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Paddling the waka: exploring the generational experiences of wāhine (women) in fisheries science, in Aotearoa New Zealand

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1 Introduction

This article set out to explore the experiences of generations of women who are or have previously worked in fisheries science in Aotearoa New Zealand in the context of the biases and barriers women face when taking up a science career (e.g. [Vetter, 1981](#); [Reuben et al., 2014](#); [Huang et al., 2020](#)). Women are an integral, but too often invisible part of fishing and aquaculture ([GAFS, 2018](#)), and an increasing proportion of ocean researchers are women ([IOC-UNESCO, 2020](#)). Despite increased awareness and establishing of equality initiatives, a growing literature still indicates entrenched gender disparities in publishing, career length, and prestige and leadership roles in marine and fisheries science ([Arisemendi and Penaluna, 2016](#); [Vila-Concejo et al., 2018](#); [Giakoumi et al., 2021](#); [Penaluna and Arisemendi, 2022](#); [Burdett et al., 2022](#)). These statistics collectively reflect a range of women's experiences such as the disproportionate challenges faced during coastal fieldwork ([Hamylton et al., 2023](#)), the unique experiences of women of color ([King, 2023](#)) and the differences in aspirations that indigenous women may prioritize in their research careers (e.g., [Thomas et al., 2025](#)).

We aim to contribute to these conversations from the lens of Aotearoa. We utilized an online survey (questions provided as supplementary material) to explore past, present, and future realities of being a woman in fisheries science in Aotearoa. Questions were based on the Frontier Special Issue guidelines, and further developed, taking inspiration from studies such as [Hamylton et al. \(2023\)](#) and the Royal Society study celebrating the diversity of work-life patterns of researchers across the United Kingdom ([Leyser, 2016](#)). They were designed to capture what inspired respondents to work in fisheries science, what their pathway was, and what were the highlights and most rewarding aspects of their careers. We also asked if there were any barriers they had faced, whether they had changed over time, and what they thought would help remove barriers for women in the future.

Our survey participants were women either known to be currently or previously working in fisheries or were forwarded the survey by other key participants. Participants either currently, or had in the past, worked mainly at the National Institute of Water and Atmospheric Research (NIWA) and/or Fisheries New Zealand (FNZ), but also at other research organizations overseas. The former carries out a significant portion of fisheries research in New Zealand and the latter is the Government department/agency responsible

for managing fisheries resources. Our contact list was not exhaustive; it did not include all fisheries research providers in New Zealand but did include all who currently work in fisheries-related roles at NIWA. Thirty-one women were invited to respond to the survey. Eighteen responses were received within 2 months. The authors acknowledge that this is a limited sample of women, but it does include a broad range of ages and career lengths.

Some individuals did not complete the survey or chose to remain anonymous, due to concerns that the opinions shared would negatively impact their careers. The lead author also wishes to acknowledge their position, which is of a Māori (indigenous people of Aotearoa) early career researcher working in the field of Māori environmental science and fisheries. She is not included in the survey respondents, and when collating responses for this article, aimed to capture and honor the breadth of experiences respondents have had working in fisheries sciences, including both the barriers and the highlights.

2 Our survey respondents and their pathways into fisheries

We collated responses from 18 women from recently graduated to retired, with a mix of personal backgrounds (Figure 1). Respondents had a broad range of research specialties within or connected to fisheries science, from inshore recreational fisheries, deep sea commercial fisheries, and supporting complimentary areas such as biodiversity and conservation (more specialties shown in Figure 1). Many developed a love for the ocean from a young age, often growing up near the coast and/or visiting marine environments and experiencing wildlife encounters on holidays. These experiences ranged from rock pools to dolphins and beluga whales. A desire to protect marine environments was a common motivator, as were the inspiring influence of schoolteachers, university lecturers and other mentors. Others were more generally interested in science and ended up in fisheries research by chance through unexpected opportunities and the application of their skills in mathematics and statistics. One respondent felt she was hired as the “token woman” to work in a summer job, really enjoyed it, so continued to stick it out. Educational backgrounds and pathways into current roles have varied (see Figure 1), and study areas included marine ecology, biology, oceanography, mathematics, statistics and marine conservation. Getting a foot in the door and finding a first job in marine science was difficult for some, leading them to seek out related experience in different but complimentary fields.

Many career paths were shaped by opportunities arising from voluntary work, casual or temporary roles, scholarships, internships and networking at conferences. The Sir Peter Blake Trust (BLAKE) Ambassador Programme, NIWA's Māori Graduate Programme and Fisheries New Zealand (FNZ)-funded Masters scholarships have provided valuable stepping stones for several of the early career women currently working in fisheries science. Voluntary activities included participation in fieldwork, unpaid volunteering on research voyages, doing beach clean ups, and supporting non-profit organizations. One respondent stated, “volunteering is definitely a great way to gain experience and make contacts early in your career and often opens up unexpected opportunities”. Once in employment, “extra-curricular” activities

that have helped progress and grow careers included being active members of professional societies, international working groups and forums, guest lecturing, supervising students and engaging in public and educational outreach activities as well as training and experience in practical activities such as diving, fishing and boating. One respondent also noted that the juggle between work and family required her to develop time and inter-personnel management skills that make her great at what she does.

3 Barriers faced

More than half of our respondents agreed that their field of fisheries science was male dominated. Most felt they had at some point experienced barriers or felt held back in their studies or working life because of their gender (Figure 1). We provided examples of some barriers that may have been experienced and asked our respondents to indicate how many of these they had experienced. Between 50–61% of respondents (9–11) reported that they had experienced inappropriate/intimidating/dismissive behavior by male staff, that there had been assumptions made about their physical ability or other skillsets required for fieldwork/seagoing duties, and/or that they had been overlooked for opportunities in favor of their male colleagues. A smaller number of respondents (5) had experienced concerns around their personal safety onboard vessels or in the field as a result of the behavior male colleagues or crew. Five respondents felt the impacts of maternity leave, and/or childcare/care giver responsibilities resulting in part-time work also resulted in the loss of work opportunities.

The respondents who have since retired have been highly successful in their chosen fields, reached influential senior positions and becoming visible role models and mentors to younger female scientists in New Zealand. In the 1970's and 1980's, when fisheries science and going to sea was very male dominated, these women started their careers and were determined to succeed. Fisheries science was expanding rapidly in this country as New Zealand declared its 200-mile Exclusive Economic Zone (EEZ) (Livingston, 2025). One respondent described that once the Director “inadvertently signed off a voyage staff list that had a woman on it”, our pioneering fisheries wāhine were able to participate on fisheries voyages. However, many experienced being underestimated, underappreciated and overlooked or dismissed for opportunities, particularly more senior and leadership roles at some stage in their careers. These women noted pay inequity as an ongoing barrier, and those who had raised families had mixed experiences; some feeling that reducing their hours to part-time resulted in them being overlooked, whilst others did not feel they had been held back.

Women in their late and mid to late career acknowledged that they have benefitted from the pathways forged by earlier generations, e.g., opportunities to go on research voyages were more accessible, and there were women visible in senior positions (e.g., female Chief Scientists at FNZ from 2005 - 2011 and NIWA from 2010—March 2021). However, most have still faced barriers, including inappropriate behavior, dismissive and insulting comments, workplace sexual harassment, and feeling a lack of support from peers or managers when speaking out—often being labeled “difficult” if they did. Many discussed perceived gender-based exclusion from fieldwork, promotions,

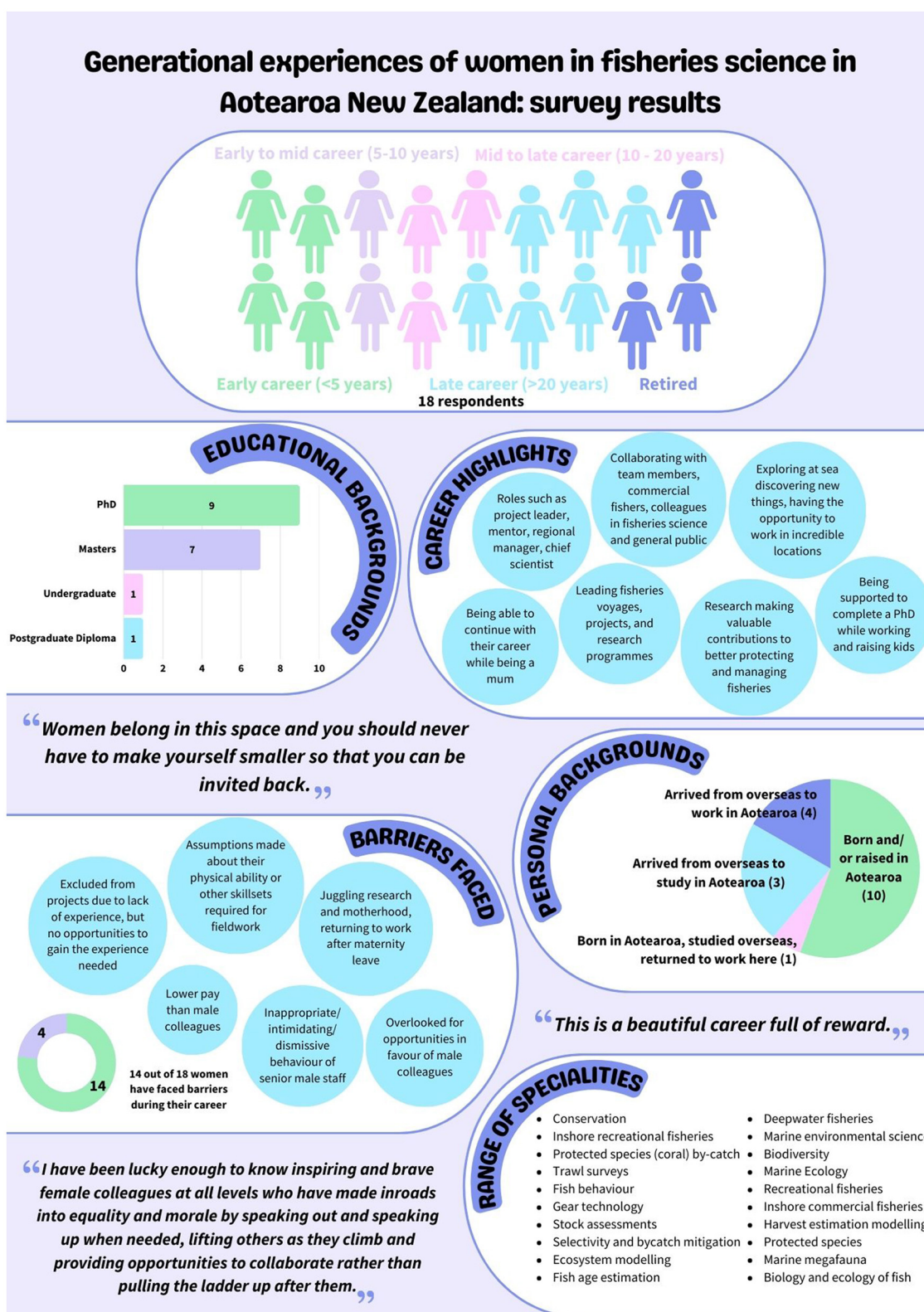


FIGURE 1

Visual summary of survey results, highlighting the defining characteristics of the 18 survey respondents, including career stage, personal and educational backgrounds, and fisheries specializations.

and leadership roles, or their contributions were only recognized and supported when echoed by male colleagues. Some felt their exclusion was exacerbated by informal male-only social networks. Respondents also highlighted lower pay compared to male colleagues. Experiences at sea ranged from extremely positive and respectful, to stories of inappropriate posters and videos, sexist jokes, and being expected to share cabins with male colleagues they had never met before. One woman touched on the rivalry and competitiveness of fisheries science in Aotearoa and shared experiences of inappropriate, dismissive behavior and exclusion from research by both male and female colleagues.

Early and early to mid-career women described many of the same barriers as their older colleagues. In particular, fieldwork and experience-building opportunities were perceived to be harder to come by compared to their male peers, and some described being disproportionately assigned organizational tasks with little recognition. Lower pay than male colleagues was also perceived as a barrier for these women.

Most of the women who mentioned combining their research career with motherhood had experienced additional barriers. They said taking maternity leave had negatively impacted their career progression and access to opportunities. Women described their return from maternity leave as distressing, challenging and brutal. A lack of support and planning to ensure positive reintegration, and appropriate work being assigned or returned to them was another barrier. The challenges of continuing their career whilst raising their families included the negative connotations of working part time, the difficulty and costs of arranging additional childcare to enable participation in fieldwork, sea trips and work-related travel and networking opportunities. One woman was even told to “stop popping out children”, and not to worry about chasing pay increases.

Four women, spanning all career groups, noted they have not encountered any barriers. Their career pathways were characterized by successfully landing early jobs with a wide variety of opportunities and positive and respectful experiences with mentors, managers and work colleagues. Institutional support for family-friendly work arrangements was key to progressing the careers of those with family. The establishment of an on-site childcare facility at NIWA in the 1980's and 1990's allowed mothers to more easily return to work with the added security of children being close by on campus. Whilst this facility sadly no longer exists, allowance for flexible working arrangements and supporting further study while still working was acknowledged as a key aspect of the success of another mid-career respondent.

When asked if barriers had changed over time, our senior women have observed improvements in workplace culture, visibility, and opportunities, with more women entering the field and an increased awareness of inappropriate behavior. Improvements in accommodation onboard vessels, and communication technology at sea were much appreciated. Several early career scientists acknowledged the benefit from funding programs and awards that were designed to recognize and support women. However, most believed significant barriers remain, including persistent unconscious bias, unequal advancement opportunities, gender pay gaps and the “motherhood penalty” with the number of women in senior leadership roles stagnating rather than increasing. Some attributed positive changes in their career to

moving to more appreciative workplaces or personal growth rather than institutional progress. Several respondents noted that having the confidence to speak up for gender inequity still needed to come with a thick skin to weather the negative labeling.

4 Highlights, positive experiences and breaking down barriers

Despite the challenges, women scientists in Aotearoa have been integral to a wide variety of fisheries research of which they are rightly proud; contributing to the establishment of New Zealand's Quota Management System in the 1980s, participating in groundbreaking early voyages discovering the location of spawning hoki (*Macruronus novaezelandiae*) and capturing the first juvenile orange roughy (*Hoplostethus atlanticus*). Their research has been instrumental in developing stock assessment processes, trawl survey protocols, aging of deep water fish and corals, novel data analysis approaches and establishing databases. The following generations have also made significant contributions across a diverse range of fields; scientific surveys, catch sampling and aging programs, ongoing development of stock assessment and modeling approaches, understanding the effects of climate change, monitoring of protected species and describing new species. Career highlights included being part of the recent increase in number of women going on and leading fisheries voyages, building their own research programs, developing innovative trawl sampling and bycatch mitigation technologies, receiving national and international recognition, creating lasting legacies through stewardship of long-term data collection programs and for some, gaining influential leadership roles mentoring the next generation. Responses reflected the rich, varied, and deeply rewarding experiences of working in fisheries science, from hands-on fieldwork at sea in beautiful locations and all elements, collaborating with passionate colleagues, engaging with fishers, Māori, environmental non-government organizations (eNGOs), universities, and overseas colleagues, while producing impactful science that has led to tangible advances in sustainable fisheries management and policy.

Many have found fulfillment in overcoming career barriers and being part of inclusive, passionate communities, working with inspiring colleagues and building careers tailored to their interests. When asked what would reduce barriers for women in fisheries science in the future, respondents agreed that genuine acknowledgment from research organizations that issues still exist is key, including the need to address unconscious bias, gender pay gaps and the “leaky pipeline” impact on women reaching senior leadership roles. It was noted that the initial very positive impact of the Equal Employment Policies introduced in the 1990's has not yet achieved the intended full workplace equality for women, and there was a perception of lack of on-going commitment to addressing issues facing women in the workplace. Continuing to support bottom-up programs that open early career opportunities for young female scientists, along with facilitating active mentorship is essential, as is striving for inclusive, flexible and supportive work cultures as the norm. One woman from the early to mid-career stage acknowledged “being a woman in fisheries science in recent years has provided me with opportunities that I would've unlikely had in the decade prior because there has been a push to ensure

we are recognized in our field". Tackling obstacles to the longer-term retention and success of our wāhine in fisheries research, including around maternity leave, childcare, and shifts to part-time, which often lead to career penalties for women, requires active listening rather than assumptions, and consideration of how different skillsets, contributions and experience are valued and recognized.

Distinctive aspects of working in Aotearoa included its large marine realm (the fifth largest EEZ), relatively small population, but with strong connections to the ocean and desire or need to gather seafood prominent across multiple cultures. The small science community allowed the chance to work across varied disciplines. While the close-knit nature of the sector could pose challenges, it also had potential to foster strong networks and collaborations. The emphasis on incorporating mātauranga Māori, community, and kaitiakitanga into fisheries science was an approach that appealed particularly to our women who felt they offered a blend of cultural insight, environmental commitment, and practical expertise that enriches the field.

We finish this article with some parting advice and encouragement from our respondents to the next generations. These women shared that while fisheries science can be hard, grubby, and challenging, it is a highly rewarding career path. Seek mentors, build supportive networks, lift others up with you as you climb, and know you are not alone on this path, just go for it.

"Women belong in this space, and you should never have to make yourself smaller so that you can be invited back. There is enough space for multiple women in our field so let's not be threatened by competent women, nor gatekeep knowledge. Let's instead lift each other up."

"Don't ever give up! This is a beautiful career full of reward. but it is tough. You may need a thick skin. But look to those women ahead of you and never, ever be afraid to come and talk to us. We will help you and nurture you as best we can. We are the trail blazers who have forged this path for you. Now come and walk it with us."

Author contributions

TT: Writing – original draft, Writing – review & editing. EJ: Conceptualization, Investigation, Writing – original draft, Writing – review & editing, Supervision. MU: Conceptualization, Investigation, Writing – review & editing. DT: Writing – review & editing, Conceptualization, Investigation, Supervision. ML: Investigation, Writing – review & editing. KJ: Investigation,

Writing – review & editing. RH: Investigation, Writing – review & editing. RT: Investigation, Writing – review & editing. HA: Investigation, Writing – review & editing. MH: Investigation, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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