
DIVERSITY INNOVATIONS TO GET MORE AFRICAN-AMERICANS INTERESTED AND EXPOSED TO FISHERIES BIOLOGY AND FISHERIES MANAGEMENT CAREERS

Darrell Norman BURRELL^{1*}

Received: May 2023 | Accepted: February 2024 | Published: June 2024

Please cite this paper as: Burrell, D.N. (2024) Diversity innovation to get more African-Americans interested and exposed to fisheries biology and fisheries management careers, *Holistica Journal of Business and Public Administration*, Vol. 15, Iss. 1, pp.136-148

Abstract

It is no secret that African-American men in the United States face an array of challenges in the workplace, especially in fisheries. According to recent reports, African-Americans are significantly underrepresented in fisheries. This lack of representation is concerning, particularly when considering the potential benefits that African-American men could bring to fisheries. Promoting diversity and inclusion in the sciences is important for a number of reasons. In order to address this issue, it is essential to develop more applied learning, internships, and experiential learning approaches for African-American men in fisheries careers. This paper will outline the potential value of such approaches for African-American men in fisheries careers.

Keywords: *Fisheries Management, Fisheries Biology, African-Americans in Fisheries, Diversity in Biology*

1.0 Purpose

This paper aims to outline the aspects of pilot learning and education program for African-American men to learn about fisheries careers. African-American men are underrepresented in the fisheries field, and thus, there is a need for targeted initiatives to provide them access to the educational resources and opportunities needed to pursue a career in the field (Davis, 2019). The potential outcomes of the pilot programs are numerous. The initiatives are designed to increase the representation of African-American men in the fisheries field, provide access to educational resources and opportunities, and offer mentorship programs to provide guidance and support (Davis, 2019). The initiatives are also designed to create a more diverse and inclusive workforce in the field.

¹ Marymount University, Arlington, VA, USA; dburrell2@thechicagoschool.edu

* Corresponding author

1.2 Design/methodology/approach

The method used was a case study approach. Case study intervention research is essential for understanding and developing effective interventions for various problems. It is a form of qualitative research that focuses on a single individual, group, or event and is often used to provide insight into a specific problem or issue (Lobo et al., 2017). Case study research provides the opportunity to explore a problem in greater detail and to gain an in-depth understanding of how various factors interact to cause a particular outcome (Lobo et al., 2017). This can be especially important when designing interventions, as it can help identify potential areas for improvement and/or provide evidence for a proposed intervention's efficacy. Case study research is also helpful for evaluating the effectiveness of interventions (Lobo et al., 2017). Additionally, case study intervention research can help inform future interventions by providing evidence on what works and does not work in certain situations.

1.3 Findings

The findings outline the benefits and the apparent need to develop more applied learning, internships, and experiential learning approaches for African-American men in fisheries careers. Such approaches can help African-American men to gain the skills and knowledge needed to succeed in the field of fisheries, as well as provide them with valuable professional networks. Ultimately, such approaches can benefit both African-American men and the field of fisheries.

1.4 Research limitations/implications

In response to the lack of representation in the fisheries field, several pilot learning and education programs have been developed to provide African-American men with access to the necessary resources and opportunities. The program focuses on providing African-American men access to fisheries-related educational resources, internships and job placement opportunities, and mentorship programs. The programs also offer courses on topics such as fisheries science, the legal aspects of fisheries management, and fisheries-related policy and regulations. Additionally, the programs are designed to provide African-American men with the necessary skills and knowledge to pursue a career in the field.

1.5 Practical implications

According to recent reports, African-Americans are significantly underrepresented in fisheries, with the most common ethnicity among fisheries biologists is White, which makes up 71.3% of all fisheries biologists and Black or African Americans only being 3.2% (ZIPPIA, 2023) . Moreover, the lack of educational resources and opportunities has hindered African-American men's ability to pursue a career in the field. To address this issue, there is a need for targeted initiatives to provide African-American men with

access to the resources and opportunities needed to pursue a career in the fisheries field.

1.6 Problem statement and originality

African-American men have been historically and systematically excluded from the field of fisheries management and research (Blount, 2000; Davis, 2019). This lack of representation has significantly impacted the quality of research and management decisions made in the field (Davis, 2019). As such, it is essential to promote the development of African-American men in fisheries careers to ensure that the field is adequately represented and to create a more inclusive environment for all members of the fishery and outdoor careers (Davis, 2019). African-American men are uniquely positioned to bring a diverse set of perspectives and experiences to the field of fisheries research and management (Blount, 2000). These perspectives and experiences can be used to inform research and management decisions, as well as to create a more equitable environment for all stakeholders (Davis, 2019).

Additionally, including African-American men in fisheries would help reduce the racial disparities in the field and create more equitable outcomes for all stakeholders (Davis, 2019). Furthermore, developing African-American men in fishery and outdoor careers can create a more diverse and inclusive workforce and enable African-American men to gain access to positions of power and influence in the field (Davis, 2019).

To address this issue, there is a need for targeted initiatives to provide African-American men with access to the resources and opportunities needed to pursue a career in the fisheries field. This paper explores one pilot program as a case study.

2.0 Overview

As the world's population grows, the demand for food and resources increases, and fisheries face increasing pressures. Fisheries and wildlife are essential to the natural environment, supporting human and animal health and well-being. As such, studying fisheries and wildlife has become a popular college major and career choice for many students.

Fisheries and wildlife are essential components of the global ecosystem, providing essential resources that support human development and health (Sass, Rypel, & Stafford, 2017). Fish and other aquatic species are a primary source of food and income for many people worldwide (Sass, Rypel, & Stafford, 2017). In addition, fisheries and wildlife provide recreational opportunities, such as hunting and fishing, that can improve the quality of life and contribute to the local economy (Sass, Rypel, & Stafford, 2017). Furthermore, wildlife provides critical ecological services, such as pollination, pest control, and carbon storage, essential for the environment's health (Sass, Rypel, & Stafford, 2017).

Fish support our ecosystems, feed our bodies, drive our economy and support our national and global economies (Ocean Conservancy, 2023). In the United States alone, more than 1.7 million jobs rely on commercial and recreational fisheries, and fishing generates over \$200 billion in sales each year (Ocean Conservancy, 2023). African Americans, which are significantly underrepresented, are only 3.2% of the workforce (ZIPPIA, 2023)

On average, 10.52% of the total population was found to fish for recreation across the industrialized world amounting to an estimated 118 million (Arlinghaus, Tillner, and Bork, 2015). From a societal perspective, fisheries and wildlife are essential for preserving cultural and traditional practices. For example, many indigenous communities rely on fishing for subsistence and cultural identity. In addition, wildlife is integral to the cultural heritage of many communities. Thus, the preservation of fisheries and wildlife is essential for the preservation of cultural practices and the perpetuation of traditional knowledge and values (Davis, 2019).

Fishery careers also provide environmental protection benefits. This is because the industry is essential to the health of marine ecosystems, as it is responsible for harvesting and managing fish populations. This includes ensuring that fish populations are not overfished, which can have a detrimental effect on the health of the environment. Additionally, the industry is responsible for habitat restoration and protection, which can help ensure that fish populations thrive in their natural habitats. This is essential for the environment's health and helps maintain marine ecosystems' biodiversity.

The study of fisheries and wildlife provides a variety of career paths, including research, conservation, and management. Research in the field generally focuses on understanding the ecology, behavior, and conservation of wildlife and fisheries (Davis, 2019). Research can be conducted in academic or government settings to understand the dynamics of wildlife populations and determine the best management strategies for the species.

Conservation careers focus on protecting and restoring wildlife and fisheries habitats and populations (Davis, 2019). Conservationists can work in government agencies, NGOs, and private organizations to promote responsible stewardship of the environment (Davis, 2019). Examples of conservation activities include habitat restoration, species reintroduction, and pollution control.

There are many benefits to pursuing a career in fisheries and wildlife. First, the field provides opportunities to contribute to the conservation and protection of the environment directly. Second, the field offers a variety of career paths, from research to conservation to management. Third, the field provides a unique opportunity to learn about the natural world and gain an appreciation for the environment. Finally, the field offers many job opportunities, with salaries ranging from entry-level to highly-paid industry and government positions.

2.1 Recent Trends

Promoting diversity and inclusion in the sciences is important for a number of reasons (Estrada, Hernandez, & Schultz, 2018). It helps to create a more diverse workforce, which can lead to more innovative research and higher-quality products and services. Studies have also found that more diverse teams can lead to better problem-solving and decision-making, and can help promote more productive and effective workplaces. Additionally, promoting diversity and inclusion can help create a more welcoming and safer environment for African-American scientists. African-Americans are traditionally underrepresented in the sciences, and diversity initiatives can help to combat this by bringing attention to the challenges and experiences of African-American professionals in the field (Estrada, Hernandez, & Schultz, 2018).

In addition to being underrepresented in the field of fisheries, there are also notable disparities in the level of employment held by African-American fishery and outdoor workers (Davis, 2019). Several barriers prevent African-Americans from entering and succeeding in the fisheries and outdoor sectors (Davis, 2019). One of the primary barriers is a need for more awareness exposure to available opportunities. This lack of awareness is compounded by a need for access to information and resources related to the sector (Davis, 2019). African-Americans may need access to mentors or other sources of information that could help them learn more about the sector. This lack of education is further compounded by a lack of access to educational resources, such as college courses and training programs related to the sector. With access to these resources, African-Americans can gain the necessary knowledge and skills to enter and succeed in the sector. Finally, a lack of mentorship can prevent African-Americans from entering the fisheries sector. This lack of mentorship can create an additional barrier to entry for African-Americans, as they may need to be made aware of the various career paths available or may need to gain the necessary skills and knowledge to pursue those paths.

3.0 Potential Solutions

Although fisheries careers are meaningful, they face numerous challenges. Firstly, there needs to be more public awareness of the importance of fisheries and the roles of fisheries and outdoor professionals (Davis, 2019). This lack of awareness can lead to the underfunding of fisheries and the lack of resources needed to manage fisheries effectively. In addition, there is a need for more qualified professionals, as there is a shortage of skilled and experienced personnel in the field (Davis, 2019; Blount, 2000). Furthermore, there is a need for more funding for research, as there needs to be more data on fish stocks and aquatic habitats.

In order to increase the representation of African-Americans in the field of fisheries, several potential solutions could be implemented. First and foremost, there needs to be an increase in the number of African-American students pursuing careers in fishery and outdoor fields (Davis, 2019). This could be done by implementing programs and

initiatives that target African-American students and encourage them to pursue a career in fisheries.

In addition, it is also essential to ensure that African-American fishery workers have access to equitable employment opportunities. This could be done by implementing policies and initiatives that provide African-American fishery workers with access to job training and career advancement, as well as access to health care and other benefits.

Finally, increasing the wages and income of African-American fishery workers is also essential. This could be done by implementing policies and initiatives that provide African-American fishery workers access to higher-paying jobs and more equitable wages.

3.1 Qualifications and Education

Generally, a degree in fisheries, biology, or a related field is required. The top U.S. universities offering programs include Texas A & M University-College Station, University of Washington-Seattle, Iowa State University, University of Florida, Virginia Polytechnic Institute and State University, University of Idaho, Colorado State University-Fort Collins, Oregon State University, and Utah State University. In addition, experience with data analysis and research methods is essential. Furthermore, knowledge of fisheries management and policy is necessary. Finally, strong communication and interpersonal skills are also needed.

Several organizations are actively working to promote fisheries careers. For example, the American Fisheries Society (AFS) is an organization dedicated to advancing fisheries science and management (American Fisheries Society, 2023). The organization provides resources to aspiring fisheries professionals, such as professional development opportunities, scholarships, and career mentoring (American Fisheries Society, 2023). In addition, the National Oceanic and Atmospheric Administration (NOAA) is an organization dedicated to protecting and conserving aquatic ecosystems (NOAA, 2023). The organization provides funding for research, education, training, and resources for aspiring fisheries professionals (NOAA, 2023).

3.2 Fish hatcheries

Fish hatcheries are vital components of aquatic ecosystems, providing a source of food for a range of species and supporting the livelihoods of fishermen. The workers at these hatcheries play an essential role in managing aquatic resources and protecting aquatic ecosystems.

Workers at fish hatcheries are employed in various roles, ranging from hatchery operators to fish-rearing technicians. The primary role of hatchery operators is to manage the production of fish eggs and larvae (Fisch, et al., 2015). They are responsible for the hatchery's daily operations, including maintaining water quality and collecting fish eggs and larvae (Fisch, et al., 2015). They also oversee the feeding and care of the

fish and manage the budget of the hatchery. Fish-rearing technicians are responsible for rearing fish from larvae to juveniles, and they carry out a variety of tasks to ensure the health and growth of the fish. These include cultivating the appropriate food sources, monitoring the health of the fish, and controlling the water quality of the hatchery (Fisch, et al., 2015).

An essential task of hatchery operators is spawning and collecting fish eggs. This process involves the collection of eggs from a wild fish population and transferring the eggs to the hatchery. Hatchery operators must ensure that the eggs are collected safely and efficiently and that the eggs are of sufficient quality for the hatchery (Fisch, et al., 2015). Once the eggs have been collected, the eggs must be incubated in a carefully regulated environment. Hatchery operators must ensure that the temperature, oxygen levels, and water quality are all within the optimal range for the development of the eggs (Fisch, et al., 2015).

Once the eggs have hatched, the larvae must be reared in a controlled environment to ensure their survival and growth. Hatchery operators must ensure that the larvae are fed an appropriate diet and that the water quality is maintained. The larvae must also be monitored to ensure they are developing correctly and that no disease or parasites are present (Fisch, et al., 2015).

Workers at fish hatcheries are also responsible for the health and disease management of the fish. Hatchery operators must ensure the fish receive an adequate diet and maintain water quality. They must also monitor for signs of disease or parasites and take appropriate action to prevent the spread of these diseases (Fisch, et al., 2015).

Aquaculture is the practice of growing fish in captivity, and it is an essential component of fish hatcheries. Hatchery operators must ensure the fish are raised appropriately and maintain water quality. They must also monitor the health of the fish and ensure that they receive an adequate diet (Fisch, et al., 2015).

The release of fish into the wild is integral to the hatchery process. Hatchery operators must release the fish at the appropriate time and location. They must also monitor the release to ensure the fish adapt to their new environment (Fisch, et al., 2015).

3.3 The case study pilot program

The program included finding first- and second-year high school students of color for a summer program. Element one of the summer program included bringing them to the hatchery to learn about fishing. The hatchery had several open to the public fishing pond. These students were from the inner city and experienced their first-time fishing at the hatchery.

The second component of the summer program consisted of taking the students to the hatchery and instructing them on the many activities there. These activities included breeding, feeding, transporting, and checking fish health. Channel Catfish, Blue Catfish, Largemouth Bass, Shiner Minnows, crappies, Grass Carp, and Shiner Minnows were

among the fish species bred and produced at the hatchery (Used as feeder fish). The hatchery not only born and reared fish, but it also bred and raised crayfish, bullfrogs, bullfrog tadpoles, freshwater snails, and freshwater clams, which enabled the establishment of a self-sustaining ecosystem for newly stocked fishing ponds and lakes.

The third component required the participant to participate in consulting activities in several fields. Several limiting factors affect the amount of catch that can be made from a fishery. This is one aspect of fisheries management. The success of a fishery depends on several factors, including the habitat, the proportion of predators to prey, the kinds of fish that are there, and the availability of food.

Another area includes lake and pond management, which plays a significant role in preventing the growth of nuisance algae and aquatic vegetation. This growth, if unmanaged, could result in a low level of oxygen, which could put a pond at risk of fish mortality. Lake and pond management also play a role in preventing nuisance algae blooms. This will establish the conditions for healthy aquatic life. Establishing a solid foundation is the first step in developing a trophy fishery since it lays the groundwork for future success. A management plan that considers the taking of predators is required for a fishery to be considered balanced. m. Annually, an excessive number of predators can be eradicated by using techniques such as electrofishing, seining, angling, or capturing them with trap nets. Getting the correct ratio of predator fish species to prey fish species is essential for any fisheries management program to be successful.

Fisheries biologists can provide recommendations regarding which forage species will best satisfy the requirements of the fish echo system. One of the most typical problems that can arise in fish communities is an imbalance in the proportion of predators to prey. It is common for predators to amass an excessive population and wholly overrun the baitfish. Once the majority of the available food source has been devoured, the growth rates of the predators begin to decelerate, and their health begins to deteriorate. The key to effective fisheries management is knowing to stock the appropriate fish species, sizes, and quantities for each factor at the optimal time of year.

Monitoring, testing, and restoring the water's quality were also included among the other topics. It is vital to have a thorough awareness of the chemical and biological contents, the demands placed on the water body, and the effects these factors have on the quality of the water.

Strategies for habitat management, preservation, and enhancement are additional areas. When managing fisheries, it is vital to consider all factors of fish habitat, including cover and water quality. The fish cover provides little fish with the required refuge they need and larger fish with the desirable hunting grounds they seek. Professionals in charge of managing fisheries put in much effort to ensure a robust equilibrium of cover concerning the total size and depth of the pond. In addition to more contemporary habitats, cover in the form of logs, boulders, or even abandoned farm equipment can serve as desirable settings for aquatic life.

Students participated in pond stocking trips to clients of the hatchery as part of the fourth component of the summer program. These travels allowed students to assist with introducing fish into state fisheries and private ponds.

3.4 The program used experiential learning

Experiential learning is an approach to education that focuses on the learner's experience as the primary source of knowledge production and acquisition. Experiential learning theories are based on the idea that the best way to understand the world and gain knowledge is through direct experience and reflection. This type of learning is often used in educational and professional settings to enhance the individual's understanding and interest in a topic or subject (Kolb, 1984).

According to Kolb (1984), experiential learning is an active, reflective, and iterative process whereby the learner is actively involved in learning, reflecting on their experiences and then applying them to new situations. This type of learning encourages the learner to be involved in the learning process, leading to a deeper understanding of the material and a more extraordinary ability to apply it in everyday life.

One of the primary benefits of experiential learning is that it allows the learner to gain a deeper understanding of the material being studied. This is because experiential learning involves the learner actively engaging in the learning process and reflecting on their experiences. As a result, they can better understand the material and develop a more extraordinary ability to apply it in real-world settings (Kolb, 1984).

Experiential learning can also help the individual to become more self-aware. By actively engaging in the learning process and reflecting on their experiences, the learner can better understand their strengths and weaknesses, which can help them become more self-aware and confident. This can be beneficial in various contexts, such as when making decisions or dealing with difficult situations (Kolb, 1984). Exposure to fishing, education programs, and work experiences can function as experiential learning about fisheries as a potential career.

3.5 The program used fishing trips

Given the barriers that African-Americans face when considering a career in the fishery industry, it is clear that targeted outreach is necessary in order to increase their interest in the industry (Davis, 2019). One way to do this is through fishing trips. Fishing trips can expose African-Americans to the fishery industry and the skills necessary to pursue a career. They can also provide a safe, welcoming environment where African-Americans can develop their fishing skills and gain confidence in their abilities. Additionally, fishing trips can provide African-Americans with mentors and role models who can provide guidance and support in pursuing a career in the fishery industry (Davis, 2019).

3.6 The program used summer education programs

One of the best ways to ensure teenagers become interested in fisheries careers is to provide engaging and informative summer education programs, field trips, and fishing experiences. This paper will discuss the various benefits of these activities concerning fisheries careers.

Summer education programs can provide various benefits for teenagers interested in fisheries careers. These programs can provide a comprehensive introduction to fisheries science and management, enabling students to gain a detailed understanding of the subject. Summer education programs can also help to develop practical skills by providing hands-on activities such as fish handling and data collection. This can benefit teenagers, as it can help them develop the knowledge and skills necessary for a successful career in the fisheries industry. Additionally, summer education programs can allow students to work with experienced professionals, which could help develop their skills further.

Furthermore, summer education programs can provide teenagers with the opportunity to network with other individuals that are interested in fisheries careers. This helps foster a sense of community among the students and helps spark an interest in the field. Additionally, summer education programs provide teenagers with a sense of purpose and motivation, which helps to keep them engaged in their studies.

In addition to summer education programs, field trips, and fishing experiences can also be beneficial in helping to get teenagers interested in fisheries careers. Field trips can give students a glimpse into the real-world applications of fisheries management and science, which could help spark an interest in the field. Additionally, field trips can allow students to observe various fish species in their natural environment, which could help develop their knowledge and understanding of the subject.

Fishing experiences can also be beneficial in helping to get teenagers interested in fisheries careers. Fishing can allow teenagers to learn how to identify different fish species and how to handle them properly. This can benefit teenagers, as it can help develop their practical skills and give them a better understanding of the field. Additionally, fishing experiences can provide an enjoyable and engaging activity for teenagers, which could help to keep them interested in the subject.

3.7 The program included summer Jobs at a fish hatchery

Summer jobs in fish hatcheries can benefit African-Americans interested in pursuing a career in the fisheries sector. One of the primary benefits is increased exposure to the industry. Working in a fish hatchery can allow African-Americans to learn about the various aspects of the fisheries sector, such as fish farming and fish processing. This exposure can increase awareness of the various career paths available and provide valuable insight into the sector.

Summer jobs in fish hatcheries can also provide African-Americans with increased access to educational resources. Working in a fish hatchery can allow African-Americans to learn from experienced professionals. This hands-on experience can provide African-Americans with the necessary knowledge and skills to pursue careers in the fisheries sector. In addition, working in a fish hatchery can provide African-Americans with access to educational resources, such as college courses and training programs related to the sector.

4.0 Conclusions

Finally, summer jobs, internships, and pilot programs in fish hatcheries can give African-Americans access to mentorship, knowledge, and exposure in the field. Working in a fish hatchery can give African-Americans access to experienced professionals who can provide guidance and advice on the various career paths available in the sector. This access to mentorship can be invaluable for African-Americans interested in pursuing a career in the fisheries sector, as it can provide them with the necessary support and resources to succeed in the sector.

12 African-American male students participated in the pilot program and completed an evaluation at the end.

12 out of 12 participants stated that they were more interested in fisheries careers due to participation in the program.

10 out of 12 participants said they would consider studying careers in fisheries in college.

12 out of 12 participants stated that they learned much about fishery biology, hatchery operations, and fisheries management.

The pilot program outlined the value and the need to develop more applied learning, internships, and experiential learning approaches for African-American men in fisheries careers. Such approaches can help African-American men to gain the skills and knowledge needed to succeed in the field of fisheries, as well as provide them with valuable professional networks. Ultimately, such approaches can benefit both African-American men and the field of fisheries.

The presence of African-American men in the fisheries industry is important for a number of reasons. Firstly, it has a direct and tangible impact on the industry itself. African-American men bring with them new perspectives and experiences, which can lead to increased innovation and solutions to problems. They also bring unique cultural backgrounds and life experiences, which can be useful in engaging diverse local communities in conservation efforts.

African-American men also have a role to play in the education and mentoring of young people. Having African-American men visible in the fisheries profession will serve as an inspiration to young African-American men who may have been discouraged from pursuing a career in the fisheries sector due to its history of exclusion. Seeing African-

American men in positions of power, success and authority will be hugely beneficial for future generations of African-Americans seeking to enter the world of fisheries.

African-American men are not the only under-represented group in the field. Other minority groups, such as Hispanics, Native Americans, and Pacific Islanders are also drastically under-represented. It is important to recognize the unique challenges faced by all minority groups in the fisheries sector and to ensure that these groups are given equal opportunities.

There are a number of potential solutions that can be applied to combat the challenges faced by African-American men in the fisheries sector. Firstly, increased diversity initiatives in the sector can help ensure that African-American men are given equal employment opportunities and access to educational and professional development resources. Second, there should be more targeted recruitment efforts to increase the number of African-American men in the sector, as well as the promotion of existing African-American men in the industry. Finally, there needs to be greater representation of African-American men in specialized targeted development and educational programs.

References

- American Fisheries Society. (2020). About AFS. Retrieved from <https://fisheries.org/>
- Arlinghaus, R., Tillner, R. and Bork, M. (2015), Explaining participation rates in recreational fishing across industrialised countries. *Fish Manag Ecol*, 22: 45-55. <https://doi.org/10.1111/fme.12075>
- Blount, B.G. (2000). Marginalization Of African- Americans In Marine Fisheries Of Georgia.
- Davis, J. (2019). Black faces, black spaces: Rethinking African American underrepresentation in wildland spaces and outdoor recreation. *Environment and Planning E: Nature and Space*, 2(1), 89-109.
- Estrada, M., Hernandez, P. R., & Schultz, P. W. (2018). A longitudinal study of how quality mentorship and research experience integrate underrepresented minorities into STEM careers. *CBE—Life Sciences Education*, 17(1), ar9.
- Fisch, K. M., Kozfkay, C. C., Ivy, J. A., Ryder, O. A., & Waples, R. S. (2015). Fish hatchery genetic management techniques: integrating theory with implementation. *North American Journal of Aquaculture*, 77(3), 343-357.
- Kolb, D.A.(1984). *Experiential Learning: Experience as the Source of Learning and Development*. Englewood Cliffs, NJ: Prentice-Hall.
- Lobo, M. A., Moeyaert, M., Cunha, A. B., & Babik, I. (2017). Single-case design, analysis, and quality assessment for intervention research. *Journal of neurologic physical therapy: JNPT*, 41(3), 187.
- National Oceanic and Atmospheric Administration (NOAA). (2023). Fisheries. Retrieved from <https://www.noaa.gov/>
- Ocean Conservancy (2023). Sustainable Fisheries: HEALTHY FISH FOR A HEALTHY OCEAN. Retrieved from: https://oceanconservancy.org/sustainable-fisheries/?ea.tracking.id=22HPXGJAXX&gad=1&gclid=EAlaIqobChMI_dCxzMCX_wIVbvHjBx2ZtAnjEAAySAAEgKz_fd_BwE

Sass, G. G., Rypel, A. L., & Stafford, J. D. (2017). Inland fisheries habitat management: lessons learned from wildlife ecology and a proposal for change. *Fisheries*, 42(4), 197-209.

ZIPPIA (2023). FISHERIES BIOLOGIST DEMOGRAPHICS AND STATISTICS IN THE US. Retrieved from: <https://www.zippia.com/fisheries-biologist-jobs/demographics/>

United Nations Food and Agriculture Organization. (2022). The State of World Fisheries and Aquaculture. Retrieved from <https://digitallibrary.un.org/record/3978694?ln=en>

U.S. Bureau of Labor Statistics. (2020). Occupational employment statistics. Retrieved from https://www.bls.gov/oes/2020/may/oes_nat.htm

U.S. Fish and Wildlife Service. (2016). National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Retrieved from <https://www.fws.gov/program/national-survey-fishing-hunting-and-wildlife-associated-recreation-fhwar>