

DEI Challenges and Opportunities in U.S. Aquaculture Workforce Development

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ABOUT THIS REPORT

This report was prepared by Meridian Institute in December 2022, based on insights from 30 interviews. It provides an overview of diversity, equity, and inclusion (DEI) barriers and opportunities in U.S. aquaculture from the perspective of those working at various points along the workforce development pathway.

This report is not intended to be a comprehensive compilation of all issues related to aquaculture DEI, nor should it be considered an authoritative, prescriptive, or consensus document. Rather, this report aims to provide a deeper understanding and discussion of aquaculture DEI issues, as educators, practitioners, and industry leaders together assess the needs and actions for growing and sustaining a U.S. aquaculture sector.

REPORT AUTHORS

Ian Yue, Maia Hatchett, and Meghan Massaua

For inquiries or additional information, please contact iyue@merid.org.

ACKNOWLEDGEMENTS

We express our deepest gratitude to the 30 individuals who shared their insights and personal stories with us to make this report both possible and cohesive. We hope that the information and outputs of this work will be useful to them in their work and allow for greater understanding and positive movement in both workforce development and DEI in U.S. aquaculture.

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Executive Summary

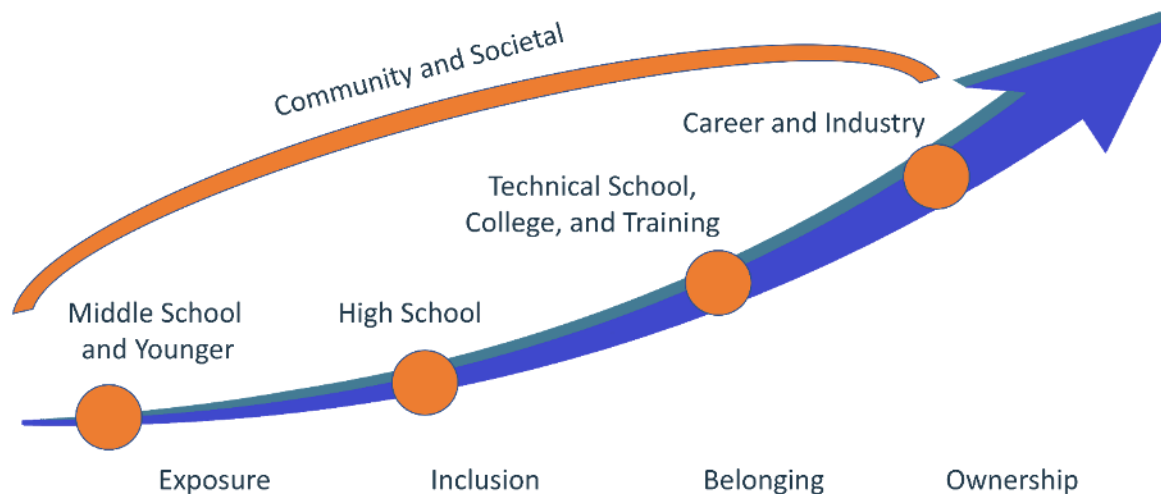
INTRODUCTION

There is growing economic and political interest in building out the U.S. marine aquaculture sector. However, the sector faces workforce development challenges that could affect successful industry build-out. Beginning summer 2021, Meridian Institute began exploring U.S. aquaculture workforce development and its nexus with diversity, equity, and inclusion (DEI). Meridian interviewed 30 individuals whose work touches on this nexus **to better understand the current state of DEI in U.S. aquaculture, including DEI barriers and opportunities to enhance DEI in the workforce.**

DEI AND THE AQUACULTURE WORKFORCE PATHWAY

In the context of this work, DEI encompasses race, ethnicity, and gender. Based on learnings from Meridian's interviews, we constructed the graphic below as a framework for understanding DEI barriers and opportunities in the U.S. aquaculture industry.

Aquaculture Workforce Pathway



The blue arrow represents a trajectory along the workforce pathway for the sector, with each orange circle a key stage along the pathway where distinctive DEI challenges exist. The orange arch represents community/societal influences that pervade DEI challenges across the trajectory. The horizontal axis indicates DEI themes that strongly relate to the parts of the trajectory under which they fall. These themes include:

1. **Exposure** – Awareness and engagement with the field (e.g., ocean, fish, aquaculture educators)
2. **Inclusion** – Being and feeling welcomed to the field (e.g., access to training, work experience, support/mentors)
3. **Belonging** – Feeling valued through positive connections to both the field and those working in it (e.g., comfort in bringing one's full and authentic self to the field, belief in one's ability to shape/contribute to the field)

- 4. Ownership** – Demonstrated ability to shape/contribute to the field and acknowledgment of such contributions (e.g., representation in leadership/positions of power, validated impact on the larger field)

The below table summarizes, for each of the four pathway stages, the relevant DEI themes, distinctive DEI challenges a person may face, and potential opportunities to address such challenges.

PATHWAY STAGE	DEI THEMES	DEI CHALLENGES FACED AT THE PATHWAY STAGE	OPPORTUNITIES TO ADDRESS DEI CHALLENGES
Middle School and Younger	Exposure	Lack of engagement at basic aquaculture touchpoints (oceans, coasts, fish), which affects connection to, comfort with, and an imagination about a career in fish/oceans	Experiential learning on fish/oceans through formal school curriculums, after school/summer programs, or community activities/organizations
High School	Exposure, Inclusion	Lack of access to opportunities to develop skills or interest in aquaculture (e.g., jobs, fish labs); limited access based on school, geography (e.g., transit access), ability to participate (e.g., finances), and social support (e.g., educator encouragement)	Establishing aquaculture labs and career and technical education programs/ internships in diverse communities; recruiting diverse students for, and easing access to such opportunities (e.g., financial aid, transportation)
Technical School, College, and Training	Inclusion, Belonging	Students feel unwelcome to the field due to a lack of both diversity and sensitivity to DEI issues in training programs and/or limited mentorship and support networks for diverse students; also, distinctive challenges faced by diverse students are often not acknowledged or accounted for in training programs.	Recruiting diverse student bodies; prioritizing of student support/ mentorship; regular conversations on DEI needs/barriers among and between faculty and students; DEI accountability measures within programs to address needs/barriers
Career and Industry	Belonging, Ownership	Hiring biases based on assumptions of physical capabilities/knowledge (i.e., hiring based on what the field looks like today); unwelcoming environments (e.g., sexism, racism, microaggressions); remote work locations (transportation/housing barriers); also, no broadscale industry buy-in to aquaculture DEI	Company and industry DEI accountability measures (e.g., leadership representation); continued conversations among industry about DEI benefits and barriers; establishing and maintaining funding/investment for diverse entrepreneurs

Community and societal influences are larger cultural and social dynamics that both connect the individual pathway stages and exert an effect on all the stages collectively. Put in another way, these structures and forces explain the *presence* of DEI challenges across the trajectory and the *extent* to which those challenges are experienced at a given stage. These influences can be seen in how they

manifest in the DEI themes. For instance, a lack of existing community connections to oceans, or a lack of marine educational programs in a specific geography, may impact community values held toward aquaculture, which may, in turn, affect aquaculture **exposure** for a child growing up in that area. In terms of **inclusion**, students may not feel welcome in the field if they face social barriers to pursuing aquaculture internships (e.g., inability to take unpaid work, work locations far from families they support) or geographic barriers (e.g., transit access). **Belonging** may be affected by overarching cultural dynamics that a predominantly male and white field can pose on diverse populations, both in training and work environments. **Ownership** issues arise in access to decision-making power (in an industry with largely homogenous leadership), access to industry knowledge (often passed down from father to son in families holding leadership), and historical barriers that continue to affect access to land, permits, funding, and markets.

CATALYZING DEI ACTIONS IN U.S. AQUACULTURE

Because DEI issues span the aquaculture workforce development pathway, there are interconnected challenges that are difficult to address collectively. However, interviewees identified broader, catalytic actions that can activate and facilitate progress toward elevating DEI and addressing DEI barriers across the workforce pathway. These catalytic actions include:

- **Invest in disparity and equity studies** – Gather robust demographic data on who makes up the U.S. aquaculture field; understand where women/minorities do not work in the field and where barriers to enhancing DEI exist.
- **Invest in areas to address inequalities** – Draw results from the disparity/equity studies to determine and invest resources (e.g., training, funding) in the areas/trajectory stages with the most significant DEI barriers.
- **Facilitate ongoing conversations on the need for DEI** – Hold and normalize conversations about DEI in both training programs and within the industry to bring to light the benefits of DEI and DEI workforce barriers.
- **Create connection points in the workforce pathway** – Establish “bridges” that connect trajectory stages (e.g., college-high school programs, college-industry co-ops, DEI-aquaculture community of practice) to facilitate co-led efforts to break down DEI barriers.
- **Identify examples of positive DEI initiatives in aquaculture** – Document DEI accomplishments, lessons learned, and best practices to highlight DEI benefits and to generate examples for use in policy/legislative proposals.
- **Build the business case for aquaculture DEI** – Make the case for why DEI matters for U.S. aquaculture (i.e., the benefits of DEI for the industry), and why DEI should be addressed now, to gain the industry leader buy-in necessary to progress DEI efforts.

A high-potential next step to elevate U.S. aquaculture DEI is to pursue initiatives that collectively advance these six catalytic actions. One promising opportunity is foster and support a community of practice that connects those working on aquaculture DEI at various stages of the workforce pathway. Such a group has the ability to compile positive examples of aquaculture DEI, create and facilitate spaces (in industry and education) for ongoing conversation on aquaculture DEI, help build a business case for aquaculture DEI, and spearhead equity or disparity studies that outline areas for impactful DEI investment. Based on the interest of a subset of interviewees, Meridian has begun convening such a community, and the group is currently exploring avenues to socialize themes from this report and activate strategies that enhance DEI in the U.S. aquaculture sector.

Introduction

Aquaculture, or the farming of seafood, has been around for centuries in many parts of the world. However, in many parts of the U.S. — including coastal and offshore areas — aquaculture is not fully developed, particularly at the commercial scale. Over the last few years, federal agencies, Congress, investors, companies, and NGOs have all expressed a keen interest in building out the domestic aquaculture sector. However, the industry faces several development challenges. One such challenge is securing a viable, consistent workforce to meet the sector’s labor needs.

Since 2019, Meridian Institute, with support from [Builders Initiative](#), has engaged U.S. ocean stakeholders to bring to light the broad range of needs, interests, and concerns regarding the future of domestic marine aquaculture. Our goal has been to build understanding on diverse stakeholder perspectives to better inform U.S. marine aquaculture development. Such work is based on the belief that the benefits of the sector can best be realized — and the potential impacts can be best avoided or mitigated — if the viewpoints of all potentially affected stakeholders are proactively considered.

In this spirit, Meridian’s initial work (Summer 2020 to Spring 2021) involved collaborating with public affairs firm [Ocean Strategies](#) (OS) to interview over 100 stakeholders across six ocean sectors to capture sectoral viewpoints on the development of marine aquaculture in the U.S. Meridian and OS published our findings in the [Sectoral Insights on the Future of Aquaculture](#) report in June 2021.

One topic raised in these initial interviews was the need to address workforce development challenges for the industry to grow. Meridian decided to explore this topic further, with a particular focus on how issues of diversity, equity, and inclusion (DEI) — including barriers and opportunities — manifest throughout the U.S. aquaculture workforce development pathway.¹ Given Meridian’s interest in informing decisionmakers on ways to responsibly build out the U.S. aquaculture sector — and the reality that the current demographic makeup of the industry is largely homogenous — we felt it was apt to examine the topic of DEI further. This report details our approach and findings.

This report outlines DEI barriers and opportunities at various stages of the U.S. aquaculture workforce pathway, including [Middle School and Younger](#); [High School](#); [Technical School, College, and Training](#); and [Career and Industry](#). We also examine [community and societal influences](#) that affect the *presence* of DEI challenges across the pathway and the *extent* to which those challenges are experienced at a given stage. The report concludes with an assessment of [six broad, “catalytic actions”](#) that can enable further, more targeted action on aquaculture DEI. Sections can be read individually or collectively to gain an understanding of cross-pathway dynamics. Additionally, each of the “pathway stage sections” feature non-attributional case studies that provide real world examples of DEI challenges and solutions.

It should be noted that this document is not intended to be a comprehensive compilation of all issues related to aquaculture DEI, nor should it be considered an authoritative, prescriptive, or consensus document. Rather, this report aims to provide a deeper understanding and discussion of aquaculture DEI issues, as educators, practitioners, and industry leaders together assess the needs and actions for growing and sustaining a U.S. aquaculture sector.

¹ We use the term “pathway” instead of “pipeline” to acknowledge that an individual’s career development journey involves learning and training that is neither solely in utilitarian service to an industry nor leading to an inevitable outcome.

Methodology

To better understand DEI dynamics in U.S. aquaculture workforce development we carried out stakeholder interviews along with desktop research. This section details the process we took to gather and synthesize data.

DEFINING DEI AND A SCOPE OF WORK

There is a broad range of ideas and dynamics that can fit under the term “diversity, equity, and inclusion.” As such, it was important for us to both define DEI and a specific scope of work to ensure a focused approach in how we investigated, evaluated, and presented data.

For the purposes of this work, we use the term DEI (i.e., the collective use of the terms diversity, equity, and inclusion) to mean:

- representation of varied individual and collective identities and differences;
- fair treatment, equality of opportunity, and fairness in access to information and resources; and
- an environment that actively invites the contribution and participation of all people.

We adapted this definition from terminology used by the Ford Foundation² and focused our work specifically on racial, ethnic, and gender DEI.

We acknowledge that this does not fully encompass the considerations of all DEI elements within the domestic aquaculture space. We are aware, for instance, of existing and important DEI-aquaculture considerations surrounding tribal nations and indigenous peoples, the LGBTQIA+ community, and military veterans, among other communities. As direction, need, and resources allow, Meridian will consider further exploring workforce needs and opportunities specific to these communities. It bears noting, however, that there are other organizations and initiatives already making meaningful progress in these areas (including, but certainly not limited to, the [Indigenous Aquaculture Collaborative](#) and the [VFW Post 8950's Veterans Aquaculture Training Center](#)).^{3,4}

BACKGROUND RESEARCH AND INTERVIEWS

Our exploration of U.S. aquaculture workforce development needs started in July 2021. Meridian began carrying out desktop research to gather information on DEI best practices in hiring, workforce pathway development, and organizational management for U.S. businesses at large (i.e., we did not limit our research to just the aquaculture, oceans, or natural resources space). The goal of such research was to

² Ford Foundation, “Diversity, equity, and inclusion,” accessed 15 August 2022, <https://www.fordfoundation.org/about/people/diversity-equity-and-inclusion>.

³ Indigenous Aquaculture Collaborative, “About Us,” Washington Sea Grant, accessed 15 August 2022, <https://indigenouaquaculture.org/about-us>.

⁴ Veterans of Foreign Wars Post 8950, “Veterans Aquaculture Training Center,” accessed 15 August 2022, <https://www.vfwpost8950.com/veterans-aquaculture-training-center>.

identify DEI workforce challenges and opportunities that may be broadly applicable to various U.S. businesses, regardless of market or specialty.

We synthesized this background research with findings from our [*Sectoral Insights on the Future of Aquaculture*](#) report to assess where DEI challenges and opportunities could possibly manifest in the U.S. marine aquaculture industry. This assessment provided us with ideas to further explore and confirm through stakeholder interviews.

The stakeholders we specifically sought to interview included individuals whose work or experience:

- touches the nexus of DEI and aquaculture workforce development, either through active pursuit of DEI initiatives and/or personal experience navigating dynamics at that nexus.
- is represented on the workforce pathway. Thus, we sought to speak with students, primary and secondary educators, post-secondary educators, practitioners in the aquaculture industry (including entrepreneurs), and government agency representatives.

We presumed that such stakeholders could speak knowledgeably on barriers to enhancing DEI in the U.S. aquaculture workforce as well as opportunities to address those barriers.

Over the course of several months, we interviewed 30 people who spoke to both overall and DEI-specific workforce development barriers and opportunities within the U.S. aquaculture industry. While we initially focused on stakeholders working in the domestic *marine* aquaculture sector, it became clear early in our interview process that limiting the range of interviewees to only those in the marine space limited our ability to gather an appropriate range of perspectives (particularly given the relative lack of diverse representation in the marine industry currently). After opening the range of stakeholders to interview, we found that many of the DEI challenges and barriers present in the marine space are also present in non-marine aquaculture spaces. Thus, our findings can apply to both spaces.

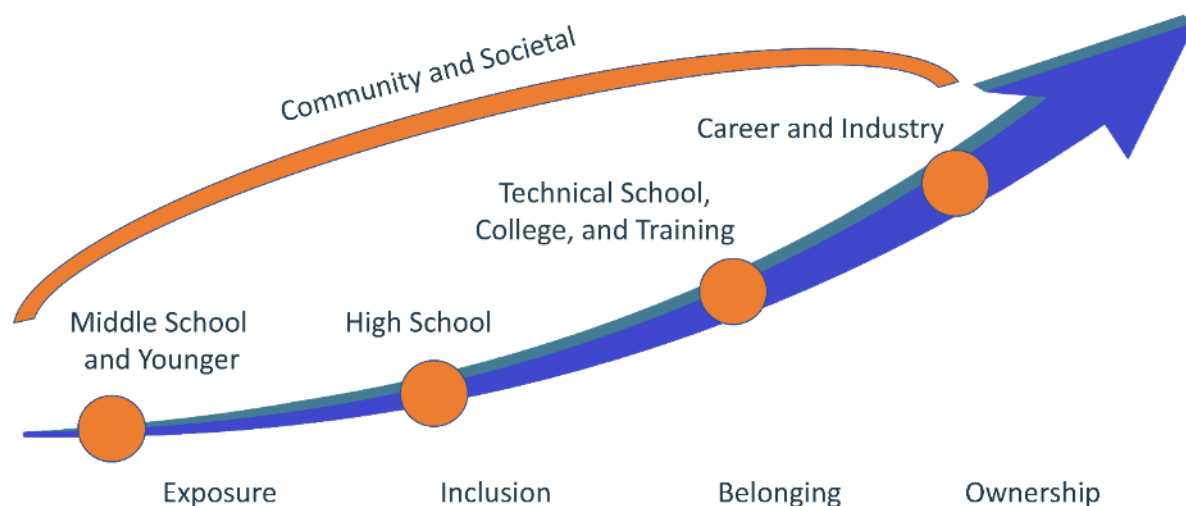
DEI Challenges and Opportunities Along the Workforce Pathway

This section outlines our interview findings on the DEI barriers and opportunities present in the U.S. aquaculture sector. These findings are presented in non-attributional form.

CENTRALIZING FRAMEWORK: THE WORKFORCE PATHWAY TRAJECTORY

To best illustrate the holistic scope of DEI challenges across the U.S. aquaculture workforce pathway, we constructed the below graphic as a centralizing framework from which we could articulate findings that are both specific to particular stages along the workforce pathway and to the pathway overall.

Aquaculture Workforce Pathway



The blue arrow in the graphic represents a trajectory along the workforce pathway for the U.S. aquaculture sector, with each orange circle representing a **key stage in the pathway** where distinctive DEI barriers and opportunities exist. Through our interviews, we identified four stages:

- **Middle School and Younger** – Education (formal and informal), activities, and career exposure for adolescents at the primary and middle school levels
- **High School** – Education (formal and informal), activities, career exposure, and work experience for adolescents at the secondary school level
- **Technical School, College, and Training** – Education (formal and informal), activities, networking, career exposure, career support, and work experience for adults in technical school, college, and other training programs related to aquaculture
- **Career and Industry** – Work experience, career development and advancement, networking, and career support for adults working in an aquaculture-related field, as an employee, employer, entrepreneur, consultant, and/or industry leader

Our findings indicate that DEI barriers at a given stage are affected by the barriers present in the stage(s) prior. That is, barriers in an earlier pathway stage can be significant enough to discourage a person from progressing to the next stage; similarly, barriers in an earlier stage, if not properly addressed, can be experienced more markedly in subsequent stages. The nuances of these dynamics are explained in the [“Pathway Stage” sections below](#).

The orange arch represents **community and societal influences**: sociocultural structures and forces that explain the *presence* of DEI challenges across the trajectory and the *extent* to which those challenges are experienced at a given stage. Community influences can dictate what a person is exposed to or the resources a person is afforded at a given stage, both of which can impact the knowledge or ease of pursuing an aquaculture career. Societal influences can inform how barriers that are pervasive throughout U.S. society (i.e., over and above the aquaculture industry) are experienced by specific populations across the pathway.

Finally, the horizontal axis outlines four **DEI themes** that correlate with the pathway stages under which they fall. These themes include:⁵

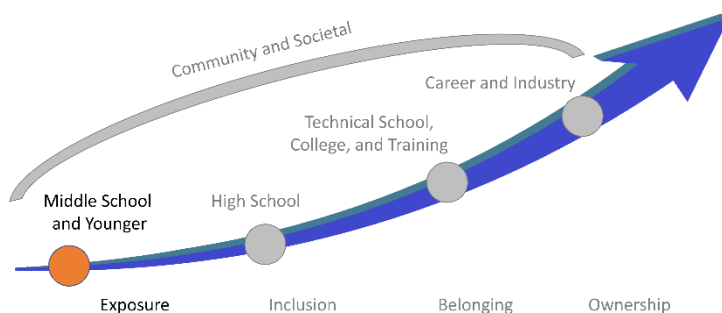
- **Exposure** – Awareness and engagement with aquaculture (e.g., fish farms, hatcheries), aquaculture-adjacent topics (e.g., ocean, fish), or aquaculture educators or professionals. Exposure is particularly relevant to the [“Middle School and Younger”](#) and [“High School”](#) pathway stages, as it impacts how young people are introduced and socialized to aquaculture.
- **Inclusion** – Access and the feeling of openness and welcome to the aquaculture field (or activities with an aquaculture component). This theme especially applies to educational and training opportunities, work experiences, and mentorship and support networks. Inclusion is particularly relevant to the [“High School”](#) and [“Technical School, College, and Training”](#) pathway stages, as it impacts career pathways to aquaculture.
- **Belonging** – Positive connections with the aquaculture field and those working in it, comfort and ability to bring one’s full and authentic self to the field, and belief that one can contribute to and shape the future of the field (e.g., identifying with leaders or decision-makers in the field). Belonging is particularly relevant to the [“Technical School, College, and Training”](#) and [“Career and Industry”](#) pathway stages, as it impacts both industry recruitment and retention.
- **Ownership** – Demonstrated ability to contribute to and shape the aquaculture field and the acknowledgment and recognition of those contributions (e.g., industry and/or community impact, promotion into leadership positions). Belonging is particularly relevant to the [“Career and Industry”](#) pathway stage, as it affects long-term industry retention, professional growth, and the lasting impacts that people can and do have on the sector.

Below, we explore in greater depth the distinctive DEI barriers and opportunities present at each pathway stage. We also provide an overarching assessment of community and societal influences that affect the entire pathway, including barriers in the context of the DEI themes and opportunities to address those barriers at a structural level.

⁵ Note: The definitions for exposure, inclusion, belonging, and ownership presented here are of our own construction and specific to the context of the U.S. aquaculture industry.

PATHWAY STAGE #1: MIDDLE SCHOOL AND YOUNGER

The first pathway stage — “Middle School and Younger” — **pertains to the education, activities, and career exposure of adolescents at the primary and middle school levels.** The DEI theme of **exposure** particularly applies to this stage, as students at this age are being made aware of (and engaged on) topics, subjects, and disciplines that help them to understand the world around them, including foundational concepts of natural and social science. Students also begin to imagine, at this stage, what they may “want to be when they grow up,” which could impact career considerations.



Students may be exposed to aquaculture (e.g., fish farms, hatcheries) or aquaculture-adjacent topics (e.g., ocean, fish) by teachers, parents, communities, or professionals in the field through formal schooling or other educational opportunities (e.g., field trips, extra-curricular activities, community programs, educational visits to museums or farms). Students may also be exposed to the field or to aquaculture professionals through personal, familial, or community connections.

DEI barriers and opportunities specific to this stage are detailed below.

IN BRIEF: DEI BARRIERS AND OPPORTUNITIES FOR MIDDLE SCHOOL AND YOUNGER

DEI BARRIERS

- Limited early childhood exposure to aquaculture.
- Lack of exposure to diverse aquaculture professionals.

DEI OPPORTUNITIES

- Increase exposure, among diverse student populations, to oceans, fish, and seafood.
- Enhance project- and field-based learning on aquaculture (or oceans in general) in school curricula.
- Enhance extracurricular education to increase exposure to oceans and fish.
- Encourage innovative opportunities to expose diverse young students to aquaculture.

DEI BARRIERS

Interviewees noted several DEI challenges present at this workforce pathway stage:

- **Limited early childhood exposure to aquaculture** – According to interviewees who work as educators at the middle school and younger level, environmental and marine education at an early age is critically important. This is not only because young people are incredibly curious at this stage of life but also because such education (both formal and informal), especially when taught in a hands-on, experiential format, helps students understand interconnections in the environment around them — including their personal connection to the world and to the subject matters they are taught. Additionally, interviewees noted, by the time students reach college age, they have already largely solidified in their minds the range of ways they can and would like to contribute to

the world. As such, exposure early on to aquaculture and aquaculture-adjacent fields can motivate or facilitate personal connection and/or intellectual curiosity with the field in a way that can be expanded and grown over time.

Unfortunately, as several interviewees noted, early childhood exposure to aquaculture in the U.S. is rare. The biggest downsides of such limited exposure, according to interviewees, is a lack of perceived affiliation with the marine environment and economy, a lack of comfort with marine resources (e.g., fear of the ocean), and/or a lack of imagination of one's future in aquaculture. In other words, students with limited exposure to aquaculture or aquaculture-adjacent fields may not be aware that the aquaculture industry even exists and thus may not see themselves as part of that field.

This is a DEI issue because lack of aquaculture exposure is particularly prevalent among communities where ease of access to the ocean, coastal and marine amenities, environmental education, and seafood is already challenged. This includes students who are racial or ethnic minorities. For instance, the literature has shown that Black and Hispanic students, overall, score lower than their white counterparts in environmental literacy metrics (particularly in terms of environmental awareness and attitudes), and this may largely be due to greater constraints to natural area access.^{6,7} Other factors that could prohibit exposure to aquaculture (or aquaculture-adjacent fields) include a lack of resources that provide access to certain activities or programs, including transportation (or transportation connections) to the coastline and/or a finances to send a student to a marine-based summer program.

- **Lack of exposure to diverse aquaculture professionals** – Interviewees noted that when professionals in a specific field interact with students — and resemble the students they are reaching (e.g., based on gender or ethnic identity) — this can, in turn, inspire students to see themselves in that field. In other words, greater diversity among aquaculture professionals that interact with students can enhance meaningful exposure to the aquaculture field. However, as women and racial and ethnic minorities remain underrepresented in the aquaculture field, this may affect the diversity of aquaculture professionals with whom young students interact.

DEI OPPORTUNITIES

Interviewees noted several DEI opportunities that can be capitalized at this workforce pathway stage:

- **Increase exposure, among diverse student populations, to oceans, fish, and seafood** – The goal of increased exposure is to create positive experiences and connections to those topics. Such opportunities are not simply a matter of adding lesson plans in science classes, however; rather, interviewees noted that the answer lies in immersing young students in the world of aquaculture by connecting the field to the realities in which those students are most familiar. Interviewees noted two ways this has been successfully accomplished: (1) partnering with trusted organizations in the communities in which those students reside, and (2) talking about aquaculture in the cultural context of those students' life experiences. See the case studies in the boxes below for examples of these two approaches.

⁶ Kathryn T. Stevenson et al., "Environmental, Institutional, and Demographic Predictors of Environmental Literacy among Middle School Children," *PLoS One* 8, no. 3 (2013): e59519, doi: [10.1371/journal.pone.0059519](https://doi.org/10.1371/journal.pone.0059519).

⁷ Karen S. Hollweb et al., "Developing a framework for assessing environmental literacy" (Washington, DC, North American Association for Environmental Education, 2011), <https://cdn.naaee.org/sites/default/files/devframewkassessenvlitonlineed.pdf>.

- **Enhance project- and field-based learning on aquaculture (or oceans in general) in school curricula** – If curricula are successfully developed and implemented, those lesson plans can be shared across schools and school districts, perhaps utilizing organizations such as the National Marine Educators Association to do so. Interviewees gave two practical examples on curricula changes that could benefit aquaculture:
 - **In biology classes that teach animal life cycles**, frogs are often the primary example used, given their unique evolution from egg to tadpole to amphibian and the fact that students can view live examples of each life stage. **Biology teachers, however, may be able to use bivalves (e.g., clams) to teach these same life stage concepts.**

Case Study: Aquaculture Industry Investment in the Local Community

One person with whom we spoke represents a bivalve and seaweed seed company that dedicates part of its business to education and outreach initiatives, stating that such work is “critical... to support[ing] a growing sustainable aquaculture industry.” In partnership with an urban community empowerment nonprofit, this company created and ran an aquaculture education program. The partnership proved effective: Not only did the company provide aquaculture content to the nonprofit’s robust portfolio of food-based learning programs but also the nonprofits involvement — a trusted name in the community since the 1970s — was a draw for parents to send their children to take part in the educational programming, enhancing exposure to the field among young children.

Case Study: Aquaculture Education Among Young Students

One interviewee is part of a nonprofit dedicated to restoring local oyster reefs through public education initiatives, including those for young students. This is how the educator describes their strategy to educating students about aquaculture:

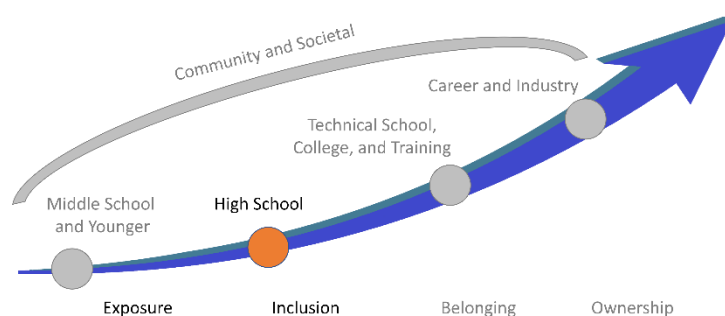
“Not everyone will want to be in the marine environment, getting dirty and learning about oysters. Many of our students are interested in [other areas like] photography, advocacy, dance, and the arts. How can you take influences from aquaculture and oysters into those [subjects]? ... I had students take photographs... had that emphasis on photos while teaching them about oysters... This is a way to grasp students who may not realize they are interested in marine science... allows you to bring new ideas to subjects that are otherwise ‘straight and narrow.’”

“Science can be very daunting... [but you can] use storytelling as a way to share the research [about oyster reefs] and get many interested... People tend to listen to stories that reflect their background. So, if I am working with students [from a certain neighborhood], I would incorporate [local] history into the stories... [leverage] cultural relationships: [get students] thinking about how it relates to [their] history and [get them to] tune in.”

- **Small fish farms (e.g., tilapia) and aquaponics systems provide a low-cost, economical, and hands-on experience for young students to learn about fish rearing.** These types of systems, like school gardens, can be integrated into a school's curricula for teaching both biology and nutrition. Such systems also equip schools with food products to set up a demonstration kitchen where food that is raised on site can be prepared. One early education interviewee noted that students are more willing to eat food that they both raise and prepare.
- **Enhance extracurricular education to increase exposure to oceans and fish** – After school or summer community programs can be utilized to reach young children in communities that are currently underrepresented in the U.S. aquaculture space. To ensure effective reach to such communities, programs may require both funding and collaborations between aquaculture-related educational institutions (e.g., Sea Grant, aquaria), trusted community organizations (e.g., see the Community Services Unlimited case study on the prior page), and perhaps even government agencies (e.g., integration with natural resource agency “Take a Kid Fishing” programs).
- **Encourage innovative opportunities to expose diverse young students to aquaculture** – One interviewee noted an example of an author working with a local research university to publish a series of children's books featuring BIPOC characters working in STEM fields, aimed at students in communities that are underrepresented in STEM. This interviewee envisioned the impact such books could have on the aquaculture industry if one of the books in the series featured a character working in fish farming.

PATHWAY STAGE #2: HIGH SCHOOL

The second pathway stage — “High School” — **pertains to the education, activities, career exposure, and work experience of adolescents at the secondary school level.** The DEI theme of **exposure** applies to this stage, as students at this age have begun to seriously engage in thinking and conversations around a future career, including perceptions of viable, possible, and open career paths. The DEI theme of **inclusion** also applies to this stage, as students may have access to education (e.g., career and technical classes or schooling), activities (e.g., extra-curriculars), and/or work experiences in a specific field that may make them feel welcomed, encouraged, and inspired to pursue further work in that field.



Like those at the [“Middle School and Younger” stage](#), High School students may be exposed to aquaculture (e.g., fish farms, hatcheries) or aquaculture-adjacent topics (e.g., ocean, fish) through teachers, parents, communities, or professionals in the field through formal schooling or other educational opportunities (e.g., field trips, extra-curricular activities, enrichment programs). However, students at this stage are more likely than their Middle School and Younger counterparts to be exposed to aquaculture professionals through higher education institutions (e.g., pre-college programs and partnerships) and career-specific connections (e.g., career fairs, mentorship, internships).

DEI barriers and opportunities specific to this stage are detailed below.

IN BRIEF: DEI BARRIERS AND OPPORTUNITIES FOR HIGH SCHOOL

DEI BARRIERS

- Limited exposure to aquaculture.
- Limited access to aquaculture training and experiences.
- Lack of training in social and cultural literacy.
- Difficulties presenting aquaculture as a viable career choice.
- Locations of aquaculture work experiences and training institutions that may be especially challenging for diverse students.

DEI OPPORTUNITIES

- Enhance aquaculture- and oceans-related content in curricula.
- Create partnerships between high schools and colleges and industry (e.g., to build aquaculture labs, sponsor credit-bearing programs and extracurricular opportunities, expose schools and students with industry knowledge and work opportunities).
- Build opportunities for mentorship (e.g., industry partner mentorship, peer mentorship).

DEI BARRIERS

Interviewees noted several DEI challenges present at this workforce pathway stage:

- **Limited exposure to aquaculture** – Like the [“Middle School and Younger” stage](#), high school student exposure to aquaculture in the U.S. is not common. According to the high school and college educators with whom we spoke, student exposure to aquaculture at the high school level most often occurs through aquaculture- or marine-specific career technical education (CTE) school curriculums or at schools with dedicated aquaponics or fish rearing labs; the latter is sometimes supported (both in terms of equipment and broodstock supply) by college aquaculture programs. In some parts of the country (particularly rural areas), high school students may also be exposed to aquaculture through extracurricular activities. For instance, FFA (previously the Future Farmers of America), a youth leadership organization with a focus on agricultural education, has previously hosted aquaculture competitions for high school students. However, all these opportunities for aquaculture exposure at the high school level are more the exception than the norm.

The impacts of limited to no aquaculture exposure among high school students are the same as that for younger students: A lack of perceived affiliation with the marine environment and economy, a lack of comfort with marine resources (e.g., fear of the ocean), and/or a lack of imagination of one’s future in aquaculture. Particularly if students were also not exposed to aquaculture before high school, interviewees noted, they will likely be entering higher education or the workforce without a clear worldview that they can contribute to the aquaculture space (and if so, how). This dynamic is further explored in the [“Looking Across the Pathway: Community and Societal Influences” section](#) below.

- **Limited access to aquaculture training and experiences** – Even for high school students that *are* exposed to aquaculture through their education, there exist exposure- and access-related challenges. We spoke with educators at two high schools that provide students with aquaculture-related training but in different ways. While both schools have dedicated resources to invest in aquaculture, educators at each institution noted how resources can be a limiting factor to both student exposure and access (i.e., inclusion) to aquaculture. See the case studies to the right and below for details.
- **Lack of training in social and cultural literacy** – Beyond aquaculture-specific training, interviewees also raised that training in social and cultural literacy — the “soft skills” needed to successfully operate in the U.S. aquaculture space — becomes relevant for high school students, as they start

Case Study: High School CTE

We spoke with an educator at a high school that offers a CTE curriculum focused specifically on aquaculture. The school also boasts a diverse student population, largely representative of the city in which it is located. While the school has both laboratory and field-based resources to train students, its program focuses specifically on shellfish culture for restoration due to its close connection with a restoration-focused nonprofit. The educator noted that there are limited resources to expose students to the broader industry, such as field trips to farms where students can “see that it is possible to work in this industry... especially if they see adults that look like them in those jobs.”

exploring different career options. According to interviewees, students often learn how to navigate professional spaces from their parents and families. This is particularly because, interviewees noted, high schools do not often have the capacity or mandate to provide students with the soft skills training to help them enter into the field of their choice. As such, a student who is potentially interested in a field — in which they are a minority or the first in their family to enter that space — may end up feeling daunted accepting a place in that industry if they feel they don't have the professional soft skills to succeed. Interviewees noted that this is particularly a barrier for diverse students entering into fields, such as U.S. aquaculture, that are not as demographically diverse.

Case Study: Urban STEM High School

One interviewee is an educator at an urban, STEM-focused magnet high school that has an aquaponics room, used both as a classroom lab and as an after-school space for students to manage and run all aspects of the fish-rearing operation. The lab, according to the educator, not only provides a useful hands-on space for students to learn and innovate (e.g., students recently designed 3D-printed fish feeders for the lab), but it also serves as a key attraction for prospective students touring the school during annual open houses.

Despite the availability of this onsite resource, there are DEI challenges when it comes to student engagement with the lab. The educator estimates that the makeup of classes that utilize the aquaponics lab is 70% racial/ethnic minorities, while that of the after-school program (which offers more unstructured hands-on learning) is only 50%. The primary barrier is transportation-related: Many students do not have access to personal vehicles and must either wait on parents to pick them up after work or take (often long) public transit rides home. For these students, the choice may come down to going home late after the school day or opting out of the after-school program altogether. This dynamic sheds light on how access to transit could affect a high school student's ability to participate in aquaculture training opportunities.

Another example of the impact transportation has on access to training: The high school has connections to a local university's algae research lab, where the school's students can work during the summer months. The lab offers additional exposure to the aquaculture field, as students gain experience growing, among other things, fish feed. This training opportunity includes bus transportation between the high school and the university, paid for by the high school's alumni. The educator noted that this transit resource provides a notable benefit to students, especially for those who may not otherwise be able to pursue such an opportunity due to transportation limitations.

- **Difficulties presenting aquaculture as a viable career choice** — Interviewees noted that pitching aquaculture as a career to high school students, particularly diverse students whose families or communities do not have knowledge or experience in the field, is difficult. For instance, one interviewee noted that the most diverse part of the aquaculture workforce currently is in farm labor and seafood product processing. While these are respectable jobs, based on interviewee's interactions with high school students, pitching a career in farm labor to the younger generation is a very "hard sell" in comparison to other careers, especially if students only see representation in

that part of the sector. Another consideration interviewees brought up is the fact that, as a young industry in the U.S., aquaculture often carries risks in terms of job security, finances (especially for aspiring farm owner-operators), and clarity on career growth (including horizontal movement into other blue economy fields). According to interviewees, the uncertainty and risks present on these fronts can especially be barriers for minority and first-generation students in their choices of career paths or college majors. On top of this, interviewees indicated that many aquaculture internships at present are unpaid. Interviewees emphasized that gaining hands-on experience (at least in terms of the farming and production side of the industry) is essential to for working in aquaculture. Yet, for some students from diverse backgrounds, an unpaid internship is enough of an opportunity cost that they may choose to not pursue aquaculture as a career.

Embedded in the challenge of recruiting high school students to aquaculture is that parents in many cultural communities feel compelled to ensure their children have better lives than they did. This often means families are hesitant to support career choices that do not appear to secure a higher salary and standard of living. There may also be considerations of whether a salary is sufficient to care for elders and other dependents in the family. For many families, to put their support behind a student pursuing a career in a field that is new or unfamiliar, there needs to be clarity surrounding the trajectory of that career pursuit. However, as interviewees stated, high school career counselors do not often feel well equipped to speak to what an aquaculture job looks like (e.g., starting salaries, job functions, career growth opportunities). CTE programs have also expressed that they don't feel right actively promoting careers in aquaculture if they aren't sure whether there will actually be good jobs in the field for students to take on after graduation (this consideration is also relevant for higher education institutions, as discussed in the [“Technical School, College, and Training” section](#) below).

- **Locations of aquaculture work experiences and training institutions that may be especially challenging for diverse students** – Another DEI challenge at the high school level is the location of internship and training opportunities (this topic was also touched upon in the [urban STEM high school case study on the previous page](#)). We spoke with one high school aquaculture educator who noted the challenge in placing their diverse students in paid internships with prominent aquaculture companies due to location concerns. According to interviewees, there are several reasons why location can be a deterrent to diverse high school students taking on well-regarded internship opportunities. For one, aquaculture work and training opportunities are often in remote areas, where there may be concerns about housing (both location and costs) and transportation access. These work locations are also often outside of urban areas (with which many diverse students are familiar). For some students, there may also be anxieties surrounding being away from familial and community support structures, particularly in more remote settings with less demographic diversity, fewer nearby social amenities, and limited access to public transportation (if students do not drive). Considerations of location are also relevant for continuation of aquaculture training into college. For example, the CTE high school mentioned in a [case study earlier in this section](#) has articulation agreements with a rural state university, which has undergraduate aquaculture degree programs. However, the cultural differences between the high school's city environment and the university's rural location, along with the university's focus on pond- and tank-based hatcheries (in contrast to the high school's focus on local oyster reef restoration), have resulted in students telling interviewee from that school that they don't see themselves going attending that university to pursue such work.

Considerations of work and training locations have also come into play when it comes to high school recruitment by colleges with aquaculture programs. According to one interviewee, college

aquaculture programs see it as “easier” to recruit students from rural areas for natural resource degrees (including fisheries and aquaculture), as students from those locations often have greater familiarity with (and affinity toward) natural resource topics. This is, in part, due to more regular exposure to natural resources (and related industries) in those areas compared to urban environments. However, this same interviewee noted that college programs would do well to not make assumptions about student potential for those coming from urban environments, which tend to be more racially and ethnically diverse in the U.S.⁸

DEI OPPORTUNITIES

DEI opportunities at the high school level largely revolve around increasing exposure to and inclusion in the aquaculture field among diverse students. Exposure involves socializing, among diverse high school students, an understanding that the oceans and seafood fields are ones that such students can pursue. Inclusion involves showing those students *how* they can be part of that field.

- **Enhance aquaculture- and oceans-related content in curricula** – This is seen as the primary way to increase exposure among high school students to the aquaculture field. This could include hands-on learning experiences both on the water (e.g., bringing students on a boat to carry out field-based lab work) and in the classroom (e.g., showing videos of the day-to-day jobs of ocean or aquaculture practitioners). Also, as noted previously in the [“Middle School and Younger” section](#), building an aquaculture or aquaponics lab can be a relatively economical way to expose students to aquaculture. Such labs need not just be aquaculture education-oriented either. As demonstrated by the [urban STEM high school case study](#), fish labs can be used to teach mechanical design and engineering (e.g., building tank systems, feeding machines), biology, chemistry (e.g., water quality), and organizational leadership (e.g., management and ownership of the lab space, training other students to help run the lab). Labs have also been shown to inspire STEM career paths in aquaculture and aquaculture-supporting industries. For instance, the urban STEM high school boasts alumni who now work in the technical side of aquaculture (i.e., computer systems, technological innovation to support aquaculture). Moreover, as noted in the same case study, fish labs can serve as both a learning space and an attraction to help draw more potential trainees in. As interviewees were quick to point out, however, building and running fish labs requires both institutional buy-in and funding.
- **Create partnerships between high schools and colleges and industry** – These partnerships can further connect students to opportunities and help students build an understanding of how they can see themselves as (and be) part of the aquaculture field.
 - **Colleges can help building aquaculture labs at high schools** – For example, the urban STEM high school’s fish lab funding came from both the state Sea Grant office and a research, training, and economic center based out of the state university system. Another college representative we spoke with noted that they send fish, equipment, and trainers to support student programs, including as part of the college’s efforts to expand diverse student recruitment efforts. This college representative noted that the school is still assessing whether

⁸ USDA Economic Research Service, “Racial and ethnic minorities made up about 22 percent of the rural population in 2018, compared to 43 percent in urban areas,” last updated 13 October 2020, <https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=99538>.

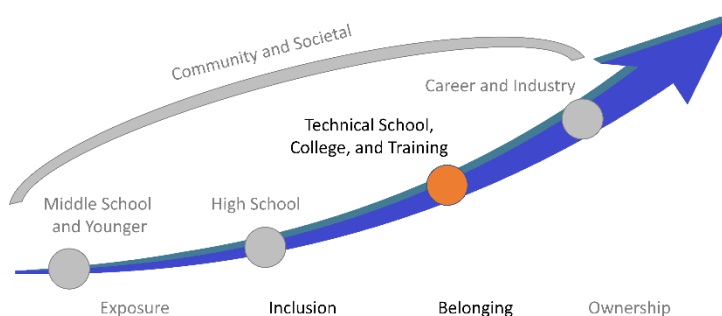
such efforts are indeed working to enhance aquaculture exposure. In situations like these, high schools can work with colleges to measure impact.

- **Colleges can sponsor credit-bearing programs and extracurricular learning opportunities** – For example, post-secondary training institutions can work with high schools to build bridge programs, where students can both fulfill high school requirements and earn college credits (e.g., dual enrollment programs). There are also opportunities for colleges to get involved in extracurricular high school learning activities. For instance, one university professor with whom we spoke noted that their campus plays host to programming for a local chapter of the Future Farmers of America (FFA). Recently, this professor's students helped set up and run a practicum for high school students on biotechnology, including giving tours of a college lab space and talking about work opportunities. This not only created opportunities for exposure but organic connections between high school and college students. This professor thinks this same idea could be applied to FFA programming on aquaculture.
- **Industry can help expose students to knowledge that high schools are not set up to provide** – High school students can learn from industry practitioners how the industry operates, what types of jobs are available, and movement and growth in the field. These are all knowledge areas that, according to interviewees, high schools are not well equipped to provide. Exposure to industry practitioners also helps students gain an expanded understanding of the different roles that make up the industry (e.g., animal husbandry, water quality). Interviewees noted that providing students with this knowledge is important because students will be able to see the different ways aquaculture is practiced and thus different paths to working in the field.
- **Industry can provide regular input to high schools and touch points for high school students** – CTE programs often have industry advisory boards, where industry representatives not only help inform and guide curricula (and provide learning resources for students) but also have direct exposure to students as classroom speakers or at career/industry days. Such exposure, interviewees noted, can sometimes lead to students taking on summer internships. From a DEI perspective, one interviewee noted that high schools must put in intentional effort to build out diversity (e.g., female representation) among their industry boards. Connections to industry can also mean connections to alumni. One CTE educator noted that alumni have come back to their high school to speak with students about their work in the field. Alumni have also been known to provide funding for school initiatives (e.g., providing transportation to work opportunities).
- **Industry can provide work opportunities for high school students** – Some CTE programs partner with industry to coordinate co-op jobs as part of their curricula. In some cases, this can mean student work opportunities on campus. For example, one aquaculture CTE high school has, as part of its FFA chapter, a student-run seafood market where students both prepare and sell aquaculture products for the public. If co-ops provide students with more than one term or summer of learning, this allows for continued skill development, more exposure to different aspects of the industry, and potentially paid work. Interviewees also noted that connections to industry can help build soft skills that students will need to succeed in the aquaculture industry.
- **Build opportunities for mentorship** – Interviewees noted that receiving and providing mentorship are critical to helping retain students in the aquaculture field, particularly those who may be underrepresented in the field.

- **Industry partners can help mentor students** – As one interviewee put it, “Industry partners are important to equity.” By having access to industry professionals, students feel that they are valued by having people invest in them. Cross-age mentorship allows a student to connect with an industry professional and see that person not only operating in the field but also succeeding in it. According to interviewees, if a student does not have exposure to someone from a given field at any time between elementary school through college, their likelihood of success pursuing a career in that field diminishes significantly.
- **High schools can help “develop mentors from within”** – According to interviewees who work in education, students often learn and respond to educational lessons better when they come from people whom the students see as peers. This dynamic largely stems from students feeling a greater sense of comfort asking questions of peers (as opposed to older individuals) and a closer personal connection with someone who is nearer in age to them (as opposed to someone who the student feels is significantly older). Learning among peers (a form of peer mentorship) thus has the potential to strengthen a student’s sense of inclusion and belonging in the field because it allows them the opportunity to both learn from peers, as well as share their knowledge by teaching others. Two examples of what peer mentorship could look like:
 - The urban STEM high school educator with whom we spoke noted that in school’s student-run fish lab, upperclassmen take it upon themselves to not only run the lab space but also train underclassmen in aspects of running the fish lab. The educator noted that this peer coaching structure is critical to ensuring both student ownership of the lab and perpetuity of the student-run system.
 - One interviewee noted that she works with high school students who participate in “community-engaged internships.” These internships involve the student not only gaining new knowledge but also sharing that knowledge with the community. For instance, some of this interviewee’s high school students held internships with aquariums that required outreach to community-based organizations. This included opportunities for the high school interns to share what they’ve learned at community fairs, where younger students are exposed to aquaculture. This creation of relationships between younger and older students is a key example of creating a connection between the “Middle School and Younger” and “High School Stages” in a way that solidifies the pathway the older student is already on, as a result of peer mentorship. Also, as this interviewee put it, creating touch points between older and younger students allows the older student to instill confidence in younger students that they can follow in the older students’ footsteps (“I did it, so can you”).

PATHWAY STAGE #3: TECHNICAL SCHOOL, COLLEGE, AND TRAINING

The third pathway stage — “Technical School, College, and Training” — **pertains to the education, activities, networking, career exposure and support, and work experience of adults in technical school, college, and other aquaculture-related training programs.** While young adults (e.g., those who graduated from high school and attend higher education soon after) may represent a large portion of people at this stage, this population also includes those who may be pursuing aquaculture-specific training as entrepreneurs, in their mid-career, or as specialized or continuing education.



The DEI theme of **inclusion** particularly applies to this stage, as one’s desire to pursue aquaculture as a field of study, professional interest, or career will need to be met by both access and a sense of welcome to the field to achieve the necessary learnings and skills to successfully enter or engage with the field. Moreover, the DEI theme of **belonging** also plays a significant role at this stage, as students at this stage will likely gain direct contact with the field through research, industry conferences, hands-on learning, and/or internships. Students’ initial experiences with the field (and the people who work in it) can frame their view on whether they believe they can both contribute and comfortably bring their full, authentic selves to the field — which, in turn, can impact their decision to continue in that field.

A student’s interaction with the aquaculture field at this stage is likely intentional, focused, intensive, and career focused. Educators play a large role in a student’s contact with the field, though one’s individual connections and networks are also an important influence (e.g., career mentors, peer mentors, interaction with industry at conferences and in work experiences).

DEI barriers and opportunities specific to this stage are detailed below.

IN BRIEF: DEI BARRIERS AND OPPORTUNITIES FOR TECHNICAL SCHOOL, COLLEGE, AND TRAINING

DEI BARRIERS

- Post-secondary students may not sense welcomeness and belonging within the school and training environment if there is a lack of representation.
- Post-secondary students may not feel higher education programs are fully preparing them to enter the aquaculture field.

DEI OPPORTUNITIES

- Design aquaculture programs in a way that sets all post-secondary students up for success (e.g., training students in a range of industry skillsets, fostering intentional connections with diverse students, taking a flexible educational approach, providing diverse students with opportunities to work and contribute to the field).
- Strategically leverage higher education’s position as a critical juncture point in the workforce pathway (e.g., create connection points with high school and industry).
- Foster networks of support for students (e.g., establishing formal mentorship programs, creating spaces where students can support one another).

IN BRIEF: DEI BARRIERS AND OPPORTUNITIES FOR TECHNICAL SCHOOL, COLLEGE, AND TRAINING**DEI OPPORTUNITIES (cont.)**

- Formalize support for DEI initiatives through a DEI action plan adopted by departmental and institutional administration (e.g., a plan that includes components of transparency and accountability, areas for building literacy on DEI, creating safe space agreements, establishing platforms for open conversations on DEI, supporting staff and student affinity groups, creating work opportunities specifically for underrepresented students).

DEI BARRIERS

Interviewees noted how college can be a critical point in the workforce pathway. At this point in the pathway, students have actively chosen to pursue this field, and a student's motivation to keep pursuing the field will likely be affected by their perception of the field's welcomeness and openness toward them. That sense of inclusion will weigh heavily on one's feelings of belonging, which links directly to retention (e.g., students can lose passion for the field if they feel like they are not welcome in the field or don't have a voice to contribute to it).

Retention is already a challenging prospect for diverse students in U.S. aquaculture. As noted in the ["High School" section](#), questions about career stability, growth, and salary come into play when students and their parents think about the future. As interviewees pointed out, U.S. aquaculture, as a relatively small and young industry, lacks both the financial security and vertical and horizontal movement and career growth that is present in other fields. These are all barriers for students from underrepresented communities and can be challenges to keeping people in the field.

However, most of the technical school, college, and training challenges raised by interviewees had to do with the interplay between inclusion and belonging at higher education institutions. These include:

- **Post-secondary students may not sense welcomeness and belonging within the school and training environment if there is a lack of representation** – Diverse students may not feel welcomed and belonging in the industry if their training institution does not have faculty or a student body that reflects their ethnic or demographic background. In an education environment where students sense a lack of diversity, students may also experience tokenism. One interviewee noted that as a student in a largely non-diverse aquaculture program (from both a faculty and student body perspective), they sometimes feel that the program "needs someone who looks like me, but they don't actually want me." A lack of welcomeness and belonging can also be felt when attending industry and association meetings as students. Interviewees mentioned an "old boys' club" culture at U.S. aquaculture meetings, where politicking among powerful industry players feels of greater importance than foster a learning environment, particularly for diverse students. Additionally, interviewees mentioned that internship experiences accentuate feelings of unwelcoming and unbelonging, given common experiences of racial- and gender-based microaggressions (further explored in the ["Career and Industry" section](#)).
- **Post-secondary students may not feel higher education programs are fully preparing them to enter the aquaculture field** – Higher education curricula often take a "one size fits all approach" to education, which often does not account for the distinctive needs of diverse students entering the field. For instance, as mentioned in the ["High School" section](#), diverse students who lack social and cultural literacy of the aquaculture industry (including "soft skills") can be at an even greater

disadvantage if they also come into a higher education program with insufficient academic preparation. Diverse students may also find themselves in situations where they are caretakers for their family and thus may need to work significant hours in addition to pursuing an academic degree. Many training programs currently, however, are designed for full-time students. Interviewees noted that college programs often feel strapped because they don't feel they have the tools, understanding, or capacity to both run an academic program and meet a diverse set of student needs.

Interviewees noted that school preparation for entering the aquaculture field goes beyond considerations of curricula. For example, interviewees mentioned that most aquaculture programs do not talk openly with their students about DEI issues they may encounter in the field. Part of this may be because post-secondary educators often feel that their role, when it comes to DEI, is limited to recruiting a diverse pool of students, providing students with equal opportunities to enter training programs and summer research opportunities, and preparing students academically to enter the industry. Beyond this, interviewees noted, post-secondary educators largely do not feel knowledgeable or empowered to talk about the DEI issues present in the industry. Yet, for many diverse students, having such knowledge is an essential (but largely absent) part of the training experience.

Interviewees noted that when students face DEI challenges within an academic program, particularly if they do not have a mentor to help them work through these challenges, retention within the program suffers. Additionally, bringing such issues to light can be difficult for students, as it can feel like a burden to raise these issues with school administration, particularly if there is no DEI policy or plan in place to ensure accountability for enhancing DEI in the program.

DEI OPPORTUNITIES

Interviewees noted several DEI opportunities that technical schools, colleges, and training programs can implement:

- **Design aquaculture programs in a way that sets all post-secondary students up for success –** Overall, this involves educational programs breaking from a “one size fits all” mode of education and being aware of how to adjust educational approaches based on the needs of the students. This consists of multiple components:
 - **Training students in the range of skillsets needed to successfully enter the field –** This includes technical and field skills (e.g., tractor trailer and stick shift operation, boat operation, soldering, basic plumbing) entrepreneurial skills (can be especially valuable for diverse students who may come into an aquaculture program with limited social or cultural literacy on “soft skills”), survival skills (e.g., swimming), and specialty skills (e.g., food safety certifications like ServSafe). Academic programs can purposefully incorporate skill building practice into their curricula. One interviewee, for instance, noted that their college program incorporates writing, oral communication, and mathematics exercises into classes with the intent of giving students opportunities to practice those skills. Educators can also link skills development to known workforce demand and job opportunities in their specific region.
 - **Foster connection and intentionally interact with diverse students –** Program faculty, staff, and administration should approach student interactions with intentionality, understanding that there may be distinctive challenges that students face that such students may not readily

disclose or necessarily be aware of (e.g., academic under-preparation, lack of soft skills, challenges with balancing working and study). Interviewees noted that faculty and staff can help by committing to being the “eyes and ears” for students who may be struggling with their studies amid distinctive challenges. For instance, students may experience “culture shock” in college programs, particularly if they grew up in diverse educational settings and are now pursuing a degree in an environment that is less culturally or ethnically heterogeneous. Interviewees also raised examples of diverse students choosing to drop out of aquaculture programs, even if they’ve received full-ride scholarships and were offered paid international internships, due to extenuating family issues back at home. Interviewees noted that having staff acknowledge challenges faced by diverse students and encouraging students to continue their studies amid these challenges goes a long way to showing students their support.

Another important element of intentional interaction involves preparing students for the full reality of what they will face in the field (e.g., sexism, racism) while simultaneously creating spaces within the school program for students to bring their full selves to the academic program. Taking this approach, interviewees noted, will inspire confidence in diverse students that they belong in the aquaculture field. Programs can help achieve this result by allocating space for open conversations about DEI in the academic program. Conversations should include honest reflections about DEI challenges in the field (to better prepare diverse students for challenges they may face) as well as discussions on the benefits that DEI provides to the field overall.

- **Taking a more flexible approach to education and assessment** – Extending flexibility both acknowledges the distinct challenges that diverse students may be facing and helps to better set them up for success. For example,, faculty that are aware of a student working full time in addition to taking classes can choose to be flexible in due dates of homework assignments. Another example: If aquaculture programs are aware that in-person classes are a hindrance to diverse students participating in a program — perhaps, due to long travel times on public transportation — department heads may require in-person participation for just the lab classes and hands-on practicums instead of all courses. Even in one’s teaching approach, faculty can be more intentional. Interviewees noted, for example, the importance of teaching in a way that highlights student experiences (e.g., providing examples of underrepresented aquaculture practitioners that are innovating ways of doing business). All in all, these approaches are ways of “showing authentic care” to students.
- **Provide work opportunities specifically for diverse students** – Realizing that challenges diverse students face may also be barriers to these students being able to take on aquaculture work opportunities, schools can help set up internships, co-ops, and apprenticeships specifically designed to meet the needs of underrepresented students (e.g., providing paid internships so that diverse students may not have to choose between an internship in their field of study and working an unrelated job to support themselves and their families). As one interviewee put it, “People want meaningful opportunities to work but are [often] not given that chance.” Several interviewees noted that they were beneficiaries of student work experience programs designed to promote participation in the field among underrepresented students. Many of them credit such programs as one of the reasons they are still working in the field today.
- **Provide opportunities for diverse students to contribute to the aquaculture field** – Interviewees noted that one way to encourage belonging is to help students see their ability

to contribute to the field. Thus, another DEI strategy is to expand the realm of opportunities for contribution rather than just knowledge acquisition. One interviewee noted that their aquaculture curriculum includes intentional efforts to involve undergraduate students in data analysis, presentations, and on-campus research fora (which can provide students with skills to present at regional or national meetings). This interviewee also noted that a student research experience is a required part of the academic program and that the experience includes asking students to come up with a business plan, contact farmers to get an understanding of aquaculture work, and assess what part of the aquaculture field provides a career draw for the student. Interviewees also noted that some programs strongly encourage students to be co-authors on papers. As one interviewee put it, “When [students] submit a paper [to a journal], it says, ‘I am part of this field.’”

- **Strategically leverage higher education’s position as a critical juncture point in the workforce pathway** – Colleges see themselves as an important stage in the workforce pathway, particularly helping recruit more diverse participants in the industry (and thus creating connections up and down the pathway). By setting this expectation, colleges can strategically reframe their role in workforce development:
 - **Create connection points with high schools** – As noted in the [“High School” section](#), colleges can support recruitment efforts by promoting greater exposure to aquaculture. This can include, for example, providing equipment, broodstock, and trainers to high schools to help them run their own fish labs. Additionally, colleges can create dual enrollment or bridge programs for high school students to take college courses in aquaculture. Colleges can also think strategically about the high schools with which they form relationships to enhance diverse recruitment (e.g., working with urban high schools, not just those from rural areas).
 - **Create industry partnerships** – Colleges can work with industry to establish paid co-ops, apprenticeships, or internships that specifically connect underrepresented students to industry. This could be especially beneficial for Historically Black Colleges and Universities (HBCUs) and Minority Serving Institutions (MSIs) that may already have a higher proportion of students from underrepresented backgrounds compared to predominantly white institutes. Colleges may also invite members of industry to be guest educators in their academic programs. As noted in the [“High School” section](#), industry connections are critical, particularly in terms of exposing students to the needed industry skills. Post-secondary educators may not have the time or the training to teach such skills, so there may be strategic opportunities for schools to bring in industry professionals to team teach alongside faculty. Example skills that may need to be team taught include how to write an appropriate cover letter and resume for the industry, how to negotiate a salary, and what is needed to become an owner-operator of a farm. Having industry professionals teach these skills is especially important, since they are the ones that will be hiring students.

Schools can start by leveraging industry connections through connections with alumni. Interviewees noted that alumni are often happy to give presentations to current students, act as educational resources (e.g., letting students or classes come to their facilities), opening access to student work experiences (e.g., offering internships), and providing input to school or program DEI plans (having gone through those programs already).
- **Foster networks of support for students** – This opportunity was brought up repeatedly by interviewees and includes setting up mentor programs and creating spaces for peer mentorship.

- **Establish formal mentorship programs for students** – Interviewees strongly emphasized that mentorship is essential for ensuring that diverse students both feel welcomed into the field and *stay* in the field. Many interviewees noted that had it not been for the support of their mentors — both acting as guides to help them navigate the U.S. aquaculture industry and introducing (and encouraging them) to pursue career opportunities — they would not be where they are today. People spoke of their mentors taking them “under their wing” at industry conferences; connecting them with paid co-ops; and pushing them to advance in their careers (e.g., graduate studies), skill building (e.g., public speaking), and confidence.

Interviewees noted that while it is helpful to have mentors that look like their students (e.g., gender, race, ethnicity) or share their students’ live experiences, it is not essential. Mentors also need not be physically present in the same location as a student. What *is* essential, interviewees said, is that mentors treat their mentees with respect, understanding, and support and assume that their mentees belong in the field. In other words, having a mentor is not just about skill building; it is also an opportunity to feel welcomed into the field. As one interviewee said of their mentor, “I was not judged by the color of skin or assumed that I was looking for a handout.”

Interviewees indicated that good mentors establish trust with their mentees, showing interest in helping mentees pursue their career goals and guiding students through that process. Interviewees noted that it is especially important for diverse students to have mentors in whom they can confide and with whom they can work through challenging situations. Diverse students may particularly desire to reflect on challenging experiences they face (being underrepresented in the field) and have someone with whom they can bounce ideas without judgment.

According to interviewees, mentors of diverse students must be especially aware of dynamics where students do not feel like they are “enough.” Diverse students, according to interviewees, often feel an immense social pressure to fit in to an educational or work space and not stand out. As such, these students may not feel comfortable readily opening to others about the difficulties they face fitting in or the challenges they seem to encounter that others do not. Mentors can be among the few people to whom diverse students open up about these experiences. In turn, mentors may play a critical role in helping diverse students process through feelings of inadequacy, specifically helping them understand that going through such feelings is normal and that experiencing such feelings is *not* a signal to students that they do not belong in the field. As one interviewee put it, effective mentors “help you know that you have value and can add value” to the field.

Case Study: Establishing Community Spaces in a University Setting

At one university, the marine sciences program set up its lab facility to include a space (in the case, a patio) that is dedicated for use as a community space. An educator at this university noted that students have responded well to this set-up, organizing events and organic networking with one another around that space. This educator noted that this setup has made a big difference in student connectivity, as, without this space, interactions between students may have been limited in some cases to passing one another in the hallway.

- **Create spaces where students can support one another** – Colleges can encourage students to network and support one another, both within and outside the institution. Within the institution, interviewees noted the positive impact of simply creating dedicated spaces for students for organic connect and camaraderie (see the case study above), as well as providing thematic social and networking events for faculty and students (e.g., ice cream social at an oyster farm). Outside the institution, colleges can also encourage students to connect with network professionals who have made the transition from school to career. Examples of such networks raised by interviewees include [Women in Aquaculture](#), [Minorities in Aquaculture](#), and the [Society for the Advancement of Chicanos/Hispanics and Native Americans in Science](#).^{9,10,11} Interviewees also suggested that college programs connect aquaculture students to other college departments that may help students build necessary skills to successfully enter the workforce (e.g., communications, marketing, graphic design). Finally, interviewees spoke to opportunities for colleges to link the work carried out in the academic program to larger considerations of food systems, food sovereignty, and human livelihoods (see the case study below).
- **Formalize support for DEI initiatives through a DEI action plan adopted by department and institutional administration** – A key strategy for colleges to advance progress on DEI goals is to create a DEI plan that outlines DEI shortcomings in the program and needed actions to address those shortcomings. Plans can include such commitments as building diversity within the faculty and student bodies. As interviewees pointed out, institutions that serve underrepresented populations (e.g., HBCUs, MSIs) are not exempt from creating DEI plans, as aquaculture programs at some of these institutions face similar challenges to those at predominantly white institutions (e.g., low student enrollment of underrepresented populations, lack of diverse faculty members). Interviewees noted that institutions that are just starting the process of putting together a DEI plan can refer to existing plans from other institutions or professional societies. According to interviewees, effective DEI plans include several components, including:

Case Study: HBCU and Tribal College Partnership

We spoke with an educator from an HBCU that has provided nearly \$2 million in scholarship funds to a local Tribal college for students at that college to obtain training in aquaculture. The HBCU has committed to sponsoring six indigenous students to complete an aquaculture certificate program, including funding for those students to build their own aquaponics system. The HBCU is also looking to have an extension aquaponics facility built at the Tribal college and is working with retailers to eventually sell the farm-raised products. Through this partnership, the HBCU sees itself as having a dual role: providing equitable access to the aquaculture field and utilizing aquaponics to develop systems of food sovereignty and security.

⁹ Women in Aquaculture, “Women in Aquaculture,” Facebook, accessed 15 August 2022, <https://www.facebook.com/womeninaquaculture>.

¹⁰ Minorities in Aquaculture, “About Minorities in Aquaculture,” accessed 15 August 2022, <https://www.mianpo.org/aboutmia>.

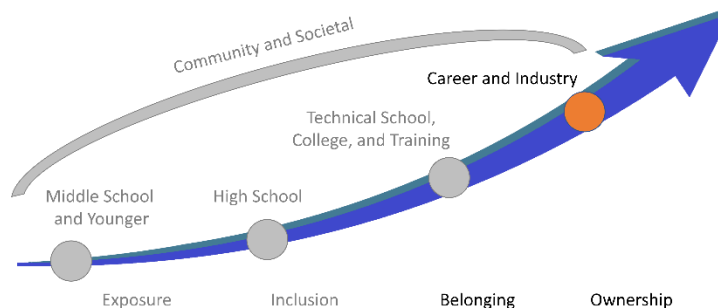
¹¹ Society for the Advancement of Chicanos/Hispanics and Native Americans in Science, “Mission + Impact,” accessed 15 August 2022, <https://www.sacnas.org/mission-impact>.

- **Transparency and accountability** – This includes providing clarity on how DEI plans will lead to action and outlining the avenues through which both internal and external stakeholders can keep the department and institution accountable to action and progress on DEI (e.g., public reporting, metrics). This also includes an acknowledgement of the need to ground truth DEI challenges and progress with both students, faculty, and staff. As such, DEI action plans can outline the processes by which student and faculty stakeholders help ground truth the success of and gaps in DEI efforts.
- **Areas for building social and cultural literacy on DEI in academia and in the field** – This could include the need for regular DEI training among leadership, faculty, and staff and processes for intentionally accounting for DEI in the way classes are taught, how educators provide support to students, and how mentorship is carried out.
- **Creating safe space agreements** – These agreements both protect and set expectations for the spaces in which faculty and staff operate and in which students learn, train, and engage. This could include
- **Establishing platforms for open conversations on DEI** – As interviewees pointed out, much of the workforce pathway goes through academia. Thus, holding conversations in academia can encourage conversations to carry on through industry spaces (e.g., when students graduate and enter industry). This could also include holding regular DEI-focused conversations with leadership, faculty, and staff focused on areas of DEI progress and areas for improvement to meet outlined DEI priorities.
- **Fostering and supporting staff and student affinity groups** – These groups can help normalize DEI conversations within the institution and further DEI priorities. These groups can also support accountability toward progress on DEI, including helping ensure that the burden of meeting DEI priorities is shared across the organization rather than just placed on minorities within the organization.
- **Creating work opportunities specifically for underrepresented students** – This also includes considerations of funding these opportunities, both to provide a stipend (or wage) and to assist with transportation and housing support for students to be able to be able to take on internships.

PATHWAY STAGE #4: CAREER AND INDUSTRY

The fourth pathway stage — “Career and Industry” — **pertains to the work experience, career development and advancement, networking, and career support for adults working in aquaculture or an aquaculture-related field.** One’s experience in this stage can be that of an employee, employer, entrepreneur, or consultant.

Additionally, this stage represents the gamut of professional experience in the field, ranging from those who have just recently started working in aquaculture to those who are well established in the industry. Some in this space may be seen as industry leaders, whether formally (e.g., affiliation with an industry group or professional society) or through peer recognition. Peer recognition may be broad or limited in scope — organizationally, geographically, or within particular spheres of influence.



Due to the range of aquaculture experience represented at this stage, this population also represents a range of ages of working adults. There exist both generational and demographic differences among those in the “Career and Industry” stage, including possible differences between those who hold (formal or informal) positions of industry leadership (often also industry veterans) and those who are early in their careers.

The DEI theme of **belonging** continues to play a role at this stage, as direct work experience, particularly over time, may solidify or challenge one’s belief on whether they can both contribute and comfortably bring their full, authentic selves to the field. From an industry standpoint, views of belonging impact both recruitment and retention. The DEI theme of **ownership** also emerges at this stage, as those working in the field test and sense their ability to both contribute to the field and have those contributions be acknowledged and recognized (whether narrowly or broadly). Ownership is felt both in terms of one’s individual work and in the context of the field’s overall accomplishments and influences over time. One’s sense of ownership may also be impacted by access to resources (i.e., financial, physical, and human capital), particularly for entrepreneurs.

Interaction with the aquaculture field at this stage is direct and immersive, with one’s contact with colleagues, mentors, professional networks, and industry leaders all influencing their view of and participation in the field. Because the nature of the field is dynamic and largely guided by those who work in it, the Career and Industry stage can both influence internal and external perceptions of the field and set expectations for touchpoints between the “Career and Industry” stage and earlier pathway stages. Initiatives to change both perceptions of the field and connectivity to earlier points in the pathway may be motivated by both workforce needs and a desire for industry growth.

DEI barriers and opportunities specific to this stage are detailed below.

IN BRIEF: DEI BARRIERS AND OPPORTUNITIES FOR CAREER AND INDUSTRY

DEI BARRIERS

- Comments, actions, and assumptions from others in the industry that create unwelcome environments (e.g., sexist remarks, racial microaggressions).
- Undue expectations to perform and the implications of those expectations (e.g., pressure to feel respected by colleagues can negatively affect relationships among diverse individuals, pressure to perform can discourage diverse individuals from entering the field).
- Perceived biases in hiring and promotion.
- Work locations that may be especially challenging to diverse individuals.
- Few industry commitments made to DEI.

DEI OPPORTUNITIES

- Demonstrate buy-in to aquaculture DEI. This includes:
 - Making public statements of commitment to DEI along with a DEI action plan (e.g., integrating DEI into organizational frameworks, leadership, and decision-making; regular, public reporting on DEI; commitment to employee-centric care; culture creation focused on employee recognition and retention).
 - Reexamining hiring practices (e.g., greater willingness to invest in individuals who can be trained into roles, removing potentially exclusionary language from job listings, preparing the industry work culture to welcome and support diverse employees).
 - Reexamining recruitment practices (e.g., recruiting from more diverse applicant pools, establishing career pathways for underrepresented individuals).
 - Reexamining stakeholder engagement (including partnership and collaboration across various workforce pipeline stages).
- Consider the risks of a homogenous workforce (e.g., stakeholder expectations for DEI in business practices, untapped markets of seafood consumers, need for a stable aquaculture workforce, effect of leadership diversity lack on recruitment and retention).

DEI BARRIERS

For early career professionals, DEI barriers revolve heavily around issues of belonging. Retention of diverse participants in the field can lag if support systems or motivations for pursuing the field are not maintained from what was developed during the professional's schooling. Retention also lags if diverse participants in the field start believing that the field is not as open or welcoming as initially perceived.

For mid-to-late career professionals, DEI barriers also begin emerging around ownership. Specifically, diverse professionals not only sense whether they belong in the field but whether they are given a fair chance to contribute to and be recognized by the field.

Interviewees spoke to themes of belonging and ownership in the context of **what the U.S. aquaculture industry looks like today and how it operates**. Key points raised about the industry include:

- Industry leadership and direction is largely informed by the perspectives and viewpoints of men (predominantly white men) from the Baby Boomer generation (i.e., in their 60s and 70s). Views can include the belief that women should take a "backseat role" to men when it comes to decision-making. These cultural viewpoints are present within individual aquaculture operations

but are especially potent at industry and association meetings. Interviewees noted that meetings often feel like “old boys’ club” gatherings for existing industry leaders.

- Those who own existing aquaculture leases and permits (which provide long-term rights to farms and operations) are predominantly white men. Similarly, transfer of ownership, leadership, and industry knowledge often occurs within families, primarily from father to son.

Given this context, interviewees noted that U.S. aquaculture work environments are often challenging for women and racial and ethnic minorities to navigate, including the following challenges:

- **Comments, actions, and assumptions from others in the industry that create unwelcome environments** – Interviewees provided examples based on their experiences. Some spoke from the perspective as a woman in the industry, while others provided examples from the perspective as a racial or ethnic minority. Some insight that was shared:
 - **Perspectives from women** – Women interviewees noted that they regularly face sexist remarks from others in the industry (e.g., being told they are “too nice” or “too cute” to work on the dock; hearing comments like, “You look good, but can you actually do the work?”). Interviewees note that the underlying assumption behind these comments are that women are not knowledgeable or physically capable enough to work in aquaculture (e.g., “You don’t have what it takes to be in this field,” or “You’re only going to be the hatchery help”). Interviewees also noted that they commonly feel like “outsiders” among their male colleagues, being passed over for “drinks with the boys” after work and being excluded from co-worker conversations (e.g., one woman noted that her male colleagues, who bonded over duck hunting, would not invite her into those conversations, as they assumed women weren’t interested in it).
 - **Perspectives from racial and ethnic minorities** – Interviewees that identified as ethnic or racial minorities noted that they commonly face racial microaggressions at work, particularly around the loose usage of insensitive language (which is rarely called out in a predominantly white working environment). Interviewees also noted that colleagues commonly made preconceived assumptions about their aptitude to do their job, and as such, they felt very little room to make mistakes that may “prove” those colleagues “right.” Interviewees noted that aquaculture operations were often located in less ethnically diverse regions, and, as a result, they experienced similar microaggressions and assumptions about their aptitude among people in the surrounding area.
 - **Perspectives from those that identify as being both a woman and a racial or ethnic minority** – Interviewees indicated that they faced a combination of the factors noted above. Experiencing this, they said, compounded a sense of unwelcome and unbelonging to the field. Interviewees shared concerns that the combination of gender and racial/ethnic challenges in the workplace are a reason why women of color find it especially difficult to stay in the aquaculture industry.
- **Undue expectations to perform and the implications of those expectations** – Interviewees noted that given the assumptions made about diverse individuals in the U.S. aquaculture industry, they often feel immense personal pressure to “prove” their competency among their colleagues. Interviewees describe this dynamic as an internalized “belief about the need to work harder” and “the need to be seen or do more to feel like you belong in the space and be valued.” Interviewees further stated that when diverse individuals feel like they “stick out” in a group setting, the belief

that they must do more to be acknowledged or accepted is reinforced. Beyond heavy personal pressure, this works against diverse individuals in two additional ways:

- **The pressure to feel respected by colleagues can negatively affect relationships among diverse individuals** – Interviewees noted that the immense pressure for women to prove their individual competency can result in women competing rather than allying with one another. Dynamics can become increasingly complex when it comes differences in authority as well: Interviewees indicated that sometimes women managers echo their male counterparts' sexist remarks to their female employees as a way of continuing to demand respect from their colleagues and subordinates (particularly those who are male).
- **The pressure to perform can discourage diverse individuals from entering the field** – Interviewees noted that if a diverse individual already feels like they lack the skills to enter the field (e.g., academic skills, "soft skills," social or cultural literacy — see the ["High School"](#) and ["Technical School, College, and Training"](#) sections for a further exploration of this), there may already be a hesitancy to accept a job in the field. If the field lacks representation of individuals that look like them, individuals may feel an even greater pressure to perform, which can act as an additional deterrent to diverse individuals entering (and staying) in the field.
- **Perceived biases in hiring and promotion** – Interviewees noted that industry commonly hires people based on "what current works" for the industry, which can work against diverse individuals. For example, interviewees stated many in the U.S. aquaculture sector believe that aquaculture is "men's work." As a result, interviewees noted, women are not only overlooked for certain jobs (particularly those that are perceived as more physically demanding), but also the job benefits associated with those jobs often feel inflexible or exclusionary (e.g., no paid maternity leave, no daycare benefits). Interviewees also stated that aquaculture companies often prioritize people they believe can "hit the ground running" rather than train in a hire that may have potential to grow into a role. As such, perceived assumptions about whether a person has the physical capability or aptitude to do the job, according to interviewees, gets in the way of hiring (or promoting) diverse individuals into positions for which they may be qualified.
- **Work locations that may be especially challenging to diverse individuals** – Aquaculture operations are often located in remote areas. As mentioned in the ["High School" section](#), remote work locations can be a DEI barrier for diverse individuals taking on an aquaculture job. We noted earlier in this section that racial and ethnic minorities who work in the U.S. aquaculture field have faced microaggressions both at and outside of work, especially when stationed in a more remote location with less demographic diversity. According to interviewees, this can be a heavy disincentive for a diverse individual to accept the job, especially if they come from areas where diverse communities are in close proximity. This situation may be particularly challenging for diverse individuals without a car. Such individuals may either have difficulty finding transportation to the work site or may not wish to relocate to an area with both less diversity and less mobility, which can feel isolating.
- **Few industry commitments made to DEI** – Interviewees stated that much of the U.S. aquaculture industry has not signaled an interest in enhancing DEI in the sector. Additionally, interviewees note that while DEI conversations occurred, progress toward meaningful action has ranged from slow to non-existent. Interviewees also noted a sense that the U.S. aquaculture industry does not see diverse audiences as part of a targeted customer based. Because of this, interviewees note,

diverse individuals can feel that the industry does care about them as either industry contributors (i.e., employees, owners) or beneficiaries (i.e., customers).

In addition to the barriers noted above, women and racial and ethnic minorities in aquaculture also face several challenges that stem from historic and structural barriers that have (and continue to) limit diverse individuals access to financing, land and lease ownership, markets, and training (this is further explored in the [“Looking Across the Pathway: Community and Societal Influences”](#) section). Interviewees noted that **in response to and because of these barriers, diverse entrepreneurs carve out new spaces for themselves within the U.S. aquaculture sector**. This includes experimenting with cheaper forms of fish farming that are more affordable and space efficient (addressing the funding and land and lease ownership barriers) and developing economic networks that support and raise the visibility of diverse practitioners. See the two case studies to the right and below as examples.

While these aquaculture ventures are noteworthy and laudable for their innovation — a “do what you can, with what you have, where you’re at” approach, as one interviewee put it — it is important to note that **these operations have succeeded in spite of DEI barriers, not necessarily because barriers have been actively removed**. Interviewees were careful to distinguish between two different approaches to finding solutions to DEI challenges:

Case Study: Building Backyard Aquaculture Systems

An aquaculture entrepreneur, with whom we spoke, noted that the basis of their work stemmed from the difficulties racial and ethnic minorities face starting their own on-land aquaculture farms. Several factors play into this, including the high upfront expenses of starting such an operation, challenges in acquiring funding to cover those expenses (especially for minorities, who have historically faced barriers obtaining bank or investor funding), and accessing land on which to build the operation (land ownership being another historic barrier for minorities). Taking inspiration from the “victory gardens” concept — in which private residences around the world were encouraged to plant and grow their own food during the two world wars — this entrepreneur developed a cost-efficient model for residents in their region to develop small aquaponics systems in their backyards for either sustenance or a scaled, community-supported food venture. This entrepreneur also worked with their local government to integrate this aquaponics model into the city’s backyard garden program, which provided funding for over 175 households in the region to grow their own food.

- **Accommodative Approach** – Solutions are found by working *around* DEI barriers. That is, solutions are *created amid* the barriers. This approach often places the burden on those excluded or “outside” of the system to come up with solutions. Narratives around solutions highlight how individuals have overcome barriers to succeed.
- **Transformative Approach** – Solutions emerge because systemic DEI barriers are broken down. That is, solutions are *enabled through* barrier removal. This approach invites those currently operating *in* the system to partner with those *excluded by* (or “outside” of) it to collectively

implement systems change and come up with solutions. Narratives around solutions highlight equitable opportunities to succeed because of the systems change.

Case Study: Elevating the Visibility of Women Aquaculture Farmers

We spoke with an aquaculture entrepreneur who identified an opportunity to utilize their background and experience in events catering to support women-owned oyster farmers. They launched a mobile oyster shucking bar that sources almost exclusively from women-owned oyster farmers and sells the product at a premium. This entrepreneur also uses their business to promote and increase the visibility of women, minority, and LGBTQ+ practitioners in the industry, including through social media storytelling and hosting online networking events for women in aquaculture. This entrepreneur has received positive feedback from women working in the industry, who have noted that the business has helped them feel seen and valued.

According to interviewees, aquaculture DEI should embrace the transformative approach, as it will help to elevate DEI overall by breaking down DEI barriers, as opposed to the accommodative approach, which maintains such barriers. It should be noted, however, that many solutions put forth under the accommodative approach are pursued with the spirit, intent, and hope of driving a transformative approach to change (as is the case with both case studies noted above). However, interviewees noted that if the U.S. aquaculture industry's approach to DEI remains accommodative rather than becoming transformative, DEI barriers will continue to persist.

DEI OPPORTUNITIES

In outlining DEI opportunities, interviewees specifically focused on ways to recruit and retain diverse practitioners in the U.S. aquaculture industry. This not only accounts for creating paths for individuals to enter the industry but also enabling those individuals to develop ownership in the field by providing leadership and contributions to the field.

Opportunities are framed as actions that the aquaculture industry — both individual entities and industry leaders — can take to address and enhance aquaculture DEI. They include:

- **Demonstrate buy-in to aquaculture DEI** — At its core, buy-in to aquaculture DEI means creating environments that are supportive to everyone who would like to contribute to the field. As one interviewee put it, “People want to work in a culture where you feel like you can bring your whole self — a culture that embraces, celebrates, and values the perspectives you might bring as someone who doesn’t look like everyone else.” Interviewees believe that industry leadership can ultimately get on board with this sentiment because given the industry’s interest in growing in the U.S., “there is no time to discriminate who is and is not in aquaculture.”

Leadership buy-in is among the most effective ways initiate change, as it allows for leading by example (e.g., incorporating DEI into all aspects of decision-making) and “bringing people along” (as opposed to forcing or instituting change, which can cause resistance). Key aspects of demonstrating buy-in include the following:

- **Making public statements of commitment to DEI along with a DEI action plan** – Action plans should have clear DEI accountability and transparency measures in place that provide avenues for internal and external stakeholders to speak on leadership’s efforts and progress on the plan. DEI plans should also include a DEI code of conduct for the industry (or organization) and outlined best practices, such as:
 - **Integration of DEI into organizational frameworks, leadership, and decision-making** – This includes implementing measures that enhance diverse representation among industry (or the organization’s) leaders, apply DEI considerations to all aspects of organizational decision-making, integrate DEI into existing policies, and provide clear legal protections for diversity in the workplace. Having these elements in place, interviewees noted, will ensure DEI concerns are kept front of mind and will not fade into the background as a fad.
 - **Regular, public reporting on DEI (e.g., actions, metrics, accomplishments)** – Reporting should communicate to stakeholders how company/industry DEI is being actively pursued, perhaps within existing business reporting frameworks (e.g., corporate social responsibility [CSR]; environment, social, and governance [ESG]). Public reporting directly supports internal and external transparency and accountability. It also allows the company/industry to highlight how its DEI efforts are working to enhance the aquaculture field overall (e.g., at aquaculture conferences and meetings).
 - **Commitment to employee-centric care** – This includes considerations and practices that extend flexibility (e.g., maternity leave, daycare) and assistance (e.g., transportation) to diverse individuals, where needed.
 - **Culture creation focused on employee recognition and retention** – This includes holding DEI training for all employees, highlighting stories and accomplishments of diverse employees, and fostering safe work environments where DEI conversations can happen (i.e., mediums or platforms through which sentiments can be shared and tough questions are asked). This also includes encouraging participation in support networks, both internally (e.g., affinity groups, mentorship programs) and through existing industry networks (e.g., [Minorities in Aquaculture](#)).¹² Additionally, leadership should intentionally invest in the work of younger employees (e.g., on-the-job skills training) for the purposes of career growth (e.g., toward farm management and ownership).
- **Reexamining hiring practices** – This means hiring for what industry would like the field to look like in the future, not just what it looks like now. There are several elements involved in revamping hiring practices, including:
 - **Greater willingness to invest in individuals who can be trained into roles** – This means rather than immediately writing off a job candidate just because they don’t have all the desired experience, seriously considering them, especially if there is the potential for them to stay in the industry or organization for the long term. There is practical reasoning behind this statement. Take for example, women job candidates, who, as mentioned earlier, are sometimes overlooked for aquaculture positions that men have traditionally

¹² Minorities in Aquaculture, “About Minorities in Aquaculture,” accessed 15 August 2022, <https://www.mianpo.org/aboutmia>.

filled. At the 2022 Women in North American Aquaculture Summit, aquaculture industry recruiters noted that there is high potential for recruiting women to the sector by drawing them from other industries, including STEM fields and sales. One representative noted that the women candidates with whom they interact are not just looking for a job but are rather interested in growing *with* the industry and helping develop the industry competitively. That representative also noted hearing from farm managers that they prefer to have women on their teams, as women have demonstrated that they contribute effectively to a team environment, display a strong ability for creative problem solving, and show a sense of great care for the fish on the farm.¹³

- **Removing potentially exclusionary language from job listings** – This involves examining how language in job postings does (or does not) convey a sense of welcome to the industry. For example, one interviewee noted that using the phrase “must be able to swim” in a job posting could be seen as exclusionary to Black candidates, where there are already existing disparities in swimming abilities between African American communities and other demographic groups.¹⁴ This does not mean hiring people for positions that could endanger their lives, but it also does not rule out opportunities to further diversity the workforce. For instance, there may be other positions in the company that do not require swimming ability and can thus be expanded to draw from a more diverse recruitment pool.
- **Preparing industry work culture to welcome and support diverse employees** – An organization may need to make structural or cultural changes to establish and provide a work environment where diverse individuals can thrive. Before recruiting diverse candidates, leaders should examine their organization’s policies and practices and assess whether applicants would feel safe to work in the company environment and would be encouraged to bring their genuine selves to contribute to the organization and industry.
- **Reexamining recruitment practices** – This means putting intentional effort into recruiting from diverse applicant pools. This includes working with HBCUs and MSIs to expand the applicant pool; coordinating with non-aquaculture college departments to recruit students that provide other important skillsets to industry (e.g., marketing, sales, graphic design); partnering with urban workforce development programs (including recruiting students who are not always college-bound); and establishing pathways specifically for underrepresented individuals (e.g., scholarships, co-ops/apprenticeships, and paid internships targeted toward diverse candidates).
- **Reexamining stakeholder engagement** – This involves engaging across the workforce pathway to shape the future workforce and expand industry reach and exposure to diverse audiences. Ideas that interviewees raised to strategically engage diverse communities include:

¹³ Kathleen Offman Mathisen, Leah Stoker, and Tina Garlinski-Gonsky, “Recruitment and mentorship,” panel interview by Maryam Farag, Women in North American Aquaculture Summit, September 8, 2022, <https://www.aquaculturenorthamerica.com/ve-agenda/recruitment-and-mentorship/>.

¹⁴ USA Swimming Foundation, “USA Swimming Foundation Announces 5-10% Increase in Swimming Ability,” *USA Swimming*, 25 May 2017, <https://www.usaswimming.org/news/2017/05/25/usa-swimming-foundation-announces-5-10-percent-increase-in-swimming-ability>.

- **For the “Middle School and Younger” stage** – Partner with schools, trusted community leaders, and organizations to highlight aquaculture as a field and how diverse communities connect to it (e.g., see the [aquaculture community education case study in the “Middle School and Younger” section](#)).
- **For the “High School” stage** – Participate in career day events; mentor high school students interested in pursuing aquaculture (e.g., those in CTE programs); provide equipment, funding, and capacity to building and run in-school fish labs; and help offset costs for field-based learning trips to aquaculture operations.
- **For the “Technical School, College, and Training” stage** – Work with colleges to set up co-op and apprenticeship programs; participate in career events; mentor post-secondary students interest in pursuing aquaculture; creating connections at universities beyond fisheries and aquaculture departments (e.g., business school, art school) to create additional pathways to the industry from a broader pool of applicants; and help pathways to specifically support and recruit students from underrepresented populations (e.g., [Kvarøy Arctic’s Women in Aquaculture Scholarship Program](#)).¹⁵
- **For the “Career and Industry” stage** – Support and partner with organizations looking to connect diverse students with industry (e.g., [Minorities in Aquaculture](#), blue economy accelerators like [AltaSea](#) and the [Youth Maritime Collaborative](#) of [Washington Maritime Blue](#));^{16,17,18,19} fund diverse practitioners to attend aquaculture conferences; sponsor or contribute to innovation seed grants and design innovation competitions (e.g., [HATCH Women in Ocean Food Innovation Studio](#));²⁰ fund incentives and capacity (e.g., extension agents) to help small operators prioritize and enhance DEI efforts; and track innovative aquaculture DEI initiatives to help fund, scale, and replicate across the industry.
- **Consider the Risks of a Homogenous Workforce** – Seriously examine the business and industry costs of not enhancing DEI in workforce development. Key considerations include:
 - **Increased stakeholder expectation for DEI in business practices (reputational risk)** – In a world where information availability and public scrutiny of businesses is high, both employees and customers are increasingly demanding more equity in company governance and operations. At the most fundamental level, discrimination litigation presents both financial and reputational risks. Beyond this, DEI plans with reporting protocols and/or certifications with CSR, ESG, OR DEI components can help address stakeholder expectations (e.g., [Asian Seafood Improvement Collaboration](#)).²¹

¹⁵ Kvarøy Arctic, “Women in Aquaculture Scholarship,” accessed 15 August 2022, <https://www.kvaroyarctic.com/women-in-aquaculture-scholarship>.

¹⁶ Minorities in Aquaculture, “About Minorities in Aquaculture,” accessed 15 August 2022, <https://www.mianpo.org/aboutmia>.

¹⁷ AltaSea, “Vision + Mission,” accessed 15 August 2022, <https://altasea.org/our-vision>.

¹⁸ Youth Maritime Collaborative, “About Us,” accessed 15 August 2022, <https://youthmaritimecollaborative.org/about-us>.

¹⁹ Washington Maritime Blue, “What is Blue?,” accessed 15 August 2022, <https://maritimeblue.org/what-is-blue>.

²⁰ HATCH, “Women in Ocean Food: Innovation Studio 2022,” accessed 15 August 2022, <https://www.hatch.blue/innovation-studios/women-in-ocean-food>.

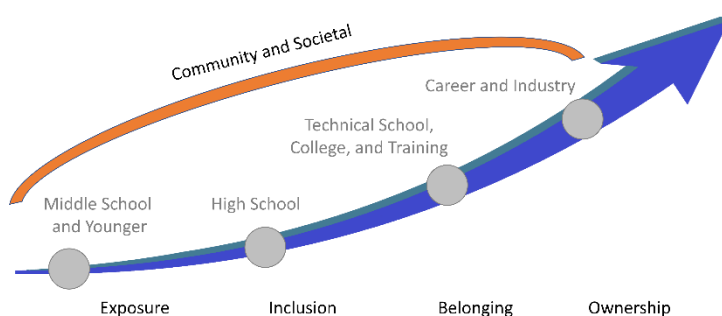
²¹ Asian Seafood Improvement Collaborative, “Our Why,” accessed 30 November 2022, <http://www.asicollaborative.org/about-us>.

- **Untapped markets of seafood consumers** – Interviewees noted that many minority communities in the U.S. consume a high proportion of seafood as part of their diet and are thus ripe for engaging as customers. Creating connections to these markets, according to interviewees, can best be done by developing a diverse workforce that can better reach these markets with cultural considerations. Additionally, interviewees noted that enhancing aquaculture DEI (and the industry’s reputation around it) can have a positive, cyclical effect by improving industry awareness and expanding the potential for more market share. This can also have the effect of potentially driving even more recruitment to the industry.
- **Need for a stable aquaculture workforce (recruitment and retention)** – Interviewees noted that given the struggle the U.S. aquaculture industry currently faces developing a robust workforce — and the risk such a challenge poses to growing the industry further — diversifying the field can help provide a steadier workforce pool. Embracing DEI can also help with workforce retention, which is more cost-effective than persistent recruitment with turnover in labor.
- **Effect of leadership diversity lack on recruitment and retention** – As previously noted in the [“High School” section](#), diversity in the industry is most heavily concentrated in processing plants. Such jobs can be a “hard sell” if potential recruits see these jobs as the extent of their growth in the industry (e.g., not seeing representation higher in leadership). This is particularly relevant, as there is increasing competition for recruitment, not only from related natural resource industries (e.g., fishing) but also from other blue economy and STEM fields. Diversity in leadership also helps provide internal accountability toward creating work environments that are seen as supportive to diverse practitioners. Poor work environments can stifle both recruitment and retention. For instance, interviewees noted that women are likely (and known to) move on to different fields if they face issues related to lack of welcome (e.g., limited flexibility in the workplace for women who require maternity leave or have regular childcare responsibilities).

LOOKING ACROSS THE PATHWAY: COMMUNITY AND SOCIETAL INFLUENCES

The previous four “Pathway” sections illustrated that there are distinctive DEI barriers at four points along the aquaculture workforce trajectory: Middle School and Younger; High School; Technical School, College, and Training; and Career and Industry. However, as interviewees pointed out repeatedly, **none of these barriers or opportunities**

exist in a vacuum; the way barriers are addressed (or opportunities are pursued) at one stage will affect (or are affected by) the stage(s) prior or subsequent. This is because **larger, sociocultural influences and forces both connect the individual pathway stages and exert an effect on all the stages collectively**. Put in another way, these structures and forces explain the *presence* of DEI challenges across the trajectory and the *extent* to which those challenges are experienced at a given stage.



Based on what we heard in interviews, we determined that **sociocultural dynamics on the aquaculture pathway generally manifest in two forms**: community influences and societal influences. **Community influences** are cultural beliefs, expectations, or realities held by one’s community (e.g., familial, geographic, ethnic, societal, political) that dictate what a person is exposed to or the resources a person is afforded at a given stage, both of which can impact the knowledge or ease of pursuing an aquaculture career. Community influences may be affected by the resources or opportunities to which it (or the people within that community) do(es) or do(es) not have access. As such, community influences are directly linked to **societal influences**: social or political factors that explain why and how barriers that are pervasive throughout U.S. society (i.e., over and above the aquaculture industry) are experienced by specific populations across the pathway.

Because community and societal influences affect all stages of the pathway, we believe it is most helpful to explore these influences by DEI theme (exposure, inclusion, belonging, and ownership) rather than by pathway stage. This framing helps to explain the sociocultural barriers felt across the pathway and better articulate DEI opportunities that work to address issues affecting all pathway stages. This framing also emphasizes the interconnected nature of the pathway and, thus, the need for collaboration across pathway stages to systematically break down DEI barriers.

IN BRIEF: DEI BARRIERS AND OPPORTUNITIES AROUND COMMUNITY AND SOCIETAL INFLUENCES

DEI BARRIERS

- Barriers Related to Exposure
 - Lack of connection to aquaculture may be affected by broader social disconnects (e.g., access to coastal areas, access to fresh seafood, disparities in swimming ability).
 - Exposure to seafood may be dependent on family or community values.
- Barriers Related to Inclusion
 - The academic backgrounds of diverse students may not fully prepare them for the high school-to-post-secondary training transition.
 - Lack of industry social and cultural literacy can be a barrier to the school-to-work transition.

IN BRIEF: DEI BARRIERS AND OPPORTUNITIES AROUND COMMUNITY AND SOCIETAL INFLUENCES

- Barriers Related to Inclusion (cont.)
 - Remote locations and transportation access can affect diverse individuals being able to accept school or job opportunities.
 - Lack of community support for an aquaculture career may affect the ability to pursue such a career.
 - Career programs specifically benefiting underrepresented individuals may not be supported.
- Barriers Related to Belonging
 - Challenges associated with learning and working in a demographically homogenous environment can cause diverse individuals to doubt whether they belong in the field.
 - Lack of familial or community support for pursuing an aquaculture career can compound feelings of unbelonging for diverse individuals.
 - Deeply ingrained cultural dynamics can create barriers to belonging (e.g., history of slavery in the U.S. informs the hesitance of some Black individuals to work on aquaculture farms).
- Barriers Related to Ownership
 - There is little to no data about the industry's demographic makeup, which affects the ability to build data-informed strategies for enhancing DEI in industry participation and ownership.
 - U.S. seafood industry leadership and ownership are largely maintained within family legacies and in systems that may exclude diverse individuals.
 - Historic barriers (e.g., access to funding; access to training; access to markets; access to land, leases, and permits) continue to affect diverse individuals in achieving ownership.

DEI OPPORTUNITIES

- Pursue disparity and equity studies to understand the demographic makeup of the U.S. aquaculture industry and barriers and opportunities to enhancing aquaculture DEI.
- Highlight success stories of aquaculture DEI.
- Intentionally engage diverse communities in aquaculture (e.g., involve both students and families in aquaculture education, relate aquaculture to community history, link community values to workforce development, raise considerations of community ownership and food sovereignty).
- Invest and participate in DEI-supportive workforce development initiatives.
- Build greater accountability for DEI in the seafood industry.
- Explore and advocate for solutions in which policymakers can help enable aquaculture DEI.

BARRIERS RELATED TO EXPOSURE

We noted in both the [“Middle School and Younger”](#) and [“High School” sections](#) the importance of increasing exposure for students to the oceans and seafood space in order to create a connection to the aquaculture industry and to inspire students' imagination and belief that they have a place in that space. Exposure is a powerful influence on one's view of the world and their place in it.

In many cases, a **lack of connection to oceans and seafood is both a matter of educational curriculum (e.g., learning about the ocean) and broader societal disconnects**. For instance, if a student lives in an area without safe and open access to the coastline or was never taught how to swim, that student may not imagine that a water-based industry is in their future (or could even be fearful of entering such an industry if, say, they do not know how to swim). Another example: If a student grows up in an area

where there is no broad access to fresh seafood, they may not develop an appreciation for the seafood industry that supplies that food source or the connection to where their food comes from.

This can manifest as a community influence, as well, given that **a child's exposure to seafood may be dependent on the child's family or community values**. For instance, if interacting with the ocean or purchasing fresh seafood is considered a valuable experience in one's family or community, that child may be more naturally prone to have a connection to (or an appreciation of) seafood and aquatic based industries, like aquaculture. Financial situations may also come into play. For example, if a child's family was not able to afford seafood, the child may have less exposure (and potentially less value shown toward) seafood and the seafood industry.

BARRIERS RELATED TO INCLUSION

Access to education and opportunities can greatly influence a student's ability and interest in gaining access to a field. As interviewees noted, many diverse students come from backgrounds that don't always equip them to take part in the industry. For instance, as noted in the ["Career and Industry" section](#), societal disparities have resulted in many in the African American community not knowing how to swim. If a student never learned to swim, this could directly affect both their interest in and access to marine jobs (e.g., marine aquaculture).

From an educational perspective, as interviewees noted in the ["Technical School, College, and Training" section](#), **diverse students may come from academic backgrounds that have not prepared them to make an easy transition from high school to post-secondary training**. Such a burden can affect a student's confidence, motivations, and abilities to pursue training in aquaculture, especially if aquaculture higher education programs are not set up to acknowledge or equip faculty to help mitigate these shortcomings in academic preparation.

Additionally, as noted in the ["High School"](#) and ["Technical School, College, and Training" sections](#), **diverse students may also struggle to make transitions from a school environment to the workforce if they lack social and cultural literacy** (including "soft skills" training) for the work spaces they are entering. We raised previously that students often gain social and cultural literacy from their families and communities, and given the relative lack of diversity in the aquaculture field today, diverse students may not have well developed "soft skills" to match aquaculture industry environments. If diverse students do not have robust learning in the social and cultural norms of the aquaculture sector, and if aquaculture educational programs are not set up to provide students with such learning, those students may not feel comfortable entering into or staying in the aquaculture industry (both a recruitment and a retention issue).

There is also the matter of **how inclusive a school or job is in terms of access and flexibility**. For example, interviewees spoke of instances in which diverse students had to drop out of highly regarded and fully paid academic programs or internships because those opportunities were located far away from the student's family, for whom the student was a primary caretaker. Similarly, many diverse students who come from modest means may not have the ability to take on an unpaid internship. Additionally, as mentioned in the ["High School"](#) and ["Technical School, College, and Training" sections](#), locations of internships and jobs can be problematic if a student does not have access to a car or housing assistance to work in a remote location. All these factors can come into play for a diverse student, which may keep them from pursuing aquaculture-related training and possibly put them at a disadvantage to compete for jobs against peers who do not face such challenges.

Considerations of inclusion, however, go beyond just a consideration of abilities and opportunities. **Inclusion can also be affected by one's community values.** In many communities, students may feel limited by what they are able to explore as a career pursuit, as they may feel only certain career paths are supported by their family or community. As such, they may not feel a sense of welcome from their own community to look at career choices beyond where they are "supposed" to look (e.g., nursing, lawyer, 4-year college). **Community values surrounding career choice may be motivated by both cultural and financial factors:** As mentioned in the ["High School" section](#), the uncertainty and risks present in a relatively young industry like U.S. aquaculture can be barriers for minority and first-generation students when choosing career paths or college majors. This is a particularly strong consideration if parents or communities feel compelled to ensure that their children have better lives than they did (which may mean families are hesitant to support career choices that do not appear to secure a higher salary and standard of living). Thus, considerations of inclusion in the aquaculture industry must account for the freedom students may or may not feel to have, as one interviewee put it, "an ownership of perspective" for what is possible to do with their career and life.

Interviewees also spoke to the issue of **inclusion affecting not just individuals but also initiatives that are led by and supportive of underrepresented individuals.** One interviewee told us that it is often hard to set up and maintain workforce programs at universities that are specifically aimed at helping racial and ethnic minorities enter a field. This interviewee noted personally seeing how educational institutions place intense scrutiny on the operations of such programs (stemming from an inherent distrust and lack of confidence that the program will succeed), thus putting the program in a situation where they feel they have little room to make mistakes. In many ways, the experience of such programs mirrors barriers that racial and ethnic minorities face in the aquaculture field, as raised in the ["Career and Industry" section](#) (i.e., immense pressure to perform and "prove" competency in the face of preconceived assumptions about capability to do the work). As a result, according to this interviewee, if such programs have even the slightest display of what could be considered "mismanagement," the programs are often quickly shut down. The systemic barriers that affect the existence and inclusion of such programs at educational institutions can, in turn, affect diverse students taking advantage of such programs and thus accessing additional pathways into the aquaculture workforce.

BARRIERS RELATED TO BELONGING

Because the makeup of the U.S. aquaculture industry is perceived as predominantly white and male (both demographically and culturally), interviewees spoke to how **learning and working in the aquaculture space as diverse practitioners can be challenging and isolating.** For instance, students who do not see many people in the field who look like them may feel both doubt about whether the field is meant for people like them and concern over working in environments that may be unwelcoming. Interviewees noted how aquaculture conferences and meetings are prime examples of situations in which diverse students and young professionals encounter these feelings, as such events can feel both isolating (i.e., diverse students have said such meetings feel like they are primarily intended for industry leaders to power broke rather than for their industry learning and exposure).

Other **dynamics related to working in a largely homogenous industry also affect diverse individuals' sense of belonging.** As noted in the ["Career and Industry" section](#), individuals face barriers that are common in the industry including: comments, actions, and assumptions from others in the industry that create an environment of unwelcome (including sexism and racial microaggressions); feeling immense pressure to perform and "prove" competency to colleagues and superiors (including little room to make mistakes); perceived biases in hiring and promotion; lack of flexibility to meet the needs of diverse individuals (e.g., for women, paid maternity leave and daycare); and limited examples of industry

entities that have made firm commitments to advancing DEI policies and practices. All these elements can communicate to diverse individuals that they may not belong in the field.

For diverse individuals, **working through issues of belonging can be compounded if individuals sense a lack of support from family or community members for pursuing work in aquaculture** (related to the inclusion and community values discussion in [“Barriers Related to Inclusion”](#) section above).

Interviewees noted that diverse individuals bear an especially difficult burden when they are not only working in a space where they are underrepresented but also do not have the understanding or full backing from their families or communities for their career pursuits

Finally, **there may be deeply ingrained cultural dynamics that inform a sense of belonging in the industry**. For instance, given the history of slavery in the U.S. — and the intergenerational trauma embedded in that history — interviewees noted that Black individuals may actively avoid spaces that require working farms in which they do not own such farms, particularly in an industries like aquaculture where farm ownership largely rests among white families and individuals.

BARRIERS RELATED TO OWNERSHIP

For many interviewees, ownership is the most important consideration when it comes to aquaculture DEI. Ownership can signal to an individual that “what they put into the field” also “matters” to the field. There is also great significance for many diverse individuals in one’s ability to own a piece of the industry, whether through contributions to the field or through physical ownership (e.g., land, farms, operations). For example, similar to how the U.S.’s history of slavery affects Black individuals’ sense of belonging, it may also affect their sense of ownership; as one interviewee put it, for many Black individuals, it comes down to this reality: “If you don’t have a business, you don’t own anything.”

These and other cultural dynamics mean that **conversations around developing the aquaculture DEI workforce pathway development must consider whether the pathway is actually leading diverse individuals toward ownership**. For many interviewees, the setup of the current workforce pathway does not lend confidence that diverse individuals’ career paths are leading toward ownership, due to several barriers.

One barrier that interviewees mentioned is the fact that **there is little to no data about the current demographic makeup of the aquaculture industry in the U.S.** While interviewees provided a consistent picture of demographic makeup, many pointed to the fact that industry wide quantitative data is both missing and not being collected. Without this information, interviewees noted, it is difficult to determine data-informed strategies for building a workforce pathway that increases DEI through industry participation, leadership, and ownership.

Another barrier **is the way in which leadership and ownership is maintained in the U.S. seafood industry**. As noted in the [“Career and Industry”](#) section, ownership in the domestic seafood industry is largely held in family legacies in which business operations, leadership positions, and industry knowledge is passed down from fathers to sons who are already in the industry. Interviewees also noted a dynamic in the seafood industry in which women entrepreneurs are often at the forefront of innovation in the field, but as their operations scale or are acquired by other companies, women are often pushed out of their leadership positions. Both dynamics have the consequence of reinforcing an industry in which ownership is predominantly male and white.

However, one of the most significant barriers to ownership for women and racial and ethnic minorities, particularly for those who want to be owner-operators of their own aquaculture ventures, lies in the fact

that there are **historic and perpetuating barriers women and minorities face accessing capital; training (e.g., extension type services); markets; and land, leases, and permits.** Each of these barriers are explored in more detail below:

- **Access to funding** – It is largely understood and accepted that starting, running, and scaling out one's own aquaculture operation requires significant financial capital (one interviewee estimated an average investment of \$300,000). For aquaculture operations, the breakeven point for return on investment can take many years to reach. Given that many individuals do not have this level of capital on hand, access to funding from banks and investors is immensely important. This also means, however, taking on financial risk to start an operation, which many diverse individuals may not be able or willing to handle, depending on their financial circumstances.

Access to funding is especially challenging for women and minorities, given well-documented barriers individuals in these groups face gaining access to investment funds. For example, in 2021, female founders raised just 2% of venture capital money,²² a figure that has stayed consistent over the past several years.²³ Another example: Studies have shown that Black- and Hispanic-owned firms receive higher rates of rejection and lower amounts of funding when financing is sought,²⁴ and Black entrepreneurs are nearly three times more likely than white entrepreneurs to have business growth and profitability negatively impacted by a lack of financial capital.²⁵ While net worth and lack of assets are cited as reasons for why these groups are often excluded from full funding, interviewees noted that historic barriers related to economic ownership, opportunity, and inheritance play into why diverse individuals do not have the net worth or assets in the first place.

It should be noted that access to funding is not just a business operations concern; lack of funding can also affect individuals' abilities to access networking opportunities. One interviewee, who also runs their own small business, noted that attending industry conferences is an extremely valuable opportunity from a networking perspective and business growth perspective, but the cost of attending can make it hard to justify the investment.

Additionally, interviewees mentioned how regulatory and legislative requirements can inadvertently present barriers to acquiring funding. An interviewee pointed to the example of the 2019 Young Fisherman's Development Act, which aims to support early career fishermen entering the industry through matching grants. While the intent of the act was to provide financial support, the interviewee noted that the Act's stipulation of only providing matching grants disadvantages women and minorities who already have difficulty raising funds on their own (and thus difficulty meeting the matching funds requirement).

²² Lizette Chapman, "Female Founders Raised Just 2% of Venture Capital Money in 2021," *Bloomberg*, 11 January 2022, <https://www.bloomberg.com/news/articles/2022-01-11/women-founders-raised-just-2-of-venture-capital-money-last-year>.

²³ Ashley Bittner and Brigitte Lau, "Women-Led Startups Received Just 2.3% of VC Funding in 2020," *Harvard Business Review*, 25 February 2022, <https://hbr.org/2021/02/women-led-startups-received-just-2-3-of-vc-funding-in-2020>.

²⁴ Minority Business Development Agency, "Improving Minority Businesses' Access to Capital," accessed 30 November 2022, https://opportunity.census.gov/assets/files/2021-problem-statements/post-covid/MBDA_Improving%20Minority%20Businesses%20Access%20to%20Capital.pdf.

²⁵ U.S. Chamber of Commerce, "Access to Capital for Minority-Owned Businesses," accessed 30 November 2022, <https://www.uschamber.com/finance/growth-engine/access-to-capital-for-minority-owned-businesses>.

The reality that minority-owned enterprises have difficulty securing funds is one of the reasons for the existence of the federal Minority Business Development Agency (MBDA). Based out of the U.S. Department of Commerce, MBDA aims to grow and increase the competitiveness of minority-owned businesses in America.²⁶ In acknowledgment of the difficulties such enterprises face gaining entry to the aquaculture space, MBDA allocated \$400,000 in grant funding in 2018 to support minority-owned firms in the U.S. marine aquaculture space.²⁷ Further aquaculture-specific funding from MBDA remains unknown.

- **Access to training** – The 2018 MBDA aquaculture grant was awarded to the Florida State Minority Supplier Development Council (FSMSDC), which used the grant to hold aquaculture development workshops in more than 20 cities and gather initial data on DEI barriers in the U.S. aquaculture space. According to an interviewee familiar with the grant, FSMSDC gathered data from over 200 people who attended the workshops and discovered that the two biggest barriers racial and ethnic minorities faces were: (1) access to capital, and (2) access to knowledge and training (specifically extension-type services). The types of knowledge and training workshop participants had difficulty accessing included business and marketing plan development, strategic development, technical assistance, and access to thought leadership and research. All these areas were echoed by our interviewees as shortcomings diverse individuals face when starting their own ventures in an industry where knowledge and ownership are often kept within families.
- **Access to markets** – Even if individuals are able to start and operate their own aquaculture ventures, interviewees noted the difficulty in accessing existing seafood supply chains, especially if their production output is small. The interviewee familiar with the 2018 MBDA aquaculture grant noted an example of a fish farmer who could not find processors to purchase his product; while the farmer was eventually connected, through the workshop, to a minority-owned seafood processor, the interviewee noted that this example is reflective of larger issues diverse individuals face gaining access to markets. Access to markets also links to the earlier discussion on access to funding and industry conference attendance; for the interviewee who spoke to the dilemma on whether or not to pay to attend an industry conference, a large consideration was the ability to connect with additional points on the value chain to expand operations.
- **Access to land, leases, and permits** – Similar to the discussions on access to capital above, interviewees pointed to historical barriers that women and minorities face in acquiring land (or submerged land leases), which can be used to support aquaculture operations. This issue is inherently linked to capital ownership, given the expense of purchasing land, as well as with considerations of historical ownership those who benefit from land or lease inheritance (i.e., often passed down in families). Additionally, acquiring land may also be a first step in acquiring permits to operate aquaculture farms. However, interviewees also pointed out that given the complex aquaculture permitting environment in the U.S., permit acquisition is also a large barrier, as those who successfully receive permits are largely those with high amounts of capital and risk tolerances. Given existing barriers in access to capital for diverse individuals, access to permits becomes an inherent barrier, as well.

²⁶ Minority Business Development Agency, “Who We Are,” *U.S. Department of Commerce*, accessed 30 November 2022, <https://www.mbda.gov/who-we-are/overview>.

²⁷ Minority Business Development Agency, “Minority Business Development Agency Aims to Increase Success of Minority-Owned Firms in Marine Aquaculture,” *U.S. Department of Commerce*, accessed 30 November 2022, <https://www.mbda.gov/news/press-releases/2018/12/minority-business-development-agency-aims-increase-success-minority>.

DEI OPPORTUNITIES

In talking about DEI opportunities related to community and societal influences, it is important to first define who carries out this work. While anyone who works along the workforce pathway could help implement actions, because community and societal influences are overarching issues that span the workforce pathway, effectively **carrying out opportunities will involve parties working collaborative across the pathway to push action forward**. Others involved in the aquaculture industry may get involved in helping to activate opportunities (including industry associations, trade press, researchers, and policymakers); however, the impetus to act on these DEI opportunities may need to come from those working on pathway development, given their intimate knowledge and experience with DEI issues.

One key opportunity to addressing community and societal barriers, according to interviewees, is to **pursue disparity and equity studies**. Such studies will examine the demographic makeup of the industry, barriers to enhancing DEI in the industry, and key opportunities for building aquaculture DEI in the workforce pathway. For instance, outputs from the 2018 MBDA aquaculture grant provided an initial understanding of barriers that racial and ethnic minorities face working in the U.S. aquaculture industry. Further disparity and equity studies can build on these outputs and collect data on barriers that women in the field face.

Interviewees noted that these types of studies can assist with gathering DEI data metrics for the U.S. aquaculture sector. Data is seen as necessary to both better understand the barriers that diverse individuals face in accessing and working in the field and to track and measure the impact of DEI initiatives. Findings from data collection can be used to identify and invest in areas that may most readily activate movement on aquaculture DEI. This idea is expounded upon more in the [“Catalyzing DEI Actions in U.S. Aquaculture” section](#) below

Interviewees raised several other opportunities to enable access and connection to the aquaculture industry across the workforce pathway:

- **Highlight success stories of aquaculture DEI** – Individuals and entities from across the workforce pathway can highlight, for their students and stakeholders, narratives of aquaculture DEI work that is being done. For one, this normalizes into conversation the diversity of people working in the field, as well as the diversity of roles people play in the field. Interviewees noted that even if it seems that not much progress is being made on aquaculture DEI, highlighting even small stories “acknowledge[s] the [DEI] progress actually being made” in the industry, and can still work to empower those reading the stories to feel seen and support.
- **Intentionally engage diverse communities in aquaculture** – The purpose of this action is to relate the aquaculture sector to different communities in ways that are meaningful to the community. This includes sharing with communities what services the sector can provide and how community members can access those resources. The [aquaculture education case study](#) in the [“Middle School and Younger” section](#) is one example. Interviewees also raised these additional examples of how to reach communities about aquaculture.
 - **Involving both students and families in aquaculture education** – One interviewee, who is an early childhood educator, noted that when it comes to community marine education, they look to involve the entire family as much as possible. For instance, a school or nonprofit may offer a “science night” for students, which could include storytelling about the ocean or sustainability lessons taught through hands-on activities. The educator noted that not only do

families have a role on influencing what their students do (both in terms of activities and career choices), but also children have a powerful effect in teaching their parents about environmental and sustainability topics.

- **Re-emphasizing the Black community's rich maritime history** – One interviewee noted that one way they communicate to members of the Black community about aquaculture is to convey the long history and leadership of Black watermen and fishermen who worked on the Chesapeake Bay. Telling the stories of Black men and women who worked in the maritime industry, the interviewee said, helps both emphasize connection to the water and a sense of belonging to the aquaculture industry, despite the fact that the U.S. maritime industry today is not as diverse as it had been in the past.
- **Relating community values to workforce development** – An educator we interviewed noted an encounter with a high school student that demonstrated how to connect a student's career interests to community and family values. The student wanted to pursue an environmental career, but the student's family felt strongly about the student working in the construction industry, which was part of the family's work history. The educator worked with the student "sell" the family on the student's career interests by linking the environmental and construction worlds. Specifically, the educator was able to find the student an internship working with an architectural design firm that focused on projects providing communities equitable access to nature. The educator noted that once the student's family saw how much the student "lit up" as part of his internship work, they supported his choice to continue his studies in college (for which he also received a full-ride scholarship). The interviewee noted that similar creative approaches can be taken with aquaculture if students find themselves in a similar situation.
- **Raising considerations of community ownership and food sovereignty** – Several interviewees noted that a key opportunity to connect aquaculture to communities is to emphasize that aquaculture can be used to support community food sovereignty (e.g., see the [HBCU and Tribal college partnership case study](#) in the "[Technical School, College, and Training](#)" section and the [backyard aquaculture](#)

Case Study: DEI, Workforce Development, and the Blue Economy

A workforce development initiative, based out of a blue economy accelerator program, runs a program that links youth from underrepresented communities with local internships in various maritime fields. The leaders of this initiative see themselves as playing a bridging role in increasing DEI in the blue economy: Not only do they recruit high potential students for the internship, but they also vet potential internship locations to ensure that the environment in which the intern will be working is DEI sensitive. This includes holding equity trainings with employers and even making tough decisions to pass on interested employers if they do not demonstrate a serious commitment to DEI. Still, the initiative noted that the internships they have been able to offer have been good experiences for interns and the maritime companies alike.

[case study](#) in the “[Career and Industry](#)” section). For these interviewees, they envision local food systems where neighborhoods can rally around community-supported aquaculture setups (in the same vein as community-supported agriculture) and communities acquiring shared leases to local shellfish beds.

- **Invest and participate in DEI-supportive workforce development initiatives** – Interviewees noted that there is a great opportunity for various entities of the aquaculture workforce pathway to invest in blue economy workforce development initiatives that have explicit goals of increasing DEI in blue economy fields. See the case study above that highlights one such program.
- **Build greater accountability for DEI in the seafood industry** – Entities across the workforce pathway can put accountability pressure on high-visibility organizations in the seafood space to take action on DEI (e.g., make statements of support and commitment to furthering DEI, releasing DEI codes of conduct and action plans, partnerships with organizations like [Minorities in Aquaculture](#) to help lower barriers of industry entry to diverse individuals).²⁸ Entities noted that this can be done for both national industry bodies (e.g., National Seafood Council) and major seafood and aquaculture companies.
- **Explore and advocate for solutions in which policymakers can help enable aquaculture DEI** – Interviewees raised various ideas about ways that government agencies and representatives can help to advance aquaculture DEI. Examples include establishing a DEI officer within NOAA to oversee DEI initiatives and allocating additional funding to MBDA to continue investing in minority-based aquaculture ventures. An interviewee even suggested putting forth bold policy solutions, such as implementing provisions in exchange for financial support to the U.S. aquaculture industry. Provisions could include setting hiring quotas for diverse individuals to work on farms or “give back credits” (e.g., tax breaks or lower concession costs for farmers that lower the cost of their products to increase seafood accessibility among diverse communities).

²⁸ Minorities in Aquaculture, “About Minorities in Aquaculture,” accessed 15 August 2022, <https://www.mianpo.org/aboutmia>.

Catalyzing DEI Actions in U.S. Aquaculture

As illustrated in the previous section, enhancing DEI in the U.S. aquaculture workforce is an endeavor that will require intentional action at all stages of the pathway to address the range of challenges that emerge throughout the trajectory. While each pathway stage has its distinct DEI barriers, these hurdles are interconnected, with barriers at early stages accumulating in impact when combined with barriers at later stages. Additionally, while there are opportunities to address DEI challenges at each stage, pursuing such opportunities may be necessary but not fully sufficient to help overcome the barriers present at other stages, particularly considering the overarching community and societal dynamics.

Because these interconnected challenges make DEI barriers difficult to address collectively, we were interested in what interviewees would say when asked what steps should be taken *now* to enhance aquaculture DEI. We found that interviewees recommended taking *broader, strategic actions* that:

- focus on what is needed to address aquaculture DEI holistically,
- elevate awareness of the overall importance of aquaculture DEI, and
- create enabling conditions to facilitate progress on aquaculture DEI at all stages of the pathway.

In other words, interviewees suggested focusing on “catalytic actions” that lay the groundwork and act as conduits for further, more targeted DEI actions. Based on a synthesis of responses from interviewees, we identified six catalytic actions that interviewees suggested would best set up the growth of DEI:

1. **Invest in Disparity and Equity Studies** – Gather robust demographic data on the makeup of the U.S. aquaculture industry. This includes understanding what parts of the industry are most lacking in representation (e.g., in terms of women and racial/ethnic minorities) and where there may be significant barriers to enhancing DEI throughout the industry.
2. **Invest in Areas to Address Inequalities** – Draw on findings from the disparity and equity studies to determine the pathway stages and areas where funding, training, and other capacity can be most impactfully invested to enhance workforce DEI in U.S. aquaculture.
3. **Facilitate Ongoing Conversations on the Need for DEI** – Hold and normalize conversations about DEI in training programs and within the aquaculture industry to bring to light both the benefits of DEI and the barriers standing in the way of enhancing workforce DEI.
4. **Create Connection Points in the Workforce Pathway** – Establish “bridges” that connect the pathway stages to facilitate co-led efforts that break down DEI workforce barriers. Connection points could include, for example, college-high school programs and college-industry co-ops.
5. **Identify Examples of Positive DEI Initiatives in Aquaculture** – Document U.S. aquaculture DEI accomplishments, lessons learned, and best practices to highlight the demonstrable benefits of workforce DEI to the industry. Such compilations can also prove useful in providing real world examples and proofs of concept for policy and legislative proposals on aquaculture DEI.
6. **Build the Business Case for DEI in Aquaculture** – Make the case for why DEI matters for U.S. aquaculture (i.e., the benefits of DEI for the industry) to gain the industry leadership buy-in necessary to progress DEI efforts.

We explore each of these catalytic actions in the sections below.

INVEST IN DISPARITY AND EQUITY STUDIES

Nearly all interviewees spoke about the U.S. aquaculture industry with a view that the demographic makeup of the industry (based on personal experience and anecdotal evidence) is predominantly Caucasian and male, particularly when it comes to leadership and decision-making positions. While this view is highly consistent among interviewees, there is little documented data that quantitatively outlines the extent of the industry's workforce diversity (e.g., in terms of gender and racial/ethnic representation). Several interviewees pointed out that while state and federal agencies collect information about aquaculture production and sales (e.g., the USDA's Census of Aquaculture), no official data is regularly collected about the makeup of the domestic aquaculture workforce.

Interviewees noted that generating and curating accurate data on the demographics of the U.S. aquaculture workforce is essential to enhancing aquaculture DEI. For instance, such data can provide a baseline understanding (and metric) from which the industry can track and measure changes in workforce representation over time. Demographic data can also help justify the need for, and assess the impact of, interventional DEI workforce initiatives. Additionally, if such data is granular enough (e.g., demographic data is collected for both aquaculture training programs and the aquaculture industry at large), interviewees noted that it will be easier to identify differences in representation at different points along the workforce pathway and within the industry itself (e.g., demographic differences between the entire U.S. aquaculture workforce and those in industry leadership positions).

Interviewees also noted that while the collection of such data may best be done, long term, at the federal agency level (e.g., NOAA, USDA), initial gathering of this data can be carried out through a disparity or equity study — that is, a research study aimed at understanding existing inequities in the U.S. aquaculture sector. According to interviewees, a disparity or equity study could examine how representation in the U.S. industry compares to one or more benchmarks (e.g., diversity in the U.S. workforce population or in the U.S. population at large) and whether there are demographic differences *within* the sector (e.g., the demographic makeup of training programs vs. industry, or the industry overall vs. industry leadership). Such studies may also draw out connections between demographic data and existing DEI barriers in the workforce pathway (e.g., correlations between the presence of barriers and demographic patterns in representation). Understanding these connections, interviewees noted, can reveal areas in the workforce pathway where investment of resources (funding, capacity, etc.) may be especially impactful to breaking down DEI barriers. The goal of such studies, therefore, is to: (1) link quantitative and qualitative knowledge about the industry workforce makeup, and (2) outline high-potential opportunities for helping to further build DEI in the industry.

Interviewees shared several ideas for how disparity or equity studies can be framed, including:

- Identifying where women and racial/ethnic minorities are working in the industry (e.g., geographically, job functions);
- Understanding how women and racial/ethnic are currently being connected to the workforce development ecosystem and opportunities for expanding those connection points; and
- Understanding where women and racial/ethnic minorities have lower representation in the industry (e.g., geographically, job functions) and how such representational patterns may relate to the presence of DEI barriers.

These studies will be most effective, interviewees noted, if the data and results are made accessible and are widely distributed to practitioners working across the workforce development pathway. The outputs

of these studies can also inform and support government, investor, and philanthropic decision making on where and how to invest funds to achieve maximum impact on DEI workforce goals across pathway stages. Given this, investing in disparity and equity studies connects directly to the second pathway to activation: investing in areas to address inequalities.

INVEST IN AREAS TO ADDRESS INEQUALITIES

This catalytic action builds directly on the previous action because, if carried out thoughtfully and purposefully, disparity or equity studies should directly inform where resources (funds, capacity, technical assistance, etc.) can be most impactfully invested to enhance workforce DEI in U.S. aquaculture.

For instance, a disparity or equity study may outline the areas on the workforce pathway where DEI barriers are most prohibitive (or pose the biggest bottlenecks to) recruitment and retention of women and minorities. Based off this information, funders interested in helping break down those barriers (whether government, philanthropies, or other private investors) would have an idea of where to focus or direct their funds for the biggest impact. As an example: Let's say a disparity or equity study revealed that the college-to-industry transition is a point at which diverse participation in the U.S. aquaculture workforce pathway drops precipitously due to lack of available early career training opportunities. This information could help a funder determine that they want focus their DEI investment on long-term, apprenticeship or co-op programs in colleges that specifically recruit women or ethnic or racial minorities.

Interviewees were quick to note, however, that simply investing in high-impact areas alone is not enough. As with any investment, there needs to be built-in monitoring and evaluation mechanisms to ensure that: (1) investments are directed to efforts that indeed enhance diverse, equitable, and inclusive participation *and* ownership in the industry; and (2) appropriate metrics are set up to track, measure, and broadly communicate the success of that investment. Having these elements in place would allow for both evaluating impact and ensuring accountability. Moreover, the broad communication of investment outputs (whether fully successful or not) would ensure disclosure and dissemination of lessons learned — enhancing community learning across the workforce pathway and providing possible case studies, models, and proofs of concept for scaling out DEI solutions beyond the initial investment.

While disparity and equity studies can best inform areas of investment, interviewees raised a few additional examples of potential high-impact actions that are ripe for investment:

- Developing processes and technical assistance programs that help women and ethnic/racial minorities more successfully access or compete for aquaculture financing, loans, and grants.
- Enhancing educational curriculums and programs (both formal and informal) to better connect and expose students to the growing field of aquaculture.
- Expanding recruitment beyond natural resources programs (e.g., business, graphic design).
- Broadening access to extension-style assistance to women and minority aquaculture farmers.

FACILITATE ONGOING CONVERSATIONS ON THE NEED FOR DEI

When asked, we found that interviewees were split in opinion on whether holding conversations on DEI should be a central focus for developing out DEI actions. Some believe that more conversations on DEI

are necessary to build broader stakeholder buy-in to meaningful and feasible DEI action. Others believe that while conversations are important, a primary focus on conversations has actually delayed action from being taken on DEI. (The latter sentiment often stemmed from a belief that DEI conversations in the U.S. aquaculture space have happened over the last decade with little demonstrable action, as well as the concern that DEI may eventually fade from the public view as a critical issue.) Although interviewees had varying opinions on this topic, there was general agreement that conversations are foundational for collective action to take place on DEI. Some interviewees further noted that holding and normalizing conversations about DEI can be a form of action in itself, which can, subsequently, spark and motivate further action on DEI.

Overall, interviewees pointed to two arenas in which leaning into DEI conversations could be particularly fruitful for enhancing U.S. aquaculture workforce DEI:

- **Aquaculture Conference and Industry Meetings** – Interviewees noted that holding DEI conversations at aquaculture conferences and meetings maximizes the opportunity to both socialize DEI needs with industry practitioners and integrate DEI into existing industry conversations. This work has already begun at Aquaculture America. Currently the highest profile aquaculture conference in the U.S., Aquaculture America is well-attended by aquaculture practitioners and educators from across the nation. In 2021, the U.S. Aquaculture Society (USAS), a primary event sponsor, brought in a DEI facilitator to lead Aquaculture America’s first-ever session on diversity and inclusion. This session provided a place for students, academics, and industry professionals to learn and share experiences about DEI issues affecting the industry. By hosting this session at Aquaculture America, DEI dialogue could be simultaneously held in a familiar *industry space* while creating a new *conversational space* where DEI topics could be brought forth (with the intent of building collective action to enhance aquaculture DEI). This session was organized by USAS’s Diversity and Inclusion Committee — which has served as another forum for DEI dialogue — and the Committee intends to establish the diversity and inclusion session as a standing feature of Aquaculture America going forward.
- **Community and Conversational Spaces in Academia** – These spaces are both physical and non-physical. From a physical perspective, interviewees noted the benefit of creating a community space (e.g., designated meeting room, lounge, or patio) where students can freely interact with one another and form organic support networks outside of faculty or administrative oversight. Having designated physical spaces invites students to have freer conversations with one another, which may naturally extend to issues related to DEI. Interviewees also noted, however, the need for designated conversational spaces to talk about DEI issues. This could include, for example, time spent in capstone or seminar courses, where faculty and students dialogue openly about DEI challenges and realities that students will face in the industry post-graduation. These spaces can also provide opportunities for faculty and staff to learn from students about DEI challenges on campus and within the academic program itself. Such conversations can equip faculty and staff with DEI-informed tactics to both improve the student learning experience and better equip students for work in the U.S. aquaculture industry. Interviewees noted that academia is ideal for having these types of conversations, as educational institutions serve as the primary training stage for future aquaculture professionals and because engaging in challenging conversations for the sake of learning fits within the spirit of academia.

Holding and normalizing DEI conversations in these arenas can help inform a range of people about the benefits of DEI and the barriers to progressing DEI efforts in U.S. aquaculture workforce development. Facilitation of these ongoing conversations also builds in opportunities for more aquaculture

practitioners, educators, and decision-makers to buy into the need for industry DEI. As such, dialogue on DEI can spark the collective thinking needed to coordinate DEI action across the workforce pathway — which connects directly to the following catalytic action.

CREATE CONNECTION POINTS IN THE WORKFORCE PATHWAY

Throughout the interview process, we learned that many of interviewees worked on aquaculture DEI initiatives solely within the scope of their stage in the workforce pathway and were thus often unaware of other aquaculture DEI initiatives being pursued. When we raised this observation with interviewees, they responded with a strong desire to connect with others working on the aquaculture DEI issues so that they could learn from, support, and coordinate with each other on DEI initiatives across the workforce trajectory.

Interviewees largely affirmed the belief that working only (or primarily) within one's pathway stage is a challenge to breaking down systemic DEI issues that span the entire pathway. For those that did have experience working across pathway stages, they shared clear benefits of creating those connection points, including helping provide diverse students with clearer opportunities to enter the aquaculture workforce. Key examples include:

- **Co-ops & CTE programs** – Co-ops and CTE programs provide high school and college students with direct exposure to the aquaculture industry through apprenticeships and hands-on training, all integrated into their academic program. Such programs not only provide students with relevant industry skills and experiences that they may not have gained in the classroom, but these programs also benefit the industry by building up a more skilled workforce. Interviewees also noted these programs provide critical information that can strengthen the connection points between industry, colleges, and high schools; among other things, these programs: (1) inform educators about the skills that industry is looking for in job candidates, (2) provide students and educators with an understanding of the types of industry jobs currently available, and (3) facilitate industry-student mentorship opportunities that help keep students on the pathway from training to job entry.
- **College-High School Partnerships** – These co-led partnerships can provide high school students with accessible opportunities to explore aquaculture through both curriculum- and non-curriculum-based learning opportunities. For instance, colleges can provide high schools with equipment and broodstock to build and run fish labs and offer high school students work and research experiences at their facilities during the summer. These partnerships can be mutually beneficial: High schools are able to better expose their students to skills that are in demand in the workforce and colleges can build applicant pools for their programs and scholarships. Such partnerships can also assist in recruiting more diverse students into the aquaculture field by linking initiatives. For instance, high schools and colleges can coordinate on DEI plans between institutions to collectively enhance opportunities for diverse students to work in aquaculture.
- **DEI-Aquaculture Community of Practice** – As noted above, interviewees noted that it would be beneficial to connect with others working to enhance DEI in aquaculture. In particular, interviewees noted the value in hearing from those with whom they do not regularly interact, which is (most often) practitioners who operate at different stages in the workforce pathway. One way to foster regular touchpoints among those working across the workforce pathway is to convene a community of practice of people working on aquaculture DEI issues. The purpose of such a community would be to build a shared understanding of DEI challenges and opportunities

at individual stages (including case studies and lessons learned), coordinate actions that can be taken to break down barriers that span stages, and establish resource networks to support diverse students who are navigating the workforce pathway. Additionally, this community of practice could serve to provide encouragement to those in the community itself. Interviewees noted that working on DEI issues can often feel difficult and isolating, so having support from others is essential for them to support others in turn. Meridian Institute is currently convening such a group and helping to facilitate cross-stage discussions and actions.

Creating connection points in the workforce trajectory expands the lens of how to build a larger, more diverse workforce pool through intentional initiatives and coordinated efforts across workforce stages. The intent and end goal of bridging efforts is to activate DEI-related systemic changes more effectively.

IDENTIFY EXAMPLES OF POSITIVE DEI INITIATIVES IN AQUACULTURE

Interviewees repeatedly stated the importance of having examples of positive aquaculture DEI initiatives. Such examples, interviewees noted, should demonstrate how DEI benefits the aquaculture field — not only in terms of workforce but also the overall growth and sustainability of the industry. Examples can take the form of case studies, lessons learned, narratives (including interviews and stories), and best practices to better enable DEI throughout the workforce pathway.

Examples of positive aquaculture DEI initiatives can serve multiple purposes for multiple audiences. For those who are not yet fully bought in to aquaculture DEI, examples can help provide a rationale for why investment in DEI is important, impactful, and a good return on investment. Examples can complement DEI “facts and figures” (e.g., quantitative data, statistics) by providing a more grounded, human connection to both the importance and benefit of DEI to the industry. For those that are already bought in to aquaculture DEI, examples can provide both inspiration and practical steps for enhancing aquaculture DEI at the various workforce development stages.

Interviewees noted that there may be a benefit to compiling and sharing these examples broadly so that aquaculture DEI “allies” and trusted messengers can help spread the word about the successes of aquaculture DEI. Moreover, interviewees noted that such compilations can also prove useful in providing real world examples and proofs of concept for policy and legislative proposals on aquaculture DEI, as policymakers are often looking for models that have been shown to “work.”

Ultimately, compiling and sharing examples of positive aquaculture DEI initiatives is way to bring people together. Narratives can inspire people to connect and support one another, both individually and through larger networks. Additionally, those telling stories about aquaculture DEI are often those who have personal, lived experiences working through DEI challenges and barriers. As such, identifying and sharing examples can be a means of elevating underrepresented voices and having those voices inform more equitable action and policy.

BUILD THE BUSINESS CASE FOR AQUACULTURE DEI

Given the relative youth of the U.S. aquaculture industry, interviewees noted that it is common for existing industry practitioners to think of aquaculture DEI as “less important” than other priorities such as building consumer demand for aquaculture products, addressing social license around aquaculture farms, navigating a complex regulatory environment, and increasing the overall workforce labor pool. While interviewees did not discount the importance of these issues, they noted that framing DEI as a

competing issue is a false dichotomy; rather, they stated that enhancing DEI in the industry could help to meet some of these priorities. Given that many practitioners see DEI as an issue “separate” from industry priorities, interviewees stated the need to build a business case that contends why DEI matters for U.S. aquaculture (i.e., the benefits that DEI provides to the industry) and why, being so intertwined with various industry considerations, DEI is important to address right now.

Both interviewees and the existing literature on business DEI affirmed that to make meaningful progress on DEI efforts, there must be buy-in from industry leadership on the importance and need for DEI. This is because leadership buy-in means there is greater likelihood that DEI will be incorporated into organizational decision-making, more opportunities for stakeholders to meaningfully call for greater leadership accountability to DEI, and enhanced impact when decision-makers lead by example on DEI (and thus influence and provide peer pressure on others to do the same).

Due to the importance of influencing industry leadership on DEI, interviewees noted that any business case or rationale for aquaculture DEI should focus on industry leadership as a core audience. This endeavor connects directly to the catalytic actions noted in the previous sections. For instance, the business case can draw on examples of positive aquaculture DEI initiatives, along with data from equity and disparity studies, and existing research from the business literature on the benefits of DEI (adapted to the needs of those in the domestic aquaculture industry). Creating connection points along the workforce pathway can help construct a more compelling (and complete) business case that accounts for all stages of workforce development. Facilitating ongoing conversations with industry leadership is needed to communicate and “pitch” the business case repeatedly. Lastly, the business case should put forth solutions, which draw both on positive aquaculture DEI initiatives and data on where to invest in areas that will most immediately and impactfully address inequalities.

Conclusion

Seafood demand and consumption has grown over the past few decades and is projected to continue growing in the decades ahead.²⁹ The U.S. aquaculture industry can contribute to meeting this demand, both domestically and globally, but it will take a reliable workforce to make that happen.

Enhancing the presence and practice of DEI in U.S. aquaculture workforce development is an opportunity to help meet this workforce demand, but DEI challenges exist at various stages of the workforce pathway, including in both education (middle school and younger; high school; technical school, college, and training) and in career and industry spaces. Additionally, community and societal dynamics accentuate DEI issues that students and others in the aquaculture industry may face along the workforce pathway, including those related to exposure, inclusion, belonging, and ownership. Interviews with 30 U.S. aquaculture practitioners — whose work or direct experience touches on industry workforce development — not only provided a better understanding of these DEI-specific challenges but also outlined opportunities to address challenges at both individual pathway stages and through broader catalytic actions that enable stage-specific actions.

A next step to build on the knowledge presented in this synthesis is to pursue initiatives that collectively advance the six catalytic actions. One promising opportunity is to foster and support a community of practice that connects those working on aquaculture DEI at various stages of the workforce pathway. Such a group has the ability to compile positive examples of aquaculture DEI, create and facilitate spaces (in both educational and industry realms) for ongoing conversation on aquaculture DEI, help build a business case for aquaculture DEI, and spearhead equity or disparity studies that outline areas for impactful DEI investment. Based on the interest of a subset of interviewees, Meridian has begun convening such a community, and the group is currently exploring avenues to socialize themes from this report and activate strategies that enhance DEI in the U.S. aquaculture sector.

This report is not intended to be a comprehensive compilation of all issues related to aquaculture DEI, particularly given its defined focus on gender, racial, and ethnic DEI. However, the insights shared in this report provide a foundation for better understanding DEI dynamics within U.S. aquaculture, a basis for exploring additional DEI issues that merit further study, and a mobilizing framework for enhancing DEI in a way that benefits the entire aquaculture industry.

²⁹ Rosamond L. Naylor et al., “Blue food demand across geographic and temporal scales,” *Nature Communications* 12 (September 2021): 5413, doi: [10.1038/s41467-021-25516-4](https://doi.org/10.1038/s41467-021-25516-4).