



# Careers in Fisheries & Wildlife

## Current Job Trends and Future Growth

August 2017

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## Foreword

This report presents the findings of the ECO Canada Environmental Employment Outlook, an employment model that is informed by a combination of ECO Canada's environmental surveys over the 2003–2016 period, analysis of job advertisements for environmental jobs, and econometric modelling. The Environmental Employment Outlook was supplemented by interviews with nine experts in Fisheries and Wildlife management.



## Introduction

Canada's fisheries and wildlife (herein FW) management sub-sector is comprised of professionals who are actively involved in the management and protection of ecosystems (marine, wetland, and terrestrial), marine resources and wildlife, species at risk, and invasive species.

The FW sub-sector is a large multi-disciplinary field. FW professionals perform activities such as scientific research and analysis, engineering and planning, policy development, regulation enforcement, and technology development and implementation.

Careers in FW are in demand and the sub-sector is expected to maintain stable growth from the 2017-24 forecast horizon, in part due to the recovery of federal government spending on FW management and protection in 2016. In addition, new FW professionals will be required to fill positions left vacant by retiring employees.

In 2015, the core FW workforce was comprised of approximately 12,569 FW professionals. Core workers perform activities directly related to FW management and protection and typically spend more than half of their time doing so. This report focuses on core FW workers.

As shown in Figure 1, the number of core FW workers in Canada decreased from 16,778 in 2013 to 12,569 in 2015. The decrease is attributed to government funding cuts for FW, as well as reduced demand for environmental impact studies due to a drop in energy and infrastructure projects. After economic improvements in 2016, employment stabilized as government employers began to hire again. The FW sub-sector is projected to grow steadily until 2024.

Figure 1: Fisheries & Wildlife Employment Outlook 2013-2024 (Core Workers)

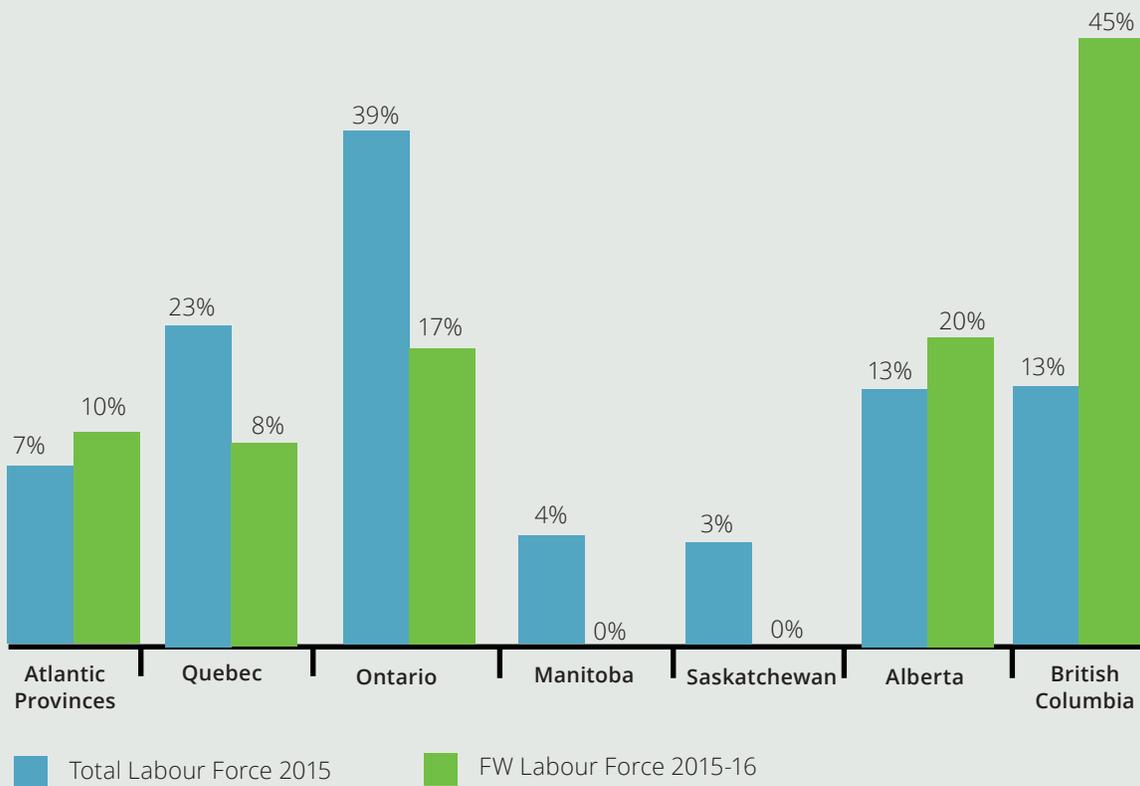


In 2015, nearly half of all Canadian FW professionals (45.0%) were employed in British Columbia (BC). However, BC only represents 13.0% of Canada's total labour force. Alberta has one-fifth (20.0%) of Canada's FW labour force, but only 13.0% of Canada's total labour force. In Quebec, Ontario, Manitoba, and Saskatchewan, the FW labour force is much smaller than each province's total labour force (see Figure 2).

**IN 2015, NEARLY HALF OF ALL  
CANADIAN FW PROFESSIONALS WERE  
EMPLOYED IN BRITISH COLUMBIA**



Figure 2: Demand for Fisheries & Wildlife Professionals by Province



Source: ECO Canada Environmental Employment Outlook, Burning Glass Job Ads Database

## Occupational Categories

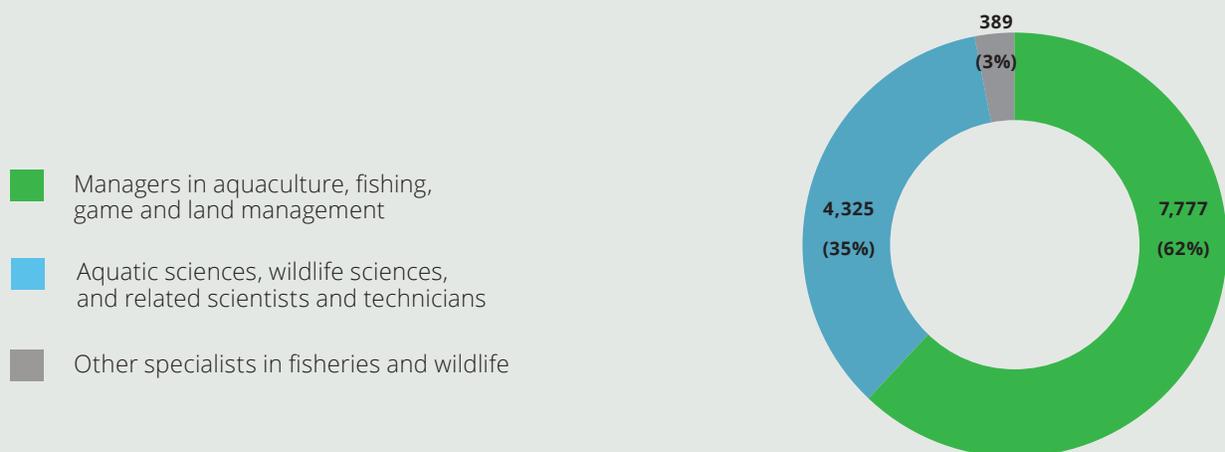
FW professionals work in a broad range of occupations to solve problems, conduct research, and manage and protect fisheries and wildlife.

There are three main occupational categories in the FW sub-sector: managers, scientists and technicians, and other specialists (see Figure 3).

In the core FW labour force there are:

- Approximately 7,700 managers working in aquaculture, fishing, game and land management: Managers represent the largest component of the FW workforce.
- Over 4,300 scientists and technicians: This group includes scientists and technicians working in life and physical sciences. FW scientists and technicians make up over one-third of all FW professionals.
- Over 380 specialists working in FW: Professionals in this group have some specialization in FW, as well as competencies in other fields such as public protection services, policy, regulation, engineering, and land use. This is the smallest group of all FW professionals.

Figure 3: Fisheries & Wildlife Management Core Labour Force by Occupational Category, 2015



Source: Burning Glass Job Ads Database

# Practice Areas

Practice areas describe the field of work in which professionals are typically employed.

Although core FW workers perform various types of work, most FW occupations are related to ten broad practice areas (see Figure 4):

- Aquatic Sciences:** Aquatic scientists and technicians seek to understand how marine and ecosystem services function. Their research examines the impact of climate variability and human activities on Canada’s aquatic resources. Aquatic scientists and technicians collect and analyze oceanographic data, conduct fish and shellfish stock assessments, and monitor and test marine mammals. Some professionals in this area work at hydropower firms and organizations involved in infrastructure and engineering.
- Wildlife Sciences:** Wildlife specialists provide technical advice and oversight of wildlife-related matters for environmental planners, policy makers, and businesses. They collect and analyze wildlife data, assess environmental impacts, identify mitigation and monitoring needs, and develop restoration and wildlife habitat compensation plans. Some professionals in this practice area work with invasive species or specific species at risk. Wildlife specialists include biologists, ecologists, toxicologists, and related field and research technicians.
- Fishing and Aquaculture:** Fishing and aquaculture specialists and technicians work as hatchery and fish farming specialists, dockside monitors, environmental monitoring specialists, and fish health officers.
- Coast Guard Fisheries:** The Canadian Coast Guard, which is operated by the Department of Fisheries and Oceans (DFO), enforces regulations for marine fisheries and aquatic species and habitats. The Coast Guard provides research platforms for government scientists from the DFO, Environment and Climate Change Canada (ECCC), Natural Resources Canada (NRCan), and the Natural Sciences and Engineering Research Council of Canada (NSERC) to conduct surveys on biomass and stock assessments for fisheries allocation.
- Wildlife Conservation and Advocacy:** Wildlife conservation and advocacy professionals work in natural resource conservation related to fish and wildlife, land management, ecological and biodiversity monitoring, coordination of conservation volunteers, national heritage, parks management, naturalist activities and ecotourism, and stewardship of private land.

Figure 4: Fisheries & Wildlife: Top Practices\*



- **Technology Development and Deployment:** Technology is integrated into many FW roles. Technologies such as geographic information system (GIS) and geomatics, remote sensing, robotics and remote operations, imagery, monitoring technology, and other technology applications are becoming standard tools for many professionals from entry-level to the most advanced positions in FW. In the FW sub-sector, there is a convergence of careers that focus on applying technology to FW activities and traditional information technology careers in new technology development.
- **Aboriginal Peoples Collaborations and Partnerships:** Fisheries and wildlife policies, projects, and programs on traditional lands require consultation with Aboriginal communities. Professionals working in this area require FW competencies as well as skills to work effectively with Aboriginal communities (such as the ability to effectively communicate scientific information and the ability to build relationships).
- **Environmental Impact Assessment in Mining, Energy, and Infrastructure:** Major projects and developments often require environmental impact assessments (EIAs) to determine the impacts of the project on fisheries, wildlife, and the environment. Planning and engineering professionals monitor and assess mitigation strategies and design projects, policies, and programs that can mitigate or compensate for the environmental impact of major projects. There is a need for a broad range of engineering, scientific, and technical expertise to evaluate environmental impacts.
- **Policy and Legislation:** Professionals in this practice area establish legislation, policies, and procedures for environmental protection of fish habitats, wildlife, and ecosystems. Activities include: policy analysis, monitoring and data analysis, scientific roles (providing advice to governments), business and legal roles in environmental regulatory compliance, and inspection roles in monitoring and enforcement.
- **Protection and Enforcement:** Professionals in the protection and enforcement practice area enforce legislation and protect resources. They work as either wildlife protection or fisheries officers. Wildlife protection officers enforce Canadian wildlife legislation related to conservation, poaching, killing or trafficking of endangered species, illegally importing or exporting wildlife, and harmful activities to protected species. Fisheries officers enforce the Fisheries Act and protect fishery resources and fish habitats by conducting land, sea, and air patrols, and participating in public education and awareness activities.

\*Source: Multiple, including qualitative interviews and databases, consultant analysis

Figure 5: Common Occupations in Fisheries & Wildlife by Practice Area

**Aquatic Sciences**

Biologist or Ecologist	Technician or Observer	Wetlands Specialist
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**Fishing & Aquaculture**

Manager	Technician or Observer	Advisor or Specialist
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**Wildlife Conservation & Advocacy**

Park or Zoo Interpreter	Natural Resource Officer	Park Warden or Ranger
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**Aboriginal Peoples Collaboration & Partnerships**

Lands Management Officer	Liaison Coordinator	Natural Resource Specialist
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**Policy & Legislation**

Research Specialist	Policy Advisor	Wildlife Manager
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Source: Multiple, including qualitative interviews and databases, consultant analysis

**Wildlife Sciences**

Biologist or Ecologist	Technician or Observer	Wildlife Coordinator
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**Coast Guard Fisheries**

Response Specialist	Biologist	Researcher
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**Technology Development & Deployment**

Database Specialist	Scientist	Resource Information Specialist
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**Environmental Impact Assessment  
in Mining, Energy & Infrastructure**

Environmental Engineer	Land Use Planner	Biologist or Ecologist
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**Protection & Enforcement**

Wildlife Protection Officer	Fishery Officer	Provincial Conservation Officer
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Source: Multiple, including qualitative interviews and databases, consultant analysis

## Fisheries & Wildlife Employers

FW employers hire FW core workers to work in different practice areas such as aquatic sciences and policy and legislation. Although there is some overlap, FW employers and FW practice areas are two distinct categories.

Core FW workers in Canada are employed in a variety of sectors, which include the following:

- **Commercial fishing and aquaculture:** The Canadian commercial fishing and aquaculture industry is large, employing over **72,000 Canadians** (including some FW professionals). Some commercial fishing professionals require environmental competencies. These professionals work as dockside monitors and observers, fisheries experts, fish and aquatic animal health specialists, regulatory officials, and in hatchery and aquaculture operations.
- **Fisheries and Oceans Canada:** The DFO develops and implements policies and programs in support of Canada's economic, ecological, and scientific interests in oceans and inland waters, including commercial fisheries. The DFO coordinates with provincial, territorial, and Aboriginal branches of government. The DFO employs approximately 1,600 scientists, researchers, and support staff who monitor and regulate the commercial fishing industry. Most of these professionals are employed at one of sixteen DFO institutes, laboratories, and experimental centres located in six operational regions across the country. The DFO is the largest FW employer directly engaged in the field of fisheries management.
- **Other federal government departments:** FW professionals work for other federal departments that have mandates to manage and conserve fisheries and wildlife, such as ECCC, NRCan, Indigenous and Northern Affairs Canada (INAC), Health Canada's Pest Management Regulatory Agency, Infrastructure Canada, Transport Canada, and Parks Canada. These federal employers hire FW professionals with a range of educational backgrounds to work in scientific, technical, conservation, and regulatory positions.
- **Crown corporations and provincial and territorial governments:** Crown corporations and provincial and territorial governments employ FW professionals in government departments and in **emerging fields such as urban wildlife management**. These employers hire FW professionals such as scientists, policy analysts, and inspectors and enforcement officers.
- **Municipalities and local organizations:** Municipalities and local organizations employ FW professionals to manage urban fisheries and wildlife resources to ensure conservation while also enhancing the community's biodiversity and quality of life. Some municipalities may have a department of environmental management to oversee urban stream and forest management, of which urban wildlife is a component.
- **Aboriginal communities:** Aboriginal communities employ FW professionals to manage fisheries and wildlife, review permits for environmental assessments, map wildlife trails, conduct traditional knowledge studies, and protect endangered species.
- **NGOs and advocates:** Environmental NGOs conduct research, develop policy, raise awareness, and advocate for specific causes. Some of these NGOs work in coordination with Aboriginal organizations. Key employers include nature charities and NGOs that work in five main areas: land trusts, habitat protection, wildlife protection, advocacy, and the conservation economy.

- **Parks and conservation organizations:** National and provincial parks, watershed conservation bodies, conservation NGOs, forest conservation organizations, wildlife conservation institutes, Aboriginal wildlife conservation boards, wildlife rescue associations, and other organizations are all involved in FW conservation. These organizations play integrated management roles in the habitats and ecosystems of terrestrial, wetland, and marine life and employ various FW experts.
- **Zoos and aquariums:** Canada's zoos and aquariums play a role in conservation, education, scientific study, advocacy, and animal welfare. They employ zoologists, researchers, animal care technicians, veterinary care professionals and technicians, and others.
- **Environmental consulting firms, service firms, entrepreneurs, and consultants:** Employers in this category perform ecosystem studies, EIAs, wildlife population studies, and marine and freshwater studies. They also provide services for the fisheries industry (e.g., fishery inspection services). Independent consulting and business start-ups are growing areas for FW careers, many of which are deploying new technology for FW monitoring and management. FW consultants can work in a variety of occupations, including specialists, wildlife technicians, marine biologists, monitoring professionals, and toxicologists.
- **Research, academia, and education:** A significant portion of FW professionals are employed at universities, in research collaboratives, in environmental research NGOS, and in education roles in outdoor education. Many Canadian universities operate wildlife, ecology, biology, and fisheries programs for teaching and training purposes. In addition to university and college employers, a portion of FW education occurs in student outdoor education programs. Nature education is provided by outdoor education organizations, conservation organizations, NGOs, and other educational organizations.

## Environmental Skills for Fisheries & Wildlife Occupations

Core FW workers require similar environmental skills and competencies across most FW occupations. The top technical skills FW employers look for are skills in:

- Monitoring and field work
- Environmental impact assessment and site assessment
- Water quality
- Fisheries and wildlife specialization
- Technology (including computer programming, data analysis, and GIS technology)

Employers are also looking for core workers with skills in writing and reporting, policy and regulation, communication and public engagement, and research.

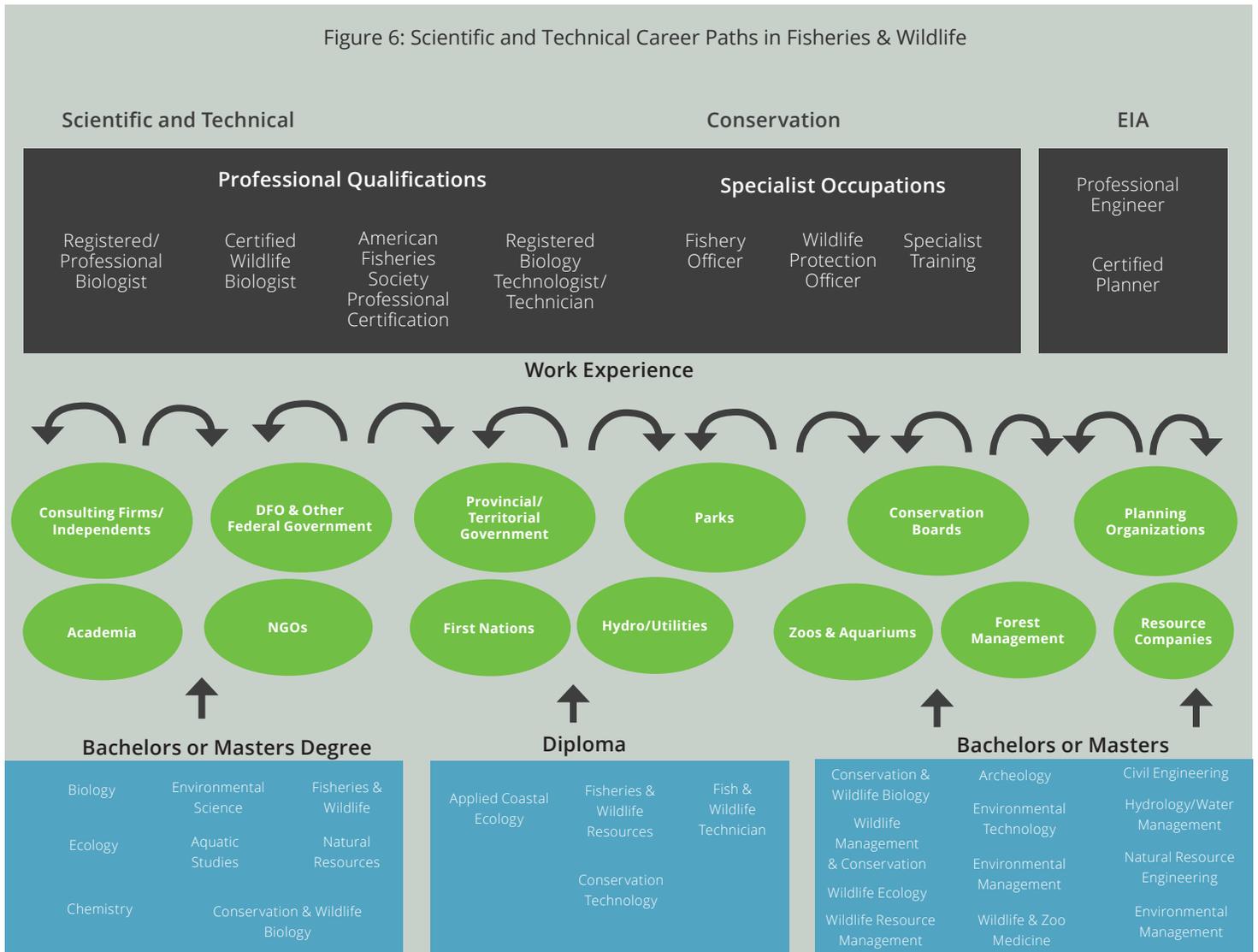
# Career Paths in Fisheries & Wildlife

Career paths for core FW workers begin with a relevant degree (or relevant diploma for technologists) or on-the-job training, followed by experience in one or more practice areas.

Scientists and technicians generally begin their careers with a bachelor’s degree in biology, ecology, natural science, earth science, conservation, or engineering (see Figure 6). Many scientists also obtain a PhD, typically with a specialization in a specific species or ecological or biological topic.

Employment for scientific and technical professionals can span a broad set of employers and may change over the course of the career. For example, a professional may begin working in consulting or for a government employer and later move into other areas, such as academia or conservation and parks.

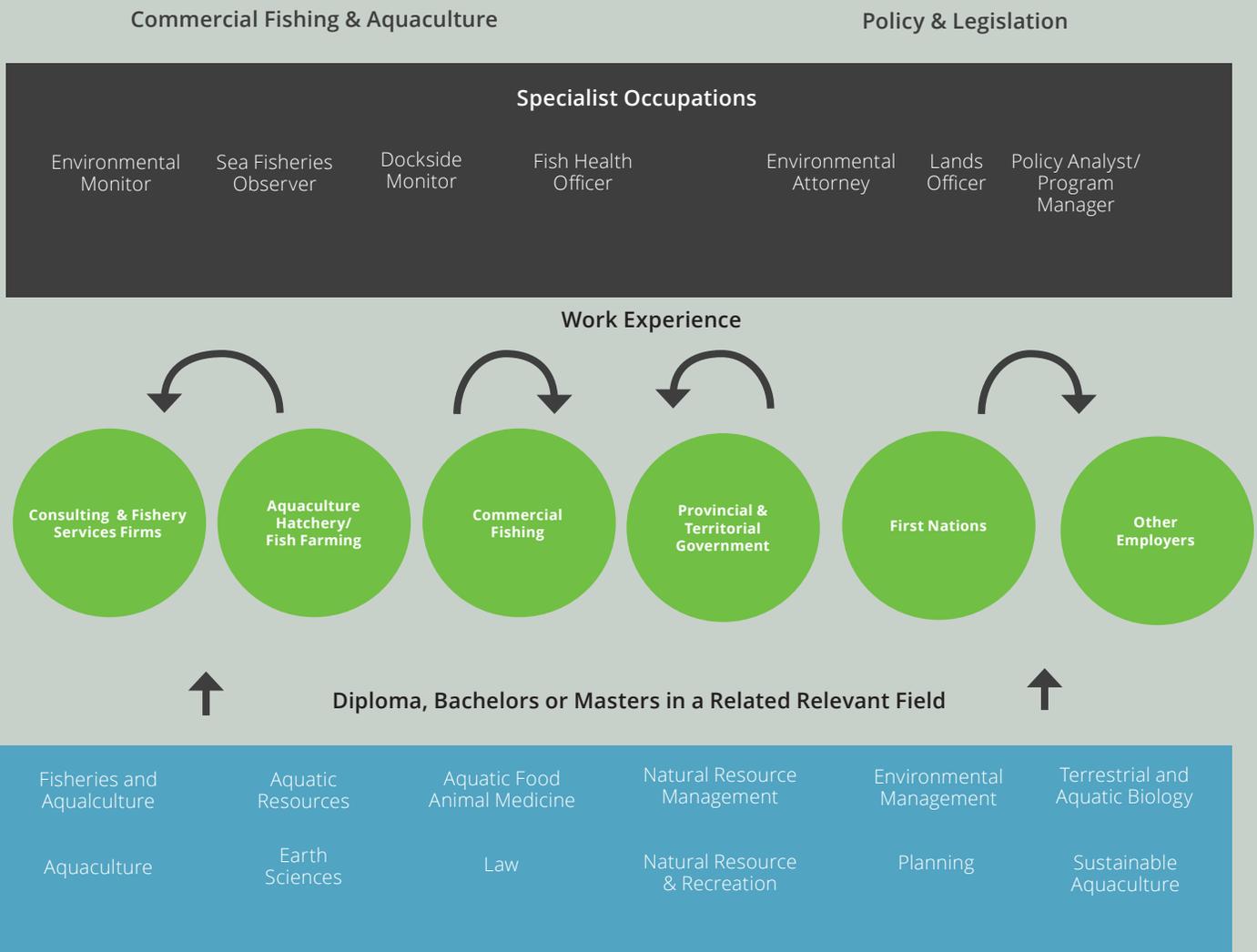
Figure 6: Scientific and Technical Career Paths in Fisheries & Wildlife



Source: Expert Interviews

Core workers working in aquaculture and commercial fishing can either obtain diplomas or degrees in fisheries and aquaculture or simply begin with on-the-job training. Other specialists, such as aquatic animal food and medicine, require veterinary training. Professionals working in policy and legislation typically begin their career with a bachelor's or master's degree in a relevant field and then move into specialist occupations based on their work experience (see Figure 7).

Figure 7: Fisheries & Wildlife Careers in Commercial Fishing and Aquaculture, Policy and Legislation



Source: Expert Interviews

## Hiring Patterns

FW employers typically hire core workers with environmental experience (either in FW or in another sub-sector). For example, in 2015 one-third (33.0%) of open FW positions were filled by a professional with a background in FW or another environmental sub-sector.

In addition, FW employers hired recent graduates and out-of-province core workers in 2015:

- Approximately half (52.0%) of FW hiring employers filled one or more positions with recent graduates or students (hired for internships)
- Over one-quarter (26.0%) of FW hiring employers filled one or more vacant positions with an employee who relocated from another province
- There were lower levels of hiring for Aboriginal Canadians, immigrants, and professionals from outside Canada:
- Only 14.0% of FW hiring employers filled one or more positions with an Aboriginal Canadian
- Only 2.0% of FW employers filled a vacant position with a recent immigrant (an individual who immigrated to Canada within the past five years)
- Only 2.0% of FW employers filled a vacant position with an employee from outside Canada

## Hiring and Retention Challenges

Almost one-third (29.0%) of FW employers experienced hiring difficulties in 2015. About half of these employers reported a lack of qualified external applicants. Other difficulties included a lack of qualified internal applicants, challenges finding applicants to work in remote or undesirable locations, challenges with recruiting due to the level of compensation offered, and difficulties related to seasonal positions.

Of the FW employers who experienced hiring challenges, most were concerned about filling intermediate and senior-level positions in the forthcoming 2016-2018 period.

Employers experienced particular difficulties recruiting candidates to occupations in the following areas:

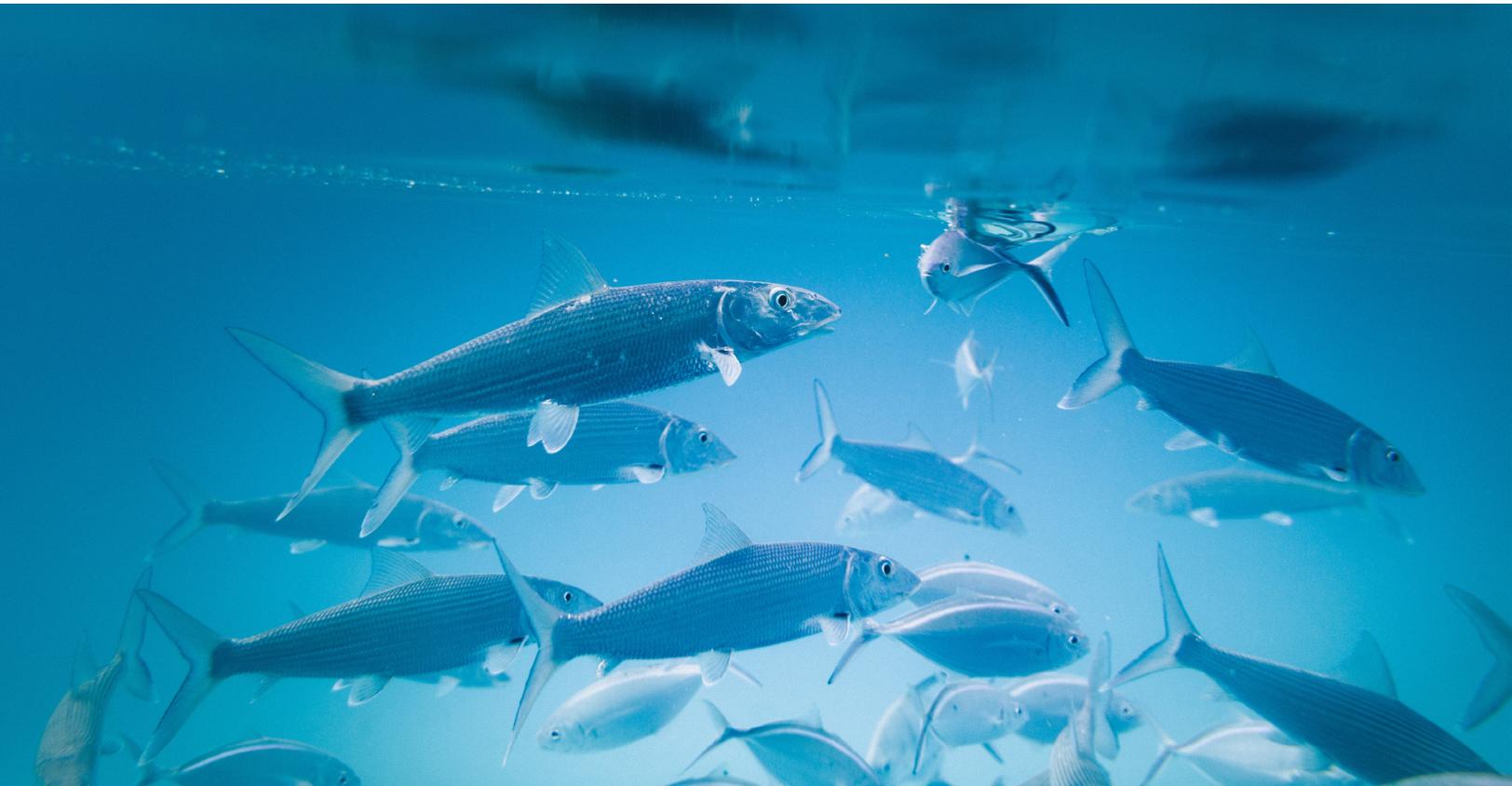
- Science (e.g., biologist, ecologist, hydrologist)
- Environmental consulting and engineering (e.g., marine engineer, environmental assessment analyst, and environmental geologist)
- Fisheries and aquaculture (e.g., aquaculture technician, dockside observer, oceanographer),
- Zoology (e.g., zookeeper, animal technician, interpretative guide)
- Research (e.g., wildlife research manager, environmental monitor, seasonal wildlife research associate)

## Career Outlook

Based on ECO Canada's survey data and FW sub-sector growth projections, the demand for core FW workers is expected to grow at a stable rate from 2017-2024. A 2015 survey of FW employers found that:

- Nearly one-third (31.0%) experienced an increase in environmental employment in the preceding twelve months
- Nearly two-thirds (64.0%) reported they had filled vacant positions for FW workers in 2015-16
- Over two-thirds (68.0%) expected employment to remain constant for the forthcoming 2016-18 period
- Replacements of existing employees due to retirements were expected to create job opportunities from 2015-24. Over half (56.0%) of FW employers expected that some of their employees would retire between 2015-2024; of this group, 27.0% expected they would need to hire replacements by 2018.

Fisheries and wildlife policies and regulations are the most important driver of employment in the FW labour market. FW core workers will continue to be in demand to conduct EIAs for major projects, monitor wildlife and fisheries conditions during a project, and make recommendations to guide policy and regulation changes.



## Industry Trends

As shown in Table 1, some of the main trends that are shaping the demand for FW professionals include the following:

- **New technology:** New technology is reshaping the FW sub-sector. For example, minimally invasive research methods are being used for data collection, such as using unmanned aerial vehicles (UAVs), remote sensing, and remote imagery processing technology. GIS technology has become a prerequisite for work in many FW occupations. Newer technologies are driving the collection of detailed information in the form of databases, imagery, and other specially related geographic data, all used to inform decision-making.
- **Consultation with Aboriginal communities:** Governments and industry are looking to build the capacity to work with Aboriginal communities to achieve mutual goals related to fisheries and wildlife management.
- **Government spending:** Government is a major employer of FW professionals. Government funding for FW positions has declined over the past decade, but recent employment in the sector has stabilized with the change of federal government in 2016. Future funding of FW positions may increase or decrease based on future political changes.
- **Public awareness about fisheries and wildlife management:** Public awareness and concern about climate change has brought more scrutiny to the impact of human activity on fisheries and wildlife resources.

\*Upward arrows indicate that the trend has a positive impact on labour demand. Downward arrows indicate that the trend has a negative impact on labour demand. Downward and sideways convey respective meanings.

Table 1: Trends Affecting Future Demand for Fisheries &amp; Wildlife Core Workers

Driver		Description
↑	Remote sensing, UAVs, and Related Technology	Minimally invasive research methods such as remote sensing and unmanned aerial vehicles (UAVs) are used for data collection
↑	Consultation and Partnership with Aboriginal Communities	Government and industry consultation with Aboriginal communities to meet mutual goals
↗	Demand for Certified Professionals	Growing demand for employees with professional designations and graduate degrees
↗	Media and Public Awareness	Public concern over climate change and fisheries and wildlife management
↗	Climate Change	More FW professionals will be needed to address climate adaptation and mitigation
↗	Aging Labour Force	The older labour force will be retiring in the next decade
↗	Social License to Operate	Companies are becoming more proactive in addressing environmental concerns
↗	Greater Volume of Information	There is a growing need for management of environmental data to inform decision-making
↗	Species Specialization	Increasing demand for professionals with specialized skills and knowledge
↗	Entrepreneurship	Increasing number of independent consultants, particularly in developing monitoring and managing technology
↗	GIS and Related Technology	GIS technology is used to reconstruct wildlife habitats through 3D and 4D images
↗	Diverse Career Paths	Career paths have become more diverse in FW, particularly for highly educated professionals
↗	Broadening of Scope of Skills	FW is starting to focus on urban and rural areas as well as cumulative impact monitoring of multiple projects
→	Regulation and Protection	More stringent environmental protection regulations and legislation
↘	Government Funding	Shifts in funding from national and provincial government organizations, depending on political changes

Source: Expert interviews

## In Summary

The current political environment is driving a positive outlook for FW careers because governments are looking to improve fisheries and wildlife management, conservation, and protection. In addition, the use of technology is reshaping the sub-sector. These, and other factors, will maintain demand for FW skills and knowledge. The FW sub-sector is expected to continue grow at a steady rate until 2024, creating a stable, vibrant, and diverse future for core FW workers.





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