances of discrimination, bullying, and harassment all lead to a higher likelihood of LGBTQ+ scientists leaving academia (Taylor, 2021).

*Parachute Science.* Notable as an important additional JEDI consideration in the marine conservation field is addressing the practice of parachute science. Asha de Vos, in *Scientific American*,<sup>4</sup> explains the term "parachute science" as "the conservation model where researchers from the developed world

<sup>3</sup>See <https://rayfellowship.org/program-overview>. Note that Anna Zivian, one of the authors, helped establish the RAY program through work at Ocean Conservancy.

<sup>4</sup>Scientific American. (2020). The Problem of "Colonial Science": Conservation projects in the developing world should invest in local scientific talent and infrastructure. <https://www.scientificamerican.com/article/the-problem-of-colonial-science> [Accessed April 7, 2021].

come to countries like mine, do research and leave without any investment in human capacity or infrastructure. It creates a dependency on external expertise and cripples local conservation efforts. The work is driven by the outsiders' assumptions, motives, and personal needs, leading to an unfavorable power imbalance between those from outside and those on the ground." The same phenomenon is seen in developed countries, when a researcher or organization conducts a project in vulnerable areas (e.g., inner-city) or Indigenous communities, often benefitting from the knowledge held by local peoples, then leaves without any reciprocal investment. The work is done on or in the community, rather than *for*, *with* or *by* the community.

Colonial research practices have previously led to exclusion, marginalization, and disempowerment of Indigenous communities, including in marine research (Zurba et al., 2019; Kourantidou et al., 2020). Despite progress in the development of participatory and community-based research methodologies that allow for meaningful engagement of local resource users, such as those from Indigenous communities, these challenges persist and harm effective and inclusive marine conservation.

An additional concern is that inclusive and locally focused research can take longer and potentially cost more than research not co-designed nor conducted with communities, which creates additional barriers for researchers. If time to publication is extended [not to mention the ongoing issues with recognition of researchers without formal Ph.D. backgrounds (see, for example, the story of peer-review in Liboiron, 2021, p. 55)<sup>5</sup>], it can result in impacts on job security and advancement, with the pressure to "publish or perish" causing tension with taking the needed time to conduct research in an equitable, inclusive, and participatory way. Greater flexibility in research funding, as well as recognition from professional societies and other research institutions for co-produced research, could help provide support for this kind of research<sup>6</sup>.

Although there is no silver-bullet solution to these challenges, measures such as requirements from research institutions for the means of engagement with local marine resource users/communities as well as for compliance with research ethics and standards (including those set by the communities) can help alleviate some of these challenges in the short term. Adopting measures to mitigate parachute science in marine research can improve outcomes from an equity and conservation perspective (Stefanoudis et al., 2021). For instance:

- Actively engaging with local early career marine professionals, particularly in those places where conservation practices take place. Engagement may happen through internships, exchange programs, and co-supervision of students and/or early career professionals.
- Increasing involvement of societal collaborators such as stakeholders and rights-holders who are often excluded from the research and decision-making process.

<sup>5</sup>Thank you, Max Liboiron, for your remarkable book, as well as your discussion on good relations in reading and citing texts.

<sup>6</sup>Thank you to our reviewer for raising this additional issue.

- Meaningful engagement to help strengthen research capacity locally, empower local actors, and enrich perspectives valuable to marine conservation through local knowledge and long-term practical experiences (Kourantidou et al., 2020).
- Supporting, partnering with, and replicating when possible, long-term models of investment that support local capacity building in concert with empowered local decision making. e.g., NOAA's Capacity Building Partnership in Fisheries for the U.S. Territories in the Western Pacific<sup>7</sup> (**Supplementary Figure 1**).
- Reducing harm. Marine science and conservation projects often appear to implicate only non-human species; however, following the human-subjects research model of risk assessment, harm reduction, and transparency and accountability at the institutional level could prevent or mitigate instances of parachute science (John et al., 2016) and yield more comprehensive results and tangible outcomes (Quigley et al., 2019).
- Using the platform of scientific societies to serve as a model of leadership in this space through their own actions and/or amplifying the JEDI priority approaches by organizations across their field.
  - They may choose to adopt, as a society of professionals, formal policies on discrimination, including hiring a diversity ombudsperson and/or other society staff or members specifically designated to address JEDI concerns or complaints.
  - SCB has many sections poised to partner and support sections focused on promoting the work of early career professionals, which may include nominations for awards, memberships on boards, and key committee memberships.
  - Lastly, they are also well suited to support the field, centrally addressing some of the leaky pipeline issues described in this brief.

## Theme 2: Equity in Editorial Matters

### Impact of Editorial Inequity on Marine Conservation and Communities

Issues associated with race, geography, gender identity, sexual orientation, and disabilities should by no means affect scientists' professional opportunities to navigate editorial and peer review processes and their scholarly success. However, the lack of diversity in marine conservation is reflected in the editorial process leading to scientific publications and the resulting body of publications, whether these be papers presented at conferences or in science journals (see text footnote 2). Similar to other disciplines, the presence of structural inequality within the marine conservation and science's academic architecture affects certain individuals' ability to conduct science and communicate their work (Taylor, 2021). In fact, this issue is potentially more pervasive in the marine sciences, with it and other

<sup>7</sup>NOAA's Capacity Building Partnership for the U.S. Territories in the Western Pacific. <http://www.wpcouncil.org/2019-2020-us-pacific-territories-fishery-capacity-building-scholarship-announcement-applications-due-mar-1st/>.



geosciences being some of the least diverse STEM fields (Bernard and Cooperdock, 2018) having achieved negligible progress to increase diversity over the last four decades (Bernard and Cooperdock, 2018). Similar trends are also found in the social sciences, with economics and policymaking, in particular, suffering a significant lack of racial, gender, and ethnic diversity (Ginther and Kahn, 2004; Bayer and Rouse, 2016; Lundberg, 2018; Wu, 2018; Doleac et al., 2021; Dupas et al., 2021; Sarsons et al., 2021).

Publication records are vital to professional growth, upward mobility, and ultimately to researchers' employment and professional success. Therefore if the editorial processes and publication pipelines are skewed such that they disfavor URM in marine sciences, they will result in lower success rates of URM individuals and fewer URM individuals in leadership positions in science and conservation practice. In fact, there is evidence that URM individuals are rewarded to a lesser extent in STEM fields even when they produce research products that are more innovative and more impactful compared to their non-URM peers (Hofstra et al., 2020). In addition to these impacts at the individual's professional success, inherent bias in the publication record has the ability to skew conservation and management decisions reliant on best available science.

### *Why Does Editorial Inequity Exist?*

In order to improve equity and inclusion in editorial and publication processes, we first need to identify the key issues contributing to inequities in these processes. We describe several key contributors in the following section.

*Lack of Reviewer Diversity.* Individuals participating as peer reviewers are more frequently from North America and Europe and identify as male (Preston, 2018). Further, first-time reviewers are usually approached to review manuscripts due to professional relationships with the editor either directly or through their principal investigators (Preston, 2018). Therefore, the system ensures continued dominance of reviewers who are or are associated with white, male and non-minority individuals in the editorial process<sup>8</sup>.

*Geographic Bias.* Reviewers tend to favor publication of manuscripts authored by people of the same country; this geographic bias has proven to be a large disadvantage for scientists from non-western countries (i.e., outside North America and Europe) (Grogan, 2019). For western reviewers, a lack of knowledge in conservation research and practice in parts of the world outside their region of familiarity may lead to a lack of understanding of pressing conservation issues and of research infrastructure available to scientists and practitioners. For example, in developing countries where state of the art

infrastructure may not be available, researchers and practitioners could be using "perceived" out of date and 'inadequate methods or equipment'. We argue that this work should not be dismissed due to lack of novelty in methodological approaches or other methodological drawbacks, as it may still hold the potential to produce vital data to meet conservation needs in the region which a foreign reviewer may not necessarily be aware of. Instead, efforts should be focused on recruiting editors and reviewers who can appreciate the nuances of research, conservation and related technological advances from diverse geographic regions. The perceived lack of comprehensive and novel research methods typically leads to a publication in a lower ranking journal or rejection of publications all together. Work from geographically or culturally unfamiliar places is also perceived as less important or less representative of global issues, even though such scientific knowledge often provides crucial lessons at global, regional, and local scales (unpublished from IMCC4 plenary speeches by Max Liboiron and Asha de Vos).

*Professional Network Bias.* Researchers and practitioners from emerging regions are often not in the professional networks of decision making groups such as reviewers and editors. Thus URM individuals and their work are not known and thus not acknowledged nor validated in the same way as the work of their peers in developed countries. As a result, research and practice by URM individuals are perceived less favorably in journal and conference publications. Lack of oral and written scholarly publications also leads to lower success of URM grant applications which are again often reviewed by the same professional networks which URM individuals are typically not associated with.

URMs outside western reviewer circles may not use the same means or extent of social media communications and, hence, may not be as familiar with the social practices and culture of western professional networks (see for example Shiffman, 2018). Thus, again, the issue of low familiarity with URM's body of work, its validation and acknowledgement combined with the limited knowledge of the regional work culture among reviewers results in lower success at peer-reviewed publications, and resultantly at obtaining research funding by URM individuals. The cycle of biased peer review thus perpetuates and severely restricts scholarly success and career advancement for URM individuals.

*Gender Bias.* There is evidence that reviewers tend to favor publications authored by people of the same gender or country as themselves, which has proven to be a large disadvantage for women and scientists from non-Western countries (Grogan, 2019; Murray et al., 2019). Additionally, Murray et al., 2019 find that papers with a male last or corresponding author are more likely to be accepted compared to their female counterparts. Bendels et al. (2018) provide evidence that as the impact factor of a journal increases, the likelihood of a woman as the first, last, or corresponding author in the journals' publications decreases significantly. Women and other minority groups are significantly underrepresented in editorial boards and reviewer pools (Grogan, 2019), further propagating reviewer biases against minorities.

Even though such trends are contentious and divisive across different fields of research (Fox and Timothy Paine, 2019; Squazzoni et al., 2021), there is a general consensus that more

<sup>8</sup>The London School of Economics and Political Science. (2020). Read and Publish Open Access Deals Are Heightening Global Inequalities in Access to Publication. <https://blogs.lse.ac.uk/impactofsocialsciences/2020/02/21/read-and-publish-open-access-deals-are-heightening-global-inequalities-in-access-to-publication/> [Accessed April 7, 2021].

Forbes. (2020). How Prestige Journals Remain Elite, Exclusive and Exclusionary. <https://www.forbes.com/sites/madhukarpai/2020/11/30/how-prestige-journals-remain-elite-exclusive-and-exclusionary/?sh=3a3dc0ac4d48> [Accessed April 7, 2021].



effort is needed to increase diversity in scientific peer-review and editorial processes. Even though the biases described above have not been thoroughly examined for marine sciences specifically, there is an imperative to address them given that these biases likely exist, and may even be stronger in some cases, due to the significantly low diversity in marine sciences compared to other STEM fields (Bernard and Cooperdock, 2018).

**Language.** The vast majority of scientific publications and conferences require English language proficiency and use. The work of those not so proficient or used to a different style of English (e.g., British vs. Indian vs. American English) are perceived unfavorably during the review process and may end up having less impact and citations (Meneghini et al., 2008; González-Alcaide et al., 2012). This problem is exacerbated by the large load of requests for reviews of applications, presentations, and publications often experienced by reviewers; these make reviewers more inclined to make a first pass rejection or acceptance decision based on quality of language and linguistic clarity after a cursory review.

For many researchers and practitioners, especially those from developing countries, it can be cost prohibitive to use professional editing services before, or even during, the review process, and they may not be able to meet reviewer requests or suggestions. This often leads to a higher rate of rejection for publications from URM individuals.

**Financial Burden on Authors and Reviewers.** As discussed by the focus group, most open access scientific publication avenues entail high article publication charges (APC). These are often unaffordable by URM professionals and academics; hence open access publications remain limited and therefore their work remains inaccessible to URM communities in the developed and developing world alike. A few publication houses (e.g., Frontiers, SpringerNature, Biomedcentral) use World Bank criteria to allow individuals from these countries or regions to apply for APC waivers; however, these criteria often do not cover all those who are unable to afford APC. Further, large APCs could act as deterrents even to application for APC waiver due to the low prospects of success, and thus continue to act as barriers to publication success.

Further, early career URM researchers not only need to meet the ongoing challenges of doing science in the less-resourced settings that exist in many low to middle income countries, but also need to be able to pay high APCs (which can approximate to a years' salary or more)—to showcase their research.

Reviewers from URM communities may be unable to spend as much time as their peers on the review process given disproportional financial hardships and overburdened schedules. This further reduces reviewer diversity and likely leads to a failure in providing necessary support from reviewers/editors to URM authors.

Needless to say, those unable to publish are unable to validate their work in the broader conservation community and, as such, remain disadvantaged in the grant making process and in terms of securing jobs. Financial burden is another

significant barrier that can restrict URM from achieving upward mobility over time.

**Life Events Leading to Name Changes.** LGBTQ+ and women scientists who change their names after gender reassignment or after marriage, experience a negative impact to their publication record and thus their careers. Typically, they are “outed” by their publication history with hardly any options to update their names on publications (Taylor, 2021).

### ***How to Address Discrepancies in Editorial and Review Processes to Improve Publication Success Among URM Communities in Marine Sciences?***

Biases in the editorial and review processes are pervasive and multifactorial as has been outlined in earlier sections. However, publication success is one of the most important metrics for evaluation and validation of one's scientific progress and is crucial for upward mobility and occupation in leadership positions. As such the JEDI focus group organized at the IMCC6 conference and workshop organized among SCB marine members identified the following ways to address and correct inequities in editorial and peer-review processes:

1. Encourage training of editorial boards and staff in matters related to diversity to ensure they are adequately equipped to handle both explicit and implicit biases. The latter can be particularly hard to identify and therefore experts on bias in science evaluation may be particularly useful in helping avoid direct and indirect biases toward minority groups and designing suitable responses (Eisen, 2020).
2. Support and publish papers and projects which are works led by or in partnership with locals in the area where work is being done. Apply Best Practices to decision making models that afford different forms of knowledge, representing known gaps in the publication record, a place in the decision making process (NOAA, 2019). Efforts and publications which contribute to supporting research capacity and educational capacity in non-western countries through collaboration and training initiatives (e.g., DOCKSIDE, 2019) should be recognized.
3. Promote commitments on behalf of journals to increase equity, diversity, and inclusion with respect to gender, geography, and ethnicity in the review and editorial processes and encourage frequent reporting on progress or efforts in these aspects:
  - a. Reporting of data on the demographic composition of editorial groups and staff throughout time, or other efforts, and new targets toward a balanced representation of different groups and/or increased representation of underrepresented minority groups.
  - b. Implement metrics that show how potential biases in the reviewer/editorial process can be avoided, e.g.:
    - i. monitor review panel composition of gender and other demographic characteristics such as ethnicity or country of origin/residence. Examine

- and analyze these trends over time in peer-reviewed published research.
- ii. monitor composition of reviewer databases of journals to ensure they are diverse. This will in turn facilitate increased diversity in the selection of reviewers on behalf of the editors.
  - c. Identify pathways, jointly with publishers, through which LGBTQ+ and women scientists can avoid a negative impact to their publication record and careers when changing names.
4. Ensure diversity in editorial (scientific advisory) boards and editorial staff, e.g.,:
    - a. promote participation of marine scholars from URM groups,
    - b. open up opportunities for new recruits of editors (e.g., through open calls) in line with the journal's commitments to increase equity, diversity, and inclusion (see point 2 above).
  5. Provide English language editing support at no extra cost to authors through the journal's editorial services or through volunteer editors with English proficiency who might then have a chance to learn about research from diverse geographic and topic areas. This will improve dialogue across URM and non-URM communities and will encourage meaningful collaborations.
  6. English language journals should be able to accommodate at a minimum abstracts or blurbs in the preferred language of the authors. This can enable a) reaching a wider audience, particular those for whom the research is of direct relevance and b) URM communities to express themselves to their peers, serve as role models to individuals in their communities, and provide a chance for dialogue and encouragement within URM conservation communities.
  7. Implement measures to avoid “parachute” and “colonial” science in marine research.
    - a. requirements to provide to the journal the research permit and research ethics permit numbers along with justification in those cases where the permits do not exist.

In order for conservation of biodiversity and to ensure justice, equity, diversity, and inclusion for all communities and individuals impacted by or participating in conservation science and practice, it is important to change editorial practices in the context of JEDI. The marine conservation community needs to ensure that editorial practices address inequities of opportunity for researchers independent of their race, gender, geography, or other characteristics.

### Theme 3: Support Services During Events and Meetings

Differences in gender, race, culture, and socio-economic status are perhaps most intense when a diverse group of people meets to

make decisions about a society or topic to which all participants feel a sense of ownership or connection; for example, in board meetings to direct the work of a society, or a work group to tackle an important question or issue. In addition, the typical in-person conference format is in itself all consuming, with every minute of the day and evening scheduled with information dissemination and a multitude of workshops, events, and activities. Despite the exhaustion that many participants experience, often due both to the meeting schedule and fatigue from travel and operating in another time zone, there are advantages to having in-person meetings, e.g., a better collective understanding of an issue or problem, progress in the workings of a society, or increased collaborative work and general progress in the particular field the meeting is focused upon. For some, it is also an opportunity to better understand the working practices of another culture and, perhaps, gain a deeper understanding of the many challenges the whole planet faces.

Many societies provide a code of conduct or a diversity and inclusion document for such meetings, with an investigation or disciplinary procedure outlined if these codes are not adhered to (see Sardelis et al., 2017 for proposed intervention strategies promoting equity and diversity in conferences that arose through the IMCC4 congress). Sadly, there is rarely a bridge between this dry list of what is and is not acceptable behavior and the consequences of not following the one- or two- page document that is supposed to encompass a myriad of behaviors from a diverse background of participants and channel them onto one path. This section explores the challenges presented when holding meetings, either in-person, virtually, or in a hybrid format, and suggests some mechanisms which diminish barriers and create a more inclusive environment for all participants. We focus on the meetings typical of SCB however, we hope that some of the suggestions herein inspire a change in practices within other societies.

#### Language

No matter what type of meeting is being convened, from board meetings and working groups to webinars and conferences, expanding support facilities and services will help ensure that the event is more inclusive and accessible to all participants. Several international institutions or conventions, e.g., the International Whaling Commission, the IUCN, and various U.N. Conventions, have three or more operating languages into which all official correspondence is translated and which are offered as standard translation options during meetings. This is not so for many global societies that often have single or bi-lingual operating languages that govern meetings and correspondence however, these societies often have a mandate to recruit and maintain international participation. As global travel and meeting restrictions have created a dramatic upsurge in online meetings, the technology to support online meetings has also improved exponentially. Translation services, once expensive, have become increasingly easier to implement in these online environments and both closed captioning and simultaneous translation can be easily incorporated into most platforms. Recognizing that it is still challenging to incorporate all languages, prior to any meeting or event, understanding the demographics of the desired

audience and the most common languages spoken should be a primary action of the meeting organizer or chair. Developing a translation strategy allows meeting materials to be provided in the most relevant languages, and bespoke translation services can be incorporated from the outset. Inviting participants to present in their native language also helps remove barriers caused by language and with translation services in place, communication can be considerably improved between participants who do not share a common language. Although perhaps easier to implement in virtual meetings, conveners of in-person meetings should strive to develop a multilingual announcement and registration process and include language specific queries as part of this process to assess needs for presenting and communicating in various languages.

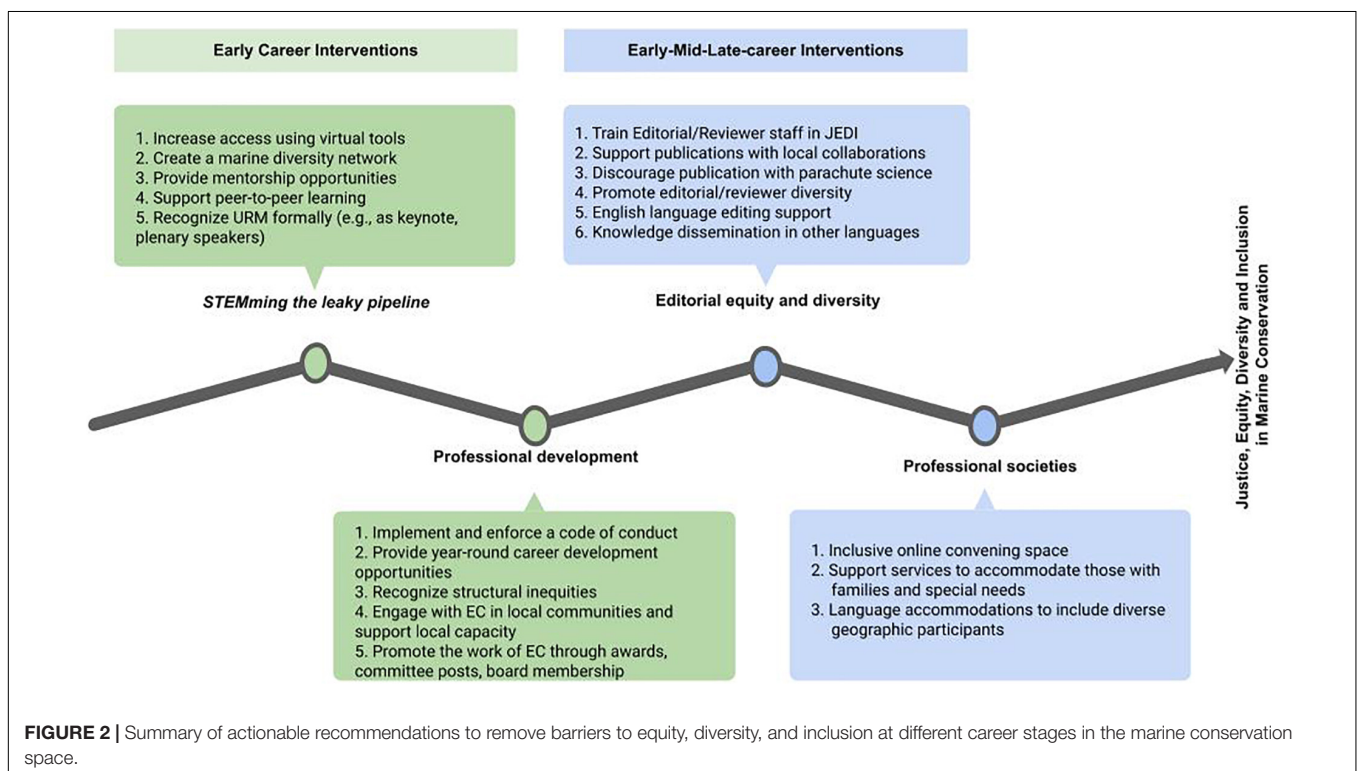
**An Inclusive Online Convening Space**

Organizers must consider how to create convening spaces that are accessible and welcoming to all participants therefore, an understanding of both timing and technology is critical. For those who will be convening meetings, abundant resources exist for facilitating online gatherings that are accessible, inclusive, welcoming, and avoid common barriers to participation<sup>9</sup>. Facilitation is a vital component of inclusive conversations, panel discussions, and Q&A sessions; conveners should take care to ensure, for example, that session moderators and organizers are equipped with the tools and training necessary to facilitate

inclusively, equitably, and in an anti-oppressive manner. A key part of inclusiveness is understanding time zones and which working days different cultures use; for example, in Middle Eastern countries, the workweek is Sunday to Thursday. If meetings are held across more than eight time zones, it is inevitable that some attendees will be requested to work outside normal working hours. While this is unavoidable with global groups, the conveners of the meeting should first assess what time zone participants are attending from and strive to offer multiple meeting choices that include typical working hours for all participants, not just those in the extreme east or west time zones. If there are simply too many time zones to accommodate easily, a second meeting can be convened at a different time so that meeting minutes or recordings can be shared. This is already practiced by the SCB Conference Committee to accommodate members from more than eight different time zones. This allows all committee members to share and discuss information and assists in breaking down global participation barriers. Recording meetings also allows participants who communicate in a different language to have more time to understand the discussion. Most online platforms also provide an encryption service to secure recordings for sharing.

There are also special considerations for virtual convenings, such as recognizing that technology access and literacy are not equitable. Inequities in technology access and literacy are not new, but received added attention in 2020 due to the increase in virtual healthcare and remote learning (e.g., Becker et al., 2020). These inequities are even evident in which conferences shifted from in-person to virtual in 2020 due to the COVID-19 pandemic. Falk and Hagsten (2021) demonstrated this shift

<sup>9</sup>AORTA (Anti-Oppression Resource and Training Alliance). (2017). Anti-oppressive facilitation for democratic process: making meetings awesome for everyone. [http://aorta.coop/portfolio\\_page/anti-oppressive-facilitation](http://aorta.coop/portfolio_page/anti-oppressive-facilitation) [Accessed March 15, 2021].



**FIGURE 2 |** Summary of actionable recommendations to remove barriers to equity, diversity, and inclusion at different career stages in the marine conservation space.



depended on, in part, the conveners' home country and access to high-speed internet. While conveners cannot be expected to solve access issues, they can provide information, guidance documents, and training for the technology tools that will be used, such as document-sharing and video conference platforms. For those without a reliable or fast internet connection, offering the option to pre-record the presentation, followed by live Q&A, can ensure that the presentation can occur and keep the agenda on schedule.

There are strengths and challenges to both in-person and virtual conferences; neither provide a panacea for JEDI concerns. In-person academic conferences provide a myriad of benefits, some of which are difficult to replicate in a virtual setting even with online tools like spatial.chat etc., such as feedback on active research and face-to-face networking with colleagues. There is a long list of important support services needed to ensure that in-person conferences, meetings, and other convenings provide pathways for overcoming common barriers to participation. One of these is financial support. Many academic societies provide scholarships and free or reduced registration for those who volunteer during the event (e.g., IMCC conferences). However, conference fees still pose a barrier for some (Tsang, 2019) and travel costs will inevitably be inequitable when organizing international conferences (Arend and Bruijns, 2019; Niner and Wassermann, 2021). Providing support and, particularly, understanding travel visa constraints should be a consideration during early planning of any in-person meeting.

Another key area of consideration is family support. There is increasing recognition that we need to normalize parenthood in academia, including services at conferences such as: breast feeding and childcare (Calisi, 2018) and discounted registration rates for childcare providers. These services should be an integral part of all conference communications and be options within the registration system. And finally, most in-person conferences come with a suite of pre-, during, and post-conference events, workshops, field trips, and evening events. Those engaged in organizing these events should consider the cultural context of the surrounding area and participants (e.g., not all centered around alcohol), event accessibility for those with different abilities and those who may require translation services, and cost (e.g., providing scholarships to participate in these events) (Morris and Washington, 2017; Sarabipour, 2020).

## DISCUSSION

Marine conservation is an interdisciplinary field that requires diverse communities and experts to work together through cross-sectional science and practice. It requires innovative interdisciplinary approaches, representation from diverse stakeholders, and communication across these sectors. Systematic barriers and unjust pathways perpetuate the opposite. Marine conservation science and practice need, to be rooted in justice, equity, and inclusion of diverse communities, particularly those who are impacted either by the lack of or alternatively, by the existence of conservation initiatives. Consideration of interests of a diverse set of stakeholders is key to an equitable, just, and sustainable conservation movement.

For instance, the absence of editorial and publication equity will likely result in a failure to recruit a diverse community of conservation scientists and practitioners, leading to under-representation of diverse voices in key places of conservation impact and lack of communication among interdisciplinary groups. Ultimately this is expected to lead to failures in effective conservation for marine resource users. With fewer URM individuals in leadership and decision-making positions, it is unlikely that a diverse set of employees will be hired or supported at conservation-focused institutions and this cycle will continue, translating into lower recruitment of URM students and early career professionals. Fewer URM individuals in top positions also mean fewer role models; this also leads to far lower recruitment of URM students and early career professionals.

Further, lack of diversity deprives marine sciences and conservation from serving the interests of the general public in an effective enough manner and limits improvement to human, social, and economic wellbeing expected through marine resource and conservation management. A marine conservation profession and an associated academic space that is limited to a narrow set of perspectives, experiences, and expertise is likely to miss opportunities to illuminate critical questions, leading to poorly informed decisions and policy-making. The questions then are: How different would marine conservation be if the work of URMs received more recognition and URMs were offered systematically more opportunities for inclusion in research and conservation circles? What would policy and conservation look like if the experiences and knowledge of URMs were better reflected in marine sciences and practice?

We have summarized the barriers and pathways to removing these barriers as discussed in the current manuscript in **Figure 2**. We envision that these specific interventions at respective career stages will enable equity, diversity, inclusion, and through these, a just marine conservation space.

## CONCLUSION

We expect that the issues highlighted in the current manuscript will help the field of conservation continue to identify barriers to JEDI and more purposefully address these in all aspects of conservation science and practice. Specifically, we envision a future wherein the field standardizes and places value on not just who is doing conservation work, but the what, where, and how the work is done and with whom the results are shared. We hope to have laid key markers for improvement that can be more broadly institutionalized across the myriad of organizations and sectors that contribute to the field of marine conservation (**Figure 2**). Furthermore, we each individually hold agency in addressing barriers to JEDI within our own spheres of influence (current networks, organizations, etc.) and can activate a web of social capital that transcends organizational silos. Even still, institutionalization of the road map initially discussed in our global dialog and specified here will require a continuous open mind and investments of time and expertise in the process and integration of JEDI in every aspect of conservation research and practice.



## AUTHOR CONTRIBUTIONS

SJ conceptualized, led and organized the JEDI workshop at IMCC6 and contributed to writing the manuscript. MC, LP, and AZ organized the workshop, manuscript and contributed to writing the manuscript. MK and ELM participated in the workshop and organized and wrote the manuscript. JS participated in the workshop and managed the team to facilitated completion of the manuscript. RAS participated in the workshop and contributed to writing the manuscript. All authors contributed to editing the final manuscript.

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## SUPPLEMENTARY MATERIAL

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**Conflict of Interest:** MC was employed by the company Piko Strategies, LLC.

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