



LABOUR MARKET INFORMATION

The Growing Nature Conservation Workforce: Reducing Canada's Footprint

A PRELIMINARY SECTOR PROFILE

March 2021

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Individuals or organizations interested in contributing to future research projects can send a request to research@eco.ca.

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Preface

Canada is the world's second-largest country, boasts the world's longest coastline, hosts 30% of the world's boreal forest and 25% of the world's wetlands, and is home to about 80,000 different species.ⁱⁱⁱ Nature is essential to the well-being of Canadians – from providing ecosystem services to generating economic benefits to safeguarding cultural heritage.

It is important to conserve nature in Canada and sustain the country's ecosystem services. As part of a long-term response to global biodiversity loss, Canada has committed to:

- Protect 25 percent of its lands and oceans by 2025 and 30 percent by 2030.^v
- Transform how government protects and recovers species at risk.
- Advance reconciliation with Indigenous Peoples.

Heightened investment in nature will require significant upscaling of the nature conservation workforce, increase the demand for nature conservation workers across all industries, and broaden the knowledge and skills requirements for the sector.

Currently, there is a lack of in-depth insight into the nature conservation workforce especially related to projected hires, job vacancies, skill shortages, training needs, and current and future labour market trends, challenges and opportunities.

Nature conservation can be broadly defined as the protection, restoration, cultivation, and sustainable engagement of nature in Canada. This includes cultural, economic, and biophysical dimensions of nature within area conservation (landscapes and waterscapes), habitat and species conservation, and natural resource stewardship.

Fostering a skilled, productive, and sustainable nature conservation workforce in Canada is essential to motivate transformative actions for the betterment of nature and society.

The objective of this study is to support policy and program development, human capital management, and career planning by:

- 1 Establishing a definitional framework for the nature conservation sector and its workforce.
- 2 Assessing current and anticipated labour market needs and gaps.

Research highlights

- The nature conservation workforce is cross-sectoral and plays a key role in achieving Canada's conservation targets.
- The nature conservation sector is composed of multi-disciplinary professionals with a broad set of competencies.
- Nature conservation workers require a blend of technical and soft skills, regardless of occupation.
- Stakeholder engagement, education, and communication are emerging occupations needed to facilitate integrative approaches and strengthen workforce capacity.
- The size of the workforce is sensitive to variability in public funding and market conditions.
- Volunteers contribute significantly to nature conservation and are critical to increasing public engagement and facilitating career development.
- Attraction is high to the sector, but retention strategies are needed to stabilize and grow the workforce.
- Collaborative partnerships are needed to influence business strategies that benefit nature conservation.

This study also revealed potential **strategies and solutions** to address nature conservation workforce needs and gaps. These include:

 Develop strategies to strengthen workforce development.		
Diversify program and project portfolios to stabilize and grow the workforce.		Update recruitment and retention strategies to reflect the changing needs of the sector.
Maintain co-op models to help young professionals transition into the workforce.	Quantify labour demand and supply to inform targeted solutions for the workforce.	Map competencies to support training and employment opportunities in the sector.

Workforce planning and human capital management interventions are needed to increase employment opportunities across the nature conservation sector.

Introduction

Human-induced changes to the natural landscape have a direct impact on the collective well-being of Canadians. Nature conservation aims to provide services at the national, regional, and local level that result in positive environmental and social outcomes for the country and the global community. These services not only support biodiversity, but also yield other benefits, such as combatting climate change, creating sustainable food systems and clean drinking water, mitigating the impacts of natural disasters, and improving human health.

Over the last several centuries, economic activities have tended to disconnect people from nature and increase conflict between individuals and communities with different objectives or worldviews. This is starting to change. The role that humans play in natural ecosystems is increasingly recognized and the shift in public perspective has propelled nature conservation to become more centralized in the day-to-day lives of Canadians.

International treaties, government mandates, policy and legislation, legal obligations, and changing preferences drive the demand for nature conservation across Canada. Governments set objectives and as needed compliance requirements, and public pressure incentivizes shifts to nature-based solutions.

New approaches have been developed to advance reconciliation^{xviii} and democratize conservation^{xi} to include more people in agendas, dissolve boundaries, and build capacity and equity across governance systems. The goal is to increase inclusion and trust, establish respectful relationships, and inspire future generations.^{viii} Through this lens, Canadians are the direct beneficiaries of community-centric outcomes that are achieved through ethical practice and a shared commitment to improving conservation outcomes.

Canada has committed to protect 25 percent of its lands and oceans by 2025 and 30 percent by 2030,^v transform how government protects and recovers species at risk, and advance reconciliation with Indigenous Peoples.ⁱⁱⁱ This shift in mandate will support sustainable economic growth in Canada and have a direct and positive impact on the number of workers employed across a broad spectrum of industries and occupations. The expansion of this cross-sectoral workforce will also increase the demand for specialized workers with unique nature conservation competencies.

However, there is a large information gap when it comes to understanding Canada's nature conservation workforce. This has a direct impact on individuals who are seeking to make decisions related to their careers, public and private employers seeking to attract and retain skilled workers, and governments and educators looking to develop appropriate responses and build capacity for the sector.

Characterising Canada's nature conservation labour market is essential for establishing a world-class workforce with the skills and competencies needed to steward the country's natural resources. However, few studies have defined the sector and its workforce or identified the human capital needs for organizations that must be addressed to uphold Canada's commitment to nature conservation.

This preliminary sector profile advances labour market intelligence by identifying the cross-sectoral composition of the nature conservation workforce and illuminating the current and future labour market trends, challenges, and opportunities. The goal of this research is to benchmark the sector and inform human resource strategies that support growth and equity across the workforce.

METHODOLOGY

The primary objectives of this study were to establish a definitional framework for nature conservation and to document current and anticipated labour and skills gaps observed by employers. A total of 78 individuals representing nature conservation organizations across Canada were engaged between August 2020 and January 2021 to gather qualitative information about the sector and its workforce. Research included interviews and a survey, which helped uncover the composition of the nature conservation sector, the occupations needed to achieve conservation targets, and the human resource trends and challenges for the current nature conservation workforce (see [Appendix 1](#) for full methodology).

Defining Nature Conservation, the Sector, and its Workforce

Nature conservation can be broadly defined as the protection, restoration, cultivation,¹ and engagement of nature across Canada. This includes cultural, economic, and biophysical dimensions of nature within the following key areas.

Area conservation (landscapes and waterscapes)

Areas are designated for conservation based on defined management objectives to mitigate potential risks or threats to ecologically or culturally significant sites. These areas can be segmented into (1) protected areas, (2) Indigenous protected and conserved areas, (3) other effective area-based conservation measures, and (4) heritage conservation.

Protected Areas

The International Union for Conservation of Nature (IUCN) defines a Protected Area (PA) as “a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values”.²

Protected areas range from strict nature reserves to areas that allow for the sustainable use of natural resources. Protected areas function to conserve biodiversity, preserve natural sites, support visitation for spiritual, scientific, educational and recreational opportunities, feature geological formations and ancient groves, conserve particular species or habitats, and can allocate a proportion of ecosystems to non-industrial activities based on associated cultural values and traditional natural resource management systems.

¹ The concept reflects the interdependence of resources and people (e.g., cultivation of abundance^{X1}) and the importance of past and current experiences that influence worldviews (e.g., cultivation of nature connections^{X11}).

Indigenous Protected and Conserved Areas

The Government of Canada has adopted Indigenous Protected and Conserved Areas (IPCAs) as a 7th kind of protected area, based on the IUCN definition outlined above.^{xviii} International guidelines and The Indigenous Circle of Experts (ICE) have advocated for these areas to be Indigenous-led and support for the integration of Traditional Knowledge, governance and knowledge systems when undertaking conservation and stewardship. These areas support reconciliation efforts and have been acknowledged as an important aspect of self-determination for Indigenous Peoples.

Other Effective Area-based Conservation Measures

The Convention on Biological Diversity, with technical advice from the IUCN, defined an Other Effective Area-based Conservation Measure (OECMs) as “a geographically defined area other than a Protected Area, which is governed and managed in way that achieves positive and sustained long-term outcomes for the *in-situ* conservation of biodiversity, with associated ecosystem functions and services and, where applicable, cultural, spiritual, socio-economic, and other locally relevant values”.^{ix}

OECMs are spatially defined areas with objectives related to at least one species of regional importance or habitat that contain ecological components of interest. These areas demonstrate clear evidence of long-term conservation measures and place restrictions on human activities that are incompatible with conservation interests within the area.

OECMs include stewardship activities initiated by landowners, farmers, other land managers, and conservation organizations and the implementation of beneficial practices across major area-based sectors such as forestry, aquaculture, agriculture, mining, and energy. The inclusion of these measures allows for the reporting of broader nature conservation efforts applicable to parcels of terrestrial and marine-protected areas that are contributing to reducing and reversing biological diversity loss in Canada.

Heritage Conservation

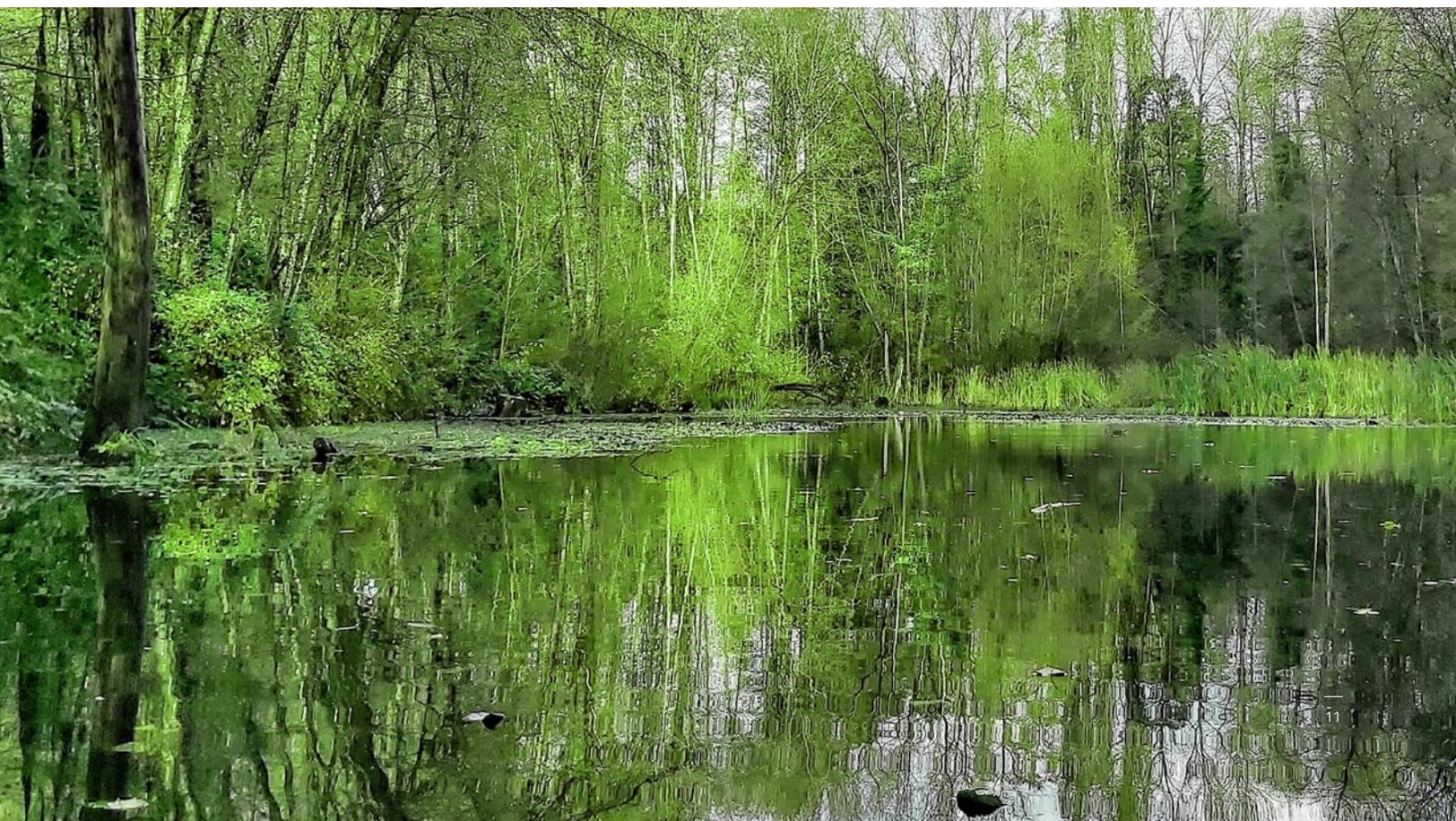
Heritage sites in Canada are defined as a “structure, building, district, landscape, archaeological site or other place that has been recognized for its heritage value”.^{vii} The cultural and historical significance of these sites supports the management and protection of nature across Canada.

Although not all heritage sites are directly related to the conservation of biological diversity, their intangible cultural and spiritual values, and related economic benefits (notably in the area of tourism) encourage their protection and tend to support the conservation of nature.

Habitat and species conservation

Habitat and species conservation seeks to maintain, conserve, and restore species and habitats that hold international, national or local importance. This approach supports conservation strategies for species and habitats that have been, or have the potential to be, significantly impacted by human presence and development.

On the ground conservation involves planning and implementing projects to address threats to native species and natural habitats caused by industrialization, urbanization, over-hunting, pollution, invasive species, and climate change.^{xvii} Areas, species, and activities are identified and prioritized to maintain and enhance biodiversity.



Natural resource stewardship

In Canada, the IUCN definitions are applied to areas, habitats and species that are directly managed to conserve biodiversity, and do not take into account the recreational value and use of nature in public spaces. The management and development of public spaces, such as municipal parks, provide opportunities for individuals to learn and interpret Canada's natural and cultural heritage, connect communities through outdoor recreation, and inspire generations to actively engage in nature. Access to these areas encourages the stewardship of natural resources, improves the quality of life for Canadians, and provides nature-derived economic benefits to communities. For the purposes of this report, activities related to the management and development of public spaces are included in the definition of the nature conservation sector if the activities contribute to biodiversity.

Canada is rich in natural resources and, consequently, the extraction of renewable and non-renewable resources is integral to the Canadian economy.^{xv} The integrated management, sustainable development, and responsible use of Canada's natural resources aims to provide long-term economic, social, and environmental benefits. Although the primary motivator of industry may not be conservation, operations are dependent on field efficiencies to maximize yields in areas such as agriculture, aquaculture, forestry, mining, and energy. These sectors can minimize the impact of activities on areas, habitat and species, while meeting global demand for natural resources.

Natural resource stewardship is maintained through area-based planning, risk-benefit analysis, environmental damages assessment, environmental management measures, engaging local stakeholders, and implementing conservation incentive and offsetting programs. These strategies require collective engagement to drive social change and effectively conserve nature, as well as diversified approaches that uphold the expansion of conservation targets nationally and globally through the identification and implementation of new models that enhance the long-term well-being of Canadians.

Governments, industry, academia, and communities conserve nature using a variety of governance structures. Nature can be effectively managed through governance by government, governance by Indigenous Peoples and local communities, shared governance, and private governance.



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Nature Conservation Organizations

Any for-profit, public, not-for-profit or charitable organization that advances or supports nature conservation directly or indirectly is considered part of the sector, regardless of whether nature conservation is its primary objective or undertaken as part of its business practice. This definition is broad and inclusive, spanning many industries in Canada and includes natural resource firms, Indigenous organizations, conservation organizations and advocacy groups, consulting firms, education and research organizations, government departments and agencies, and organizations that aim to enhance ecosystem services.

This study identified key industries that are directly or indirectly involved in nature conservation across Canada, which can be segmented and described using the [North American Industry Classification System \(NAICS\)](#).^{xiii}

Economic activities associated with nature conservation are classified as sectors and sub-sectors as described in the following table.

	<p>Professional, scientific and technical services NAICS 54</p>	<p>Establishments contribute knowledge, skills, and expertise for activities related to scientific and technical consulting services, research and development services, and public relations sub-sectors to advise on activities related to environmental issues, and conduct systematic research in social and life sciences.</p>
	<p>Administrative and support, waste management and remediation services NAICS 56</p>	<p>Establishments that provide operational support or engage in waste management activities such as remediation and other waste management services, which are responsible for contaminated sites clean-up and the operation of material recovery facilities.</p>
	<p>Educational services NAICS 61</p>	<p>Establishments that provide instruction and training including universities, colleges and cégeps, technical and trade schools, and elementary and secondary schools, and that offer formal levels of education that are often highly specialized.</p>
	<p>Other services (except Public administration) NAICS 81</p>	<p>Establishments provide support for social or political advocacy including, environment, conservation, and wildlife organizations that encourage public awareness and engagement, and giving services or granting agencies such as trusts, federated charities, and philanthropic foundations.</p>
	<p>Public administration NAICS 91</p>	<p>Establishments are governmental in nature and include protective services, fire-fighting and regulatory services, natural resources programs, fisheries support programs, parks commissions, and wildlife conservation programs.</p>

Industries that have the potential to have a greater or lesser impact on nature or are influenced by nature conservation in Canada were also identified. Economic activities related to nature conservation services are classified as sectors and sub-sectors below.

	<p>Agriculture, forestry, fishing and hunting NAICS 11</p>	<p>Establishments engage in the production of crops, animals and agriculture, forestry and logging, fishing, hunting and trapping, and support activities for agriculture and forestry sub-sectors to produce and harvest crops, timber, fish and other animals from their natural habitats.</p>
	<p>Mining, quarrying, and oil & gas extraction NAICS 21</p>	<p>Establishments engaged in oil and gas extraction, mining and quarrying, and support activities for mining, and oil and gas extraction sub-sectors that involve landscape modification for the purposes of extracting naturally occurring minerals and/or fossil fuels.</p>
	<p>Utilities NAICS 22</p>	<p>Establishments engage in operating electric, gas, and water utilities to generate, transmit, treat, and distribute power through permanent infrastructure of lines, pipes, and treatment and processing facilities.</p>
	<p>Construction NAICS 23</p>	<p>Establishments engaged in subdividing and developing land for the construction of foundations and structures, the installation of equipment and systems, and finishing structures including new work, additions, alterations, maintenance, and repairs.</p>
	<p>Health care and social assistance NAICS 62</p>	<p>Establishments engaged in providing health care, diagnosis, and treatment for medical and social reasons, and providing social assistance to those requiring such assistance.</p>
	<p>Arts, entertainment and recreation NAICS 71</p>	<p>Establishments that provide facilities and services to promote heritage institutions, and recreation and outdoor activities related to protecting nature parks, nature reserves or conservation areas.</p>



Nature Conservation Workers

ECO Canada classifies Canada’s environmental workforce as the workers that drive and support the goals of natural resource management, environmental protection, and sustainability. Individuals working in nature conservation are an integral part of Canada’s environmental workforce.

The nature conservation workforce is employed in the environmental goods and services sector (EGSS)² and in industries with management and production practices that contribute to positive nature conservation outcomes (*Figure 1*). This includes:

- A. Nature conservation goods and services workers:** those working for employers whose primary purpose is supplying nature conservation services, including those who may or may not require specialized conservation knowledge, skills or training.
- B. Core nature conservation workers:** those in occupations requiring specialized conservation knowledge, skills and training, regardless of industry.

Figure 1

The Nature Conservation Workforce Defined

The nature conservation workforce is a subset of the environmental workforce and includes:

- **Nature conservation goods and services workers, such as a bookkeeper employed by a land trust.**
- **Core nature conservation workers, such as a conservation specialist employed by a construction company.**

Core nature conservation workers can also be employed in EGSS (e.g., a conservation specialist working for a land trust), resulting in an overlap between the two classification streams.



Note—the environmental workforce includes:

- *Direct employees of firms classified under the environmental goods and service sector, regardless of occupation and whether roles require environmental-specific competencies.*
- *Any worker, regardless of industry, requiring environmental-specific competencies or training as defined within ECO Canada’s competency standards and sector framework.*

² EGSS comprises all producers that measure, prevent, limit, minimize or correct problems related to ecosystems and the management of natural resources.^{xii}

Canada's environmental workforce is spread throughout industries and occupations. Because of this, it is not possible to directly identify environmental workers using the **National Occupational Classification (NOC) system**.^{iv} To solution this unique challenge, ECO Canada maps the environmental workforce to occupational groupings (NOCs) at the 4-digit level. A total of 458 of 500 NOCs have been matched to environmental workers.

Nature conservation workers can be identified using a similar approach and the established definition of nature conservation in Canada. This study uncovered 66 out of the 458 NOCs to be a part of the nature conservation workforce (see *Appendix 3 for complete descriptions*). These broad categories include occupations that are specific to nature conservation and only a portion of each of the NOCs listed below should be attributed to the sector.

The Nature Conservation Workforce
Management occupations
Legislators (NOC 0011)
Senior government managers and officials (NOC 0012)
Senior managers – financial, communications and other business services (NOC 0013)
Senior managers – health, education, social and community services and membership organizations (NOC 0014)
Banking, credit and other investment managers (NOC 0122)
Advertising, marketing and public relations managers (NOC 0124)
Other business services managers (NOC 0125)
Engineering managers (NOC 0211)
Architecture and science managers (NOC 0212)
Government managers – economic analysis policy development and program administration (NOC 0412)
Government managers – education policy development and program administration (NOC 0413)
Other managers in public administration (NOC 0414)
Administrators – post-secondary education and vocational training (NOC 0421)
Managers in social, community and correctional services (NOC 0423)
Managers in agriculture (NOC 0821)
Managers in aquaculture (NOC 0823)
Business, finance and administration occupations
Financial auditors and accountants (NOC 1111)
Professional occupations in business management consulting (NOC 1122)
Professional occupations in advertising, marketing and public relations (NOC 1123)

The Nature Conservation Workforce
Administrative officers (NOC 1221)
Purchasing agents and officers (NOC 1225)
Accounting technicians and bookkeepers (NOC 1311)
Assessors, valuers and appraisers (NOC 1314)
Natural and applied sciences and related occupations
Geoscientists and oceanographers (NOC 2113)
Other professional occupations in physical sciences (NOC 2115)
Biologists and related scientists (NOC 2121)
Forestry professionals (NOC 2122)
Agriculture representatives, consultants and specialists (NOC 2123)
Engineers (NOC 2131-2148)
Urban and land use planners (NOC 2153)
Land surveyors (NOC 2154)
Information systems analysts and consultants (NOC 2171)
Database analysts and data administrators (NOC 2172)
Chemical technologists and technicians (NOC 2211)
Biological technologists and technicians (NOC 2221)
Forestry technologists and technicians (NOC 2223)
Conservation and fishery officers (NOC 2224)
Civil engineering technologists and technicians (NOC 2231)
Land survey technologists and technicians (NOC 2254)
Technical occupations in geomatics and meteorology (NOC 2255)
Engineering inspectors and regulatory officers (NOC 2262)
Inspectors in public and environmental health and occupational health and safety (NOC 2263)
Education, law and social, community and government services
University professors and lecturers (NOC 4011)
Post-secondary teaching and research assistants (NOC 4012)
College and other vocational instructors (NOC 4021)
Secondary school teachers (NOC 4031)

The Nature Conservation Workforce
Lawyers and Quebec notaries (NOC 4112)
Natural and applied science policy researchers, consultants and program officers (NOC 4161)
Business development officers and marketing researchers and consultants (NOC 4163)
Social policy researchers, consultants and program officers (NOC 4164)
Health policy researchers, consultants and program officers (NOC 4165)
Other professional occupations in social science, n.e.c. (NOC 4169)
Social and community service workers (NOC 4212)
By-law enforcement and other regulatory officers, n.e.c. (NOC 4423)
Art, culture, recreation and sport
Producers, directors, choreographers and related occupations (NOC 5131)
Authors and writers (NOC 5121)
Technical occupations related to museums and art galleries (NOC 5212)
Photographers (NOC 5221)
Trades helpers, construction labourers and related occupations
Contractors and supervisors, heavy equipment operator crews (NOC 7302)
Construction trades helpers and labourers (NOC 7611)
Other trades helpers and labourers (NOC 7612)
Public works and maintenance labourers (NOC 7621)
Natural resources, agriculture and related production occupations
Silviculture and forestry workers (NOC 8422)
Landscaping and grounds maintenance labourers (NOC 8612)
Aquaculture and marine harvest labourers (NOC 8613)
Logging and forestry labourers (NOC 8616)

A larger study is needed to identify the occupations corresponding to core nature conservation workers. However, the nature conservation workforce is cross-sectoral and collectively multi-skilled and multi-disciplinary, requiring a broad set of knowledge, skills, and attributes to realize conservation outcomes.

The nature conservation workforce is also specialized and combines science and policy with human dimensions to influence landscape and waterscape changes directly and indirectly. Through partnership and collaboration, scientists and knowledge holders are able to provide technical advice to ensure that conservation measures are effective and bring together perspectives to shape recommendations for projects that have a positive impact on surrounding communities.

In-scope occupations can be further grouped into occupational clusters based on specialized functional areas. This organizational structure includes:

1. Strategy, oversight, and decision-making
2. Operations and evaluation
3. Business and administration

Strategy, oversight, and decision-making

Across organizations, strategy, oversight, and decision-making occupations function to plan, govern, and advocate for nature conservation in Canada. Decision-makers and knowledge holders achieve this through leadership, research, and stakeholder engagement. These occupations require people who advise and deliver information to inform and influence the implementation of policy and programming, identifying best practices for the sector to facilitate alignment with national and international standards, and facilitate collaboration across cultures to bring together different worldviews and achieve better conservation outcomes.

Governance & leadership	Natural, social & applied science research	Policy and program development	Partnership development & stakeholder relations	Advocacy
<p>Those who provide direction, establish policy, govern relationships, and establish and oversee organizations.</p> <ul style="list-style-type: none"> • Board member • Indigenous leader • Minister • President/CEO • Vice-president • Deputy minister • Assistant deputy minister • Chief information officer 	<p>Those who explore new ideas and conduct studies to inform policy development and decision making.</p> <ul style="list-style-type: none"> • Scientist/specialist • Planner • Recovery strategist • Economist • Modelling expert • Engineer • Historian • Sociologist 	<p>Those who design and propose strategies to guide programs and initiatives.</p> <ul style="list-style-type: none"> • Program director • Policy manager • Policy analyst/advisor • Project consultant • Land use planner 	<p>Those who bring multiple stakeholders together to identify shared issues and formulate solutions.</p> <ul style="list-style-type: none"> • Director general • Executive director • Outreach director • Stakeholder affairs manager • Business development manager • Indigenous liaison • Industry liaison • Relationships manager 	<p>Those who lobby for solutions to conservation challenges.</p> <ul style="list-style-type: none"> • Advocacy officer • Social, community, environmental professional • Lawyer/ notary • Government relations specialist

Operations and evaluation

The workforce is largely made up of operations and evaluation occupations that function to assess lands, waters, biodiversity, and natural resources on a global to provincial and local scale, and to implement and assess programs and projects so that they can achieve conservation outcomes. Technical specialists transfer scientific knowledge to inform operations, engage with communities to build capacity, facilitate meaningful contributions to projects, and promote reciprocity and gratitude to nature. These occupations require skilled workers to navigate the complexity of ecosystems and implement actions for the betterment of nature and society.

Operational policy and legislation	Compliance and enforcement	Natural, social and applied science operations	Education and training	Ancillary
<p>Those who draft, put in place and evaluate the laws, regulations, programs, procedures and plans needed to implement approved strategies.</p> <ul style="list-style-type: none"> • Drafter • Evaluator • Appeals officer • Program analyst • Legal officer • Legislative coordinator • Regulatory analyst • Lawyer • Paralegal 	<p>Those who ensure compliance with implemented strategies.</p> <ul style="list-style-type: none"> • Enforcement officer • Compliance supervisor • Auditor • Assessment specialist • Park warden • Regulatory specialist • Regulatory scientist • Conservation officer 	<p>Those who undertake and manage day-to-day activities.</p> <ul style="list-style-type: none"> • Program manager/administrator • Species assessor • Environmental monitor • Operations Manager • Extension agent • Habitat manager • GIS specialist • Data scientist • Forester • Fire ecologist • Restoration specialist • Environmental technologist • Engineer • Taxonomist • Surveyor • Population biologist • Natural resource manager • Wildlife specialist 	<p>Those who provide skills and knowledge to the sector.</p> <ul style="list-style-type: none"> • Educator in: conservation science, policy, engineering, forestry, sustainable food systems, agriculture, business or environment • Community learning coordinator • Teacher • Education coordinator 	<p>Those who provide essential support to programs and initiatives.</p> <ul style="list-style-type: none"> • Labourer • Field worker • Field assistant • Administrative assistant

Business and administration

Business and administration occupations are not required to have sector-specific skills, but they perform integral roles for nature conservation organizations. They promote organizational values and achievements to the public, generate financial support for day-to-day operations, and ensure the ongoing viability of the organization.

Public awareness, communications and engagement	Funder and donor development	Finance, business and administrative services
<p>Those who communicate information to organizations and communities and oversee volunteer activities.</p> <ul style="list-style-type: none"> • Communications specialist • Communications assistant • Community engagement officer • Media specialist • Information manager • Volunteer services manager • Volunteer administrator • Translator • Interpreter • Videographer • Outreach coordinator • Stakeholder engagement specialist • Visitation coordinator 	<p>Those who build public, philanthropic, and private sector partnerships.</p> <ul style="list-style-type: none"> • Grant researcher and proposal writer • Fundraiser • Membership coordinator • Fund development advisor 	<p>Those who manage assets and accounts for the organizations.</p> <ul style="list-style-type: none"> • HR director • Trust company manager • Accountant • Personnel manager • Payroll • Asset manager • Administrator • Property assessor • Bookkeeper • Finance technician

Additional occupational clusters could include those working for **construction, health, and recreation** industries as well as those who are employed by **mining, forestry, agricultural, energy, and waste management** firms to identify and address nature conservation issues. Conserving nature increasingly requires all industries to develop strategies and actively shift business practices to maintain and enhance ecosystem services and thereby sustain economic growth and realize better conservation outcomes.

The Impact of COVID-19

The pandemic has had some positive impacts on the nature conservation sector. The availability of green spaces has helped people cope with the unprecedented consequences of an economic shutdown and supported mental and social resiliency across communities.

Canadians have sought out local alternatives to travel and new avenues for recreational activities, which has shifted behaviours towards reconnecting with nature. This cultural change has highlighted the need for spaces to support wellness and opened new avenues for blended engagement models.



Nature conservation organizations have identified that remote working will become integrated into day-to-day operations. Employers have experienced increased workforce attraction and retention, while employees have benefited from flexible work settings. This will need to be monitored over time to determine whether these workforce trends will be sustained.

At the same time, stakeholders have identified novel challenges in achieving organizational mandates. Partnership engagement activities such as donor development, community bridging, and work-integrated learning have been reduced or suspended to support the health and safety of employees and stakeholders. Transitions to technology have been adopted as an interim solution but have been observed to be less effective in advancing relationships and encouraging investment in nature conservation.

Furthermore, many stakeholders have expressed that the growth trend of the nature conservation workforce may plateau as a result of economic deficits that are being experienced across many industries, and also due to the rise in financial competition with social wellness programs and social services. This has the potential to impact future government investment in nature conservation as the Canadian economy recovers from the long-term effects of COVID-19.



Addressing Occupational Gaps and Upskilling the Workforce

Nature conservation organizations adapt and tailor their workforce with competencies and skills to meet sector needs. Today's nature conservation workforce should understand policy, have professional scientific literacy including technical knowledge and applied skills, as well as be able to communicate in a multi-functional and multi-disciplinary field to effectively recognize, integrate, and manage all dimensions of nature conservation.

The nature conservation workforce requires a blend of education and experience to operate effectively. This systems approach combines all four competency categories (*see table below*) to inform decision making and advocate and deliver nature conservation outcomes that benefit all Canadians.

To effectively provide nature conservation services, workers possess one or more of the following competencies:

<p>Core technical competencies to perform specialized functions (e.g., sustainable natural resource management, conservation science and social science research, policy, education, and communication).</p>	<p>Cultural competencies to acknowledge and take into account different experiences and perspectives (e.g., social intelligence, knowledge systems, cultural awareness, ethical space³).</p>	<p>Transdisciplinary competencies to bridge industries and perspectives (e.g., partnership engagement, stakeholder relations, collaborative decision making).</p>	<p>Business and administration competencies to sustain and enhance conservation activities (e.g., partnership development, project management, IT, finance).</p>
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³ Ethical space is the coming together of disparate worldviews through mutually beneficial engagement. This includes framework development to uphold the fundamental values of all knowledge systems and enable relational accountability for respectful interaction across cultures and communities.^{viii}

Personal and interpersonal skills have been identified to be essential across all occupations and industries. In this study, project management was the most identified skills need for the workforce. Individuals are expected to create work plans, track spending, work with others, and orient processes in an organized manner. Strong communication was identified to be another important skill; this includes: technical writing skills and conflict resolution skills to facilitate engagement. Curiosity, creativity, adaptability, critical thinking, and the willingness to take on new challenges are also important skills to support organizational mandates.



National organizations require fluency in both English and French, which presents a major challenge across the workforce. Employers identified that it is a struggle to find bilingual staff and this knowledge gap often results in a number of qualified candidates being filtered out during the recruitment process. It also restricts the upward mobility of some nature conservation professionals into leadership positions. However, the inclusion of language skills is essential not only to meet national standards, but it also facilitates the bridging of cultural divides to increase engagement with communities and help understand the nuances of diversity.

Government mandates, economic investment, and project requirements have a direct impact on the types of occupations and skills needed for the nature conservation sector, which can be classified as follows:

- **Critical** – are available and are especially important
- **Growing** – are increasingly needed
- **Emerging** – are expected to become more mainstream

<p>CRITICAL SKILLS identified throughout this study were associated with occupations requiring core scientific knowledge and specialized training. This includes:</p> <ul style="list-style-type: none"> • Engineers with conservation knowledge to design, manage, and execute restoration projects. • Professionals with legal or regulatory knowledge of conservation to interpret policy and legislation at the regional level. • GIS specialists with enhanced awareness of boundaries and governance of conserved areas to facilitate data gathering, analysis, and sharing. 	<ul style="list-style-type: none"> • Biologists • Conservation biologists • Data analysts and database managers • Ecologists • Environmental technicians • GIS, LIDAR and GPS specialists • Indigenous land managers • Law, Engineering and Finance professionals • Spatial and innovation planners
<p>GROWING SKILLS were attributed to occupations requiring scientific application. This includes:</p> <ul style="list-style-type: none"> • Monitors and assessors that conduct research, often in a field setting. • Analysts that can recognize patterns, interpret information, and synthesize findings. • Generalists that understand the role of science in policy development and can provide evaluative evidence to government. 	<ul style="list-style-type: none"> • Aboriginal liaisons • Aquatic and fisheries technicians and biologists • Climate specialists and resilience planners • Endangers species biologists • Enforcement occupations • Fire technicians • Hydrologists and geographers • Information technicians • Science and policy analysts • Wildlife technicians
<p>EMERGING SKILLS recognize occupations that require specialized knowledge to establish partnerships with Indigenous communities, landowners, industry representatives, and funders as well as build capacity for the sector. This includes:</p> <ul style="list-style-type: none"> • Partnership development specialists with localized knowledge to establish stakeholder relations, facilitate cross-collaboration, incentivize investment (including financial), and build credibility for the sector. • Educators with science expertise to train nature conservation professionals and provide bridging programs that create space for learning and career planning. • Communications specialists that engage the public in nature and increase awareness of conservation. 	<ul style="list-style-type: none"> • Communications and web design specialists • Context and culture specialists • Data scientists and modellers • Environmental educators • Indigenous guardians • Partnership development specialists • Restoration specialists and technicians • Youth engagement strategists

The sector has evolved from traditional applied science occupations to include a broad array of soft and technical skills that facilitate a socio-economic approach to nature conservation. Through collaboration, the workforce can share knowledge to bridge the science and social aspects of nature conservation to encourage and support changes at the community level.

Nature conservation is driven by a workforce of passionate and engaged individuals who are motivated to make a difference in their communities. A combination of competencies and levels of expertise support the mission of nature conservation organizations. Further, the roles and responsibilities of workers are fluid, in order to support responsive integrated approaches, regardless of occupation. Workers serve a primary function but also adjust their activities depending on program or project needs.



Attracting a Passionate Workforce

Nature conservation organizations attract strong interest from jobseekers with a broad range of skills. Applicants and employees are passionate about nature conservation and committed to working in organizations that align with their personal vocation of making meaningful impacts in the communities they serve. The nature conservation sector has established a culture that nurtures dedicated staff and upholds the value systems of their employees.

This study found that job vacancies are advertised on organization websites, job posting sites and social media, but employers also use word of mouth referrals and hire internally. In cases when positions are difficult to fill, organizations may also use recruitment agencies and executive search firms to find qualified candidates. Employers also help to develop the workforce by offering co-op placements and internships that provide young professionals with opportunities to gain applied experience as they transition into nature conservation careers.

For entry level positions, employers hire graduates from post-secondary institutions. Higher positions that require experience are likely to attract talent from within the sector and leadership positions are typically promoted internally or talent is drawn from outside of the sector.

Nature conservation employers focus on maintaining a productive and happy workforce. They make a concerted effort during recruitment to find candidates who believe in the mission of the organization as well as provide incentives to increase workforce retention. This includes employee benefits programs, flexible work hours, paid vacations, holiday incentives, professional development credits, and in-house upskilling and training opportunities.



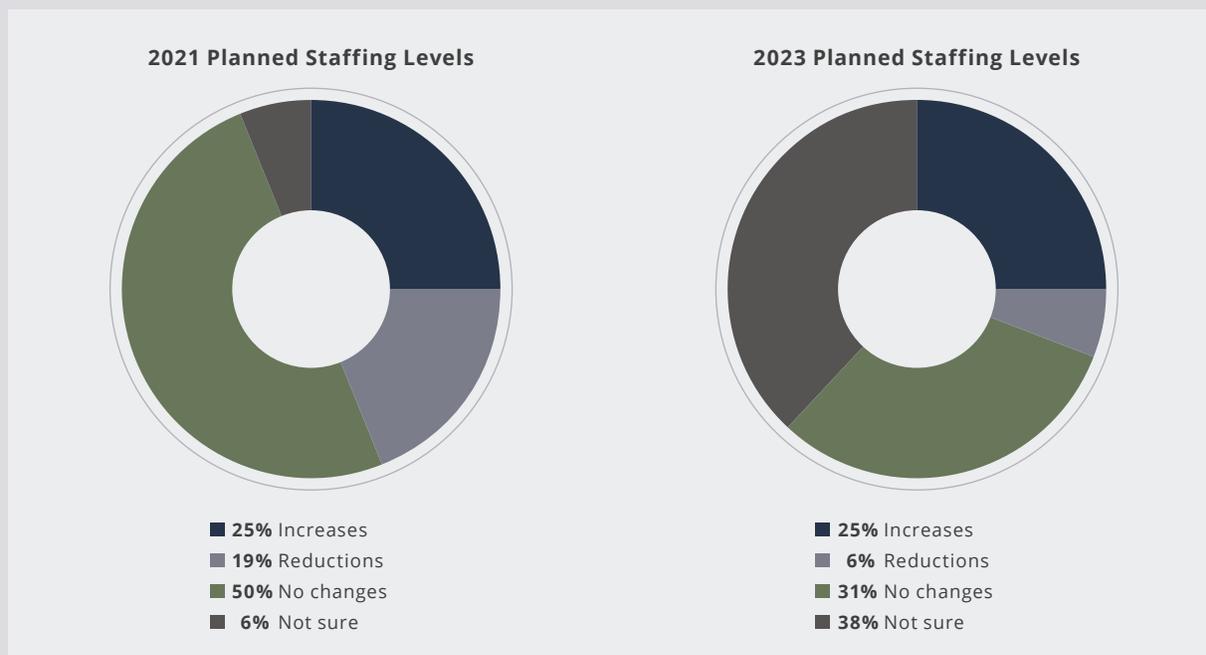
SPOTLIGHT: Employer Survey

A total of 38 organizations participated in a survey that explored the human resource challenges and trends for the nature conservation workforce. Respondents included private (n=5), public (n=14) and not-for-profit sectors (n=19), representing micro (n=4), small (n=19), medium (n=3), and large (n=10) organizations from the following industries:

- Agriculture, forestry, fishing and hunting
- Professional, scientific and technical services
- Education services
- Other services (except Public administration)
- Public administration

Organizations contribute to area conservation, habitat and species conservation, and natural resource stewardship across Canada. They operate nationally and provincially in rural and urban areas and in Indigenous communities.

Survey participants were asked about their planned staffing levels over the next three years. Three quarters of the respondents indicated their staffing levels would either remain stable or increase in 2021, while a quarter would decrease levels or were not sure. Staffing uncertainties are more prominent in the medium-term, with nearly 44% of employers expressing they were uncertain or will reduce levels by 2023.





SPOTLIGHT: Employer Survey Continued

The top reason for reducing staffing levels was:

- Funding/revenue streams

Reasons for Reductions	Staffing Level	
	2021	2023
Funding/revenue streams	38.5%	50.0%
Attrition with no replacement	15.4%	---
Regulatory requirements	15.4%	25.0%
Change in business strategy	15.4%	---
Seasonality	7.7%	---

The top reasons for increasing staffing levels were:

- Funding/revenue streams
- Growth
- Changes in business strategy

Reasons for Increases	Staffing Level	
	2021	2023
Funding/revenue streams	27.2%	28.6%
Growth	27.2%	35.7%
Change in business strategy	18.2%	7.1%
New skills requirements	9.1%	14.3%
Replacements for attrition	9.1%	7.1%

Recruitment and retention of staff is difficult for many organizations in the long-term as many employment opportunities are tied to project-based funding, which results in a large number of contract positions across the nature conservation workforce. Unstable revenue streams reduce the capacity of organizations to plan and recruit skilled workers as well as generate projects to sustain staffing levels.



SPOTLIGHT: Employer Survey Continued

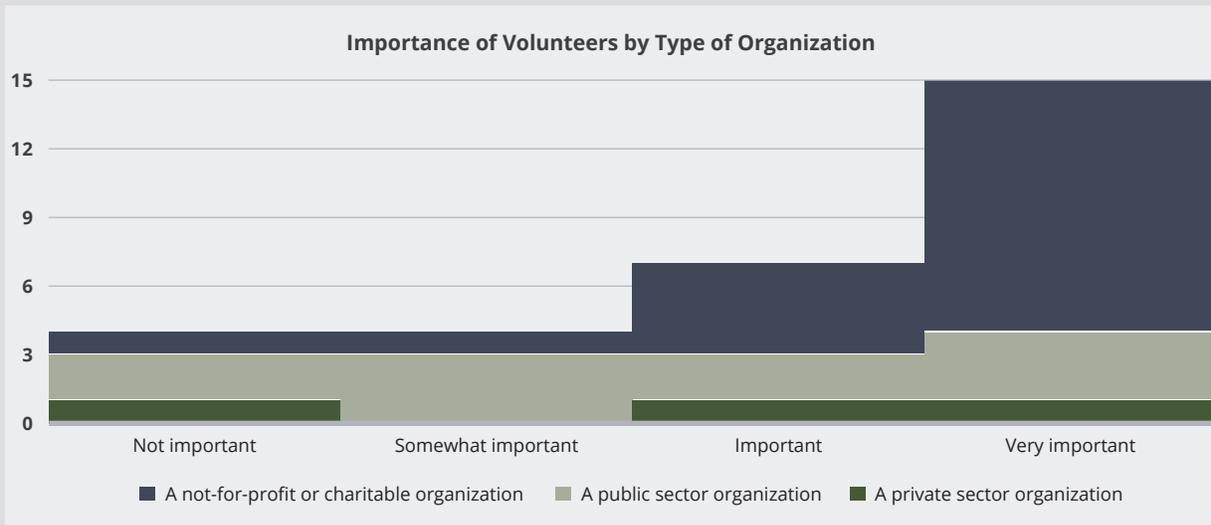
As a result, retention may be driven by nature conservation professionals who seek new opportunities across the sector as full-time positions become available. This presents an additional challenge for organizations to create succession planning strategies and staff development opportunities.

Critical role of volunteers

Across the sector, volunteers⁴ actively donate their time to serve on committees and boards of organizations, as well as contribute to citizen science programs, urban and natural habitat restoration projects, education and outreach activities, and community clean-ups. This finding complements findings from the 2012 Canadian Nature Survey, which identified that 6% of Canadians regularly volunteer for nature conservation activities.^{vi}

Survey respondents indicated that volunteers are important to the nature conservation sector (*see figures just below*). Through in-kind contributions, organizations are able to increase capacity to fulfill mandates, build partnerships across industries to create well-rounded programs, and leverage financial resources to increase the number of employees. Volunteerism also motivates youth to choose conservation careers and provides applied experience to individuals seeking opportunities to join the workforce, while simultaneously engaging the public in nature.

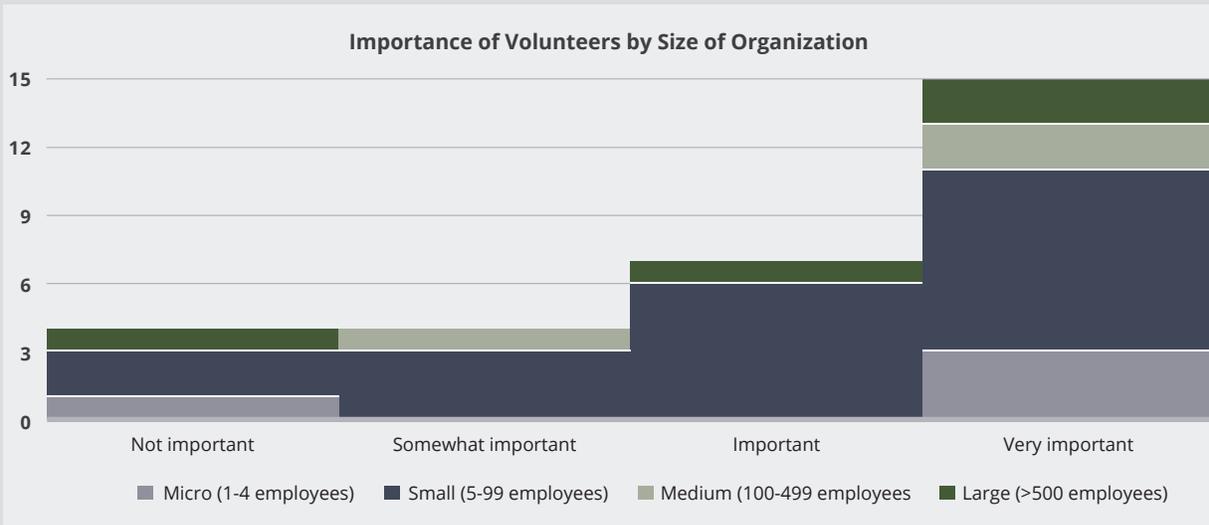
Frequency of respondents who reported that volunteers are essential to operations:



⁴ Volunteers are defined as persons who performed activities without pay or provided unpaid help to a group or organization.^{xiv}



SPOTLIGHT: Employer Survey Continued



Special case of not-for-profits

The total number of volunteers that support the nature conservation workforce may be a reflection of the number of not-for-profit organizations that operate within the sector. Of the organizations surveyed, not-for-profit organizations had the largest proportion of volunteers relative to total environmental employees (0.70), when compared to public organizations (0.36) and private organizations (0.29).

Type of Organization	Workforce		
	Employee Headcount	Environmental Worker Headcount	Number of Volunteers
Total	83,705	13,322	7,431
Public sector	49,958	4,177	1,543
Private sector	25,452	1,280	375
Not-for-profit or charity	8,295	7,865	5,513

Not-for-profit organizations require volunteers to serve on boards to establish and monitor their long-term direction. Further, volunteers also provide operational support by conducting research, writing grant proposals and publications, delivering sessions at conferences, organizing community fundraising events, and managing financial data, to name a few activities. In unique cases, some not-for-profit organizations have been identified to be entirely volunteer run.¹¹

Understanding Human Resource Challenges

Human resources play a key role in recruitment and retention strategies, from understanding what is needed to conserve nature to ensuring that the right competencies are identified for nature conservation occupations. However, maintaining organizational capacity is a consistent challenge that often takes precedence over formulating and implementing strategies aimed at growing the nature conservation workforce.

Competing priorities and perspectives

Nature conservation organizations typically receive a large number of applications for each job vacancy, suggesting that workforce attraction is high. Despite the large applicant pool, however, strong competition for financial resources (e.g., government funding, public donations, for-profit investment) between nature conservation organizations and other industries has constrained recruitment and retention across the sector.

Nature conservation organizations adapt to insecure revenue streams by maintaining a lean workforce and prioritizing program and project fulfillment. The limited number of available full-time positions results in fewer opportunities for nature conservation workers and a greater reliance on contracts employment, potentially discouraging youth seeking a career in the nature conservation sector and hindering the career progression of conservation professionals.

Over the last decade, competition for nature conservation workers has increased both within and outside of the sector. Occupational overlap across industries creates market competition for highly skilled workers, and small organizations, such as many not-for-profits, are unable to offer compensation packages that can compete with what is offered by their public and private sector counterparts.

Consequently, some organizations experience high employee turnover and struggle to develop a favourable workplace culture. These organizations have been perceived by emerging professionals as training grounds to develop experience before moving on to work as public servants in governments or leaving the sector to pursue other vocations.

Diversifying the workforce in more ways than one

Nature conservation organizations have adopted diversity, equity, and inclusion policies to expand representation within the workplace and have implemented company-wide training to bring awareness to cultural and gender pluralism and increase exposure to different ways of knowing and learning. In spite of these efforts, many organizations struggle to attract candidates from diverse backgrounds.

A number of compounding factors have been identified as contributing to the unequal representation observed across the sector:

- Socio-economic disparity that persists in Canada.
- Historical hiring and training practices.
- A tendency for the sector to be isolated from the rest of the economy.

Organizations in the nature conservation sector aspire to invest in and enrich socio-economic prospects for communities. Strategies include increasing access to nature, exposing youth to conservation career pathways, and creating employment opportunities in local areas. This approach aims to inspire future generations to pursue non-traditional lines of work, while building capacity across underrepresented communities.

The nature conservation sector faces a series of systemic challenges stemming from historic training and hiring practices. HR procedures are evolving to reduce barriers to joining the workforce by restructuring recruitment policies. This includes, recognizing the value of transferable skills, redefining success and performance indicators, and hiring from within communities when capacity exists.

Incentivizing broader industry participation within the conservation sector can help foster the development of beneficial management practices, bring together different perspectives to strengthen nature conservation outcomes, and increase employment opportunities for nature conservation professionals in Canada. Conservation organizations can provide science to inform industry decision-making and industries can offset the adverse impacts of development projects by maintaining conservation set-asides, supporting other conservation initiatives such as restoration, and promoting nature conservation.



Changes in training and hiring practices and the development of integrative partnerships provide opportunities to learn from one another and facilitate the development of innovative solutions to disrupt the status quo and increase social and cultural diversity while contributing to biological diversity and sustainable economic growth across industries.

Strategic Considerations for Nature Conservation

Economic arguments and approaches could play an important role in the management of natural capital and the conservation of nature in Canada. Significant investments have been made by the federal government to incentivize conservation efforts that conserve, restore, and improve nature.

The emergence of IPCAs will facilitate a conservation economy and sustainable employment potential for local and regional residents and support cultural and spiritual traditions.^{viii} The expansion of OECMs will also facilitate long-term sustainable employment in regions across the country. Stewardship-based conservation activities facilitate job creation, carbon capture and storage and the provision of ecological goods and services, as well as generate significantly positive economic outcomes through effective long-term management.

There is strong evidence that conserving nature sustains ecosystem services, which results in economic benefits across Canada. However, the value of nature remains underestimated and is not fully recognized through conventional market economics. Without fuller accounting of the value of nature, the United Nations has projected that, by 2050, the loss of ecosystem services will cost over \$14T annually, or 7% of global GDP.^{xv}

Data reporting on employment rates and revenue for the nature conservation workforce in Canada would highlight the contribution that nature conservation, including the stewardship of natural resources, makes to the economy. This would help to incentivize investments in nature.

Investment in natural capital will grow the nature conservation economy^{xv} in Canada and increase the size of the conservation workforce. Increased conservation activities through the expansion of partnerships and public engagement, and the integration of nature considerations into business planning, decision-making and operations will broaden knowledge and skills requirements for employment and increase the demand for nature conservation workers.

Recommendations

1. Seek more sustained funding and partnerships to stabilize and grow the workforce.

Balance is key to addressing the public interest, attracting funding, and developing environmental strategies, which collectively impact the availability of jobs in nature conservation (labour market demand) and the number of individuals wanting to join and remain in this values-driven workforce (labour market supply).

Without continual financial support, initiatives often disappear, reducing the demand for nature conservation professionals across Canada. Loosening grant restrictions could increase the ability of organizations that receive project-based funding to deliver on mandates, strengthen centralized support, and sustain long-term functional capacity. Further, collaborating with industry will build credibility for the nature conservation sector and facilitate the development of mutually beneficial partnerships where resources can be combined to achieve shared outcomes.

2. Update recruitment and retention strategies to reflect the diversity of Canadian society and the changing needs of the sector.

A more diverse workforce is likely to attract diverse applicants. Adequate training is required to create welcoming and safe environments for staff from different backgrounds and recognize social injustices that have disconnected Canadians from meaningful engagement with nature. Nature conservation organizations can develop strategies to effectively value different knowledge systems, experiences, and perspectives, as well as integrate social practices that support a multilingual and multicultural workplace that reflects the true diversity of Canada.

Flexible HR practices and modernized recruitment campaigns could attract a broader pool of candidates. Further, shifting away from hiring professionals that organizations know to engaging broader audiences could facilitate more inclusion and equity across the nature conservation workforce. Lastly, recognizing a blend of soft and technical skills across specializations would help bridge disciplines and introduce business-like practices.

3. Maintain co-op models to help young professionals transition into the workforce.

Experiential learning opportunities and bridging programs help emerging professionals develop faster through real world experience and gain skills that may not have been learned through formalized education. Students are often well-trained in core sciences or social sciences but not as well versed in relationship building and business skills. Co-op and internship programs provide formal training and mentorship and increase full-time employment prospects after graduation.

4. Work for and with natural resource firms to strengthen workforce development.

Governments and industry should have a 360° understanding of nature conservation and the communication needs for the nature conservation sector to evolve from a narrow focus on the consequences of particular development projects to an approach centred on the broad societal benefits of nature for Canadians.

Some provincial governments are moving away from employing individuals in research and policy development, which has created space for not-for-profit and private sector organizations to expand the breadth and scope of their activities to include the more strategic and policy-oriented aspects of nature conservation.

The private sector plays a big role in contributing to nature conservation outcomes and are heavy investors in science. Attracting private investment into conservation can encourage innovations that provide benefits to investors and society. Further, fostering collaborative partnerships will reduce competition for highly skilled workers and encourage nature conservation professionals to work in industry, while contributing to positive conservation outcomes.



5. Assess and communicate the economic and inherent value of nature to advance investment across the sector.

Regardless of region, age or political affiliation, the majority of Canadians support protecting and conserving natural spaces. The level of support across Canada as a whole is 86%.¹ Creating opportunities for Canadians to engage with nature will reinforce this support and increase the demand for nature conservation workers.

Having a personal commitment and connection to nature is the key motivating factor to becoming a nature conservation professional and being able to pursue these interests through professional investment is what influences nature conservation careers.

Recognizing both the social and economic benefits that nature provides is essential to growing the nature conservation sector. The nature conservation workforce requires young, innovative, and multi-disciplinary professionals who can inspire future generations to engage in nature and sway public opinion to shift consumer and business practices organically. Healthy functioning ecosystems are important because of the many services that they provide, and cross-sectoral collaboration will not only support biodiversity and area conservation, but also contribute to sustainable economic development.

6. Quantify labour demand and supply to inform targeted solutions for the workforce.

This qualitative study established a foundation to estimate the size of the nature conservation workforce across industries and occupations. Quantifying employment will be key to identifying regional supply gaps, understanding the distribution of nature conservation workers across the sector, and creating targeted solutions to support and grow the workforce.

7. Map competencies to support training and employment opportunities in the sector.

The nature conservation workforce is multi-skilled and multi-disciplinary. Developing competency statements to describe the knowledge and skills needed for nature conservation professionals will help address gaps in education and training across occupations and industries. This approach may also inform job-specific upskilling and credentialing programs to help workers in declining industries to transition into nature conservation careers.

Dissolving nature conservation barriers

The cross-sectoral workforce faces obstacles when it comes to meeting Canada's nature conservation commitments. The main source of conflict is the perceived misalignment between environmental and social values on the one hand and profitability on the other. This attitude catalyzes industry stigmatization, polarizes public opinion, and ultimately reduces the effectiveness of nature conservation initiatives.

There is a perception that natural resource industries are unable to co-exist with nature conservation. This is motivated by political interest groups supporting economic development for the communities they serve, is reinforced by natural resource extraction organizations that uphold traditional business practices, and is reaffirmed by nature conservation organizations that lobby against them. These perspectives impede transformative decision-making that aims to encourage nature conservation and economic development. There is a need to reimagine economic prosperity in a way that includes the conservation of nature. The nature conservation sector should leverage industry knowledge to find solutions and transform old paradigms.

Further, approaches need to be reframed to emphasize the importance of social, economic, and health benefits that are due to nature conservation. It needs to be communicated more clearly that long-term well-being depends on the state of nature, and that landscapes can be worked sustainably. People can reconnect to nature by recognizing that they have a custodial influence on nature. Operating at a localized management scale and decentralizing resource governance can increase accessibility to nature and encourage Canadians to identify and realize the co-benefits of conservation for production, biodiversity, and society.

Innovative approaches are needed to integrate the social and biophysical dimensions of effective nature conservation. This requires business strategies that foster nature-based solutions from peatlands to pipelines, and long-term partnerships that promote cross-sectoral investment and collaboration. Such initiatives would also facilitate employment opportunities to grow the nature conservation workforce and inspire workers to influence best practices at an organizational level that promotes the conservation of Canada's nature across all industries and regions.



Future Research

This preliminary sector profile describes the composition of the nature conservation sector and its workforce, but is limited in scope. Additional areas to explore include:

- identifying the organizations operating in the sector
- quantifying the workforce (labour supply and demand)
- describing employment opportunities and career pathways
- supporting worker transition into nature conservation careers (workforce transferability)
- conducting a workforce demographic study (including diversity)
- sustaining equitable pay across the sector (compensation study)
- estimating the economic importance of conservation

More in-depth studies are needed to understand the complexity of the nature conservation workforce. Future research will support workforce planning and human capital management, as well as targeted solutions to address workforce needs and gaps.

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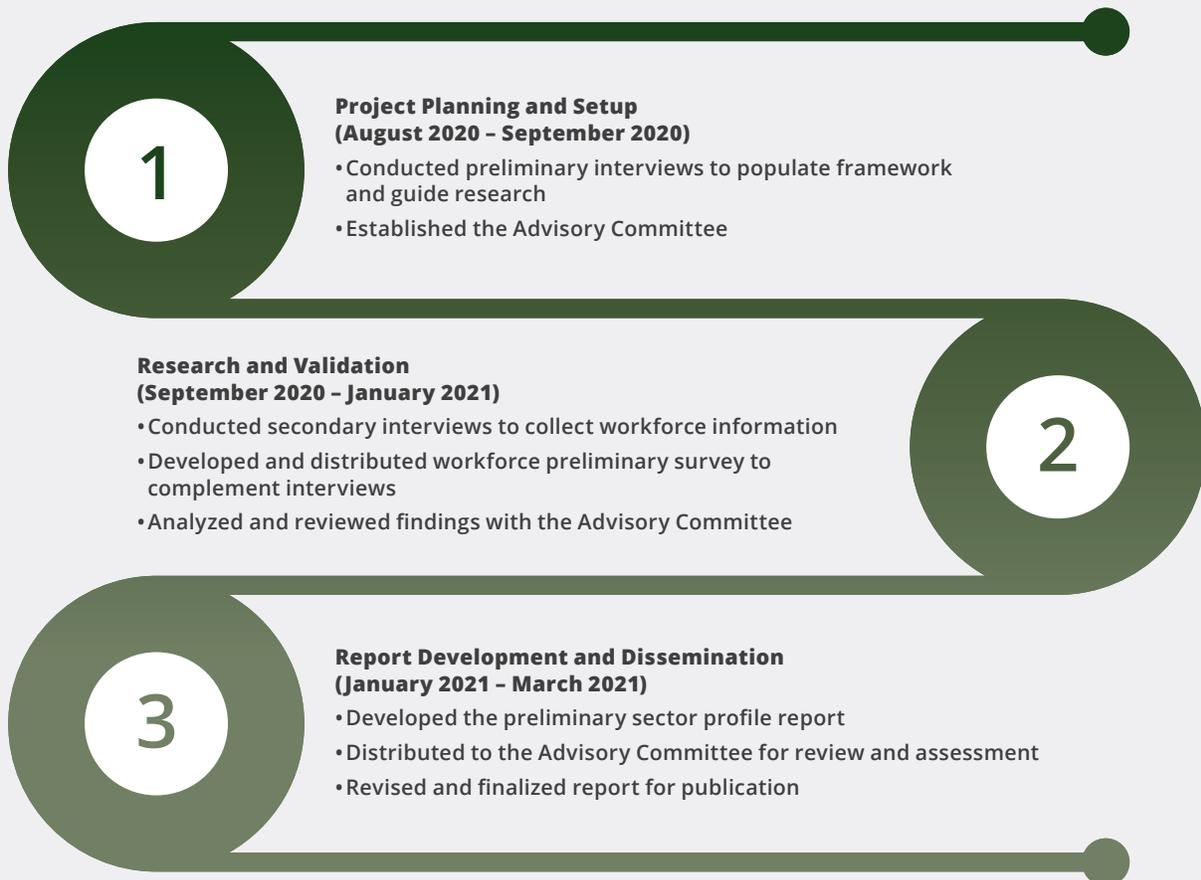
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Appendix 1: Methodology

Research was conducted from August 2020 to January 2021 to gather qualitative information about the nature conservation sector and its workforce to support the development of the preliminary sector profile. The primary objectives of this study were to establish a definitional framework for nature conservation and to document current and anticipated labour and skills gaps observed by employers. Research included interviews and a survey, which helped uncover the composition of the nature conservation sector, the occupations needed to achieve conservation targets, and the human resource trends and challenges for the current nature conservation workforce.

Research timeline



Stakeholder engagement

Preliminary interviews

A total of 10 individuals were identified by Environment and Climate Change Canada for preliminary stakeholder engagement. ECO Canada interviewed these key stakeholders to guide the development of a common definition to standardize the identification of nature conservation occupations and sub-sectors in Canada.

Interviewees were asked to comment on the proposed definitional framework for the sector and its workforce, as well as speak to the drivers and barriers for nature conservation, emerging trends that could potentially impact workforce capacity, current workforce knowledge and skills gaps, and strategic approaches to support workforce development.

Information gathered informed ECO Canada's approach to the primary research phase of this study. The advisory committee was established from a subset of preliminary interviewees, the definitional framework was validated, and an interview guide was developed to target key areas of focus identified during the first round of stakeholder engagement (see [Appendix 2](#)).

Secondary interviews

A total of 139 contacts were selected to participate in the preliminary research. Each individual was identified using the following sources:

- ECO Canada's contact database
- Contacts identified by ECCC
- Personal professional contacts of ECO Canada's project lead

For all of the stakeholders included in the matrix, the type of organization, name of organization, region of Canada and job title of the interviewee was documented to help ensure that all sectors of the nature conservation workforce are represented. Each individual's role and the organization's relevancy to the project was researched by the project lead. All of the prospective participants were ranked in order of preference, then further segmented based on the location of the headquarters and type of organization to ensure representation across Canada and the inclusion of federal agencies, provincial and municipal governments, regulatory bodies, post-secondary institutions, Indigenous organizations, non-profit or charitable organizations, NGOs and industry.

Stakeholders were contacted by ECO Canada and interviews were conducted based on the participants willingness to provide in-kind contributions to this study. A total of 40 interviewees were asked to characterize the nature conservation workforce by identifying key occupations, positions and skills, as well as speak to human resource trends and challenges within their organizations.

Online questionnaire

A preliminary workforce survey was launched at the end of 2020 to increase stakeholder engagement and complement qualitative information collected from interview participants. Survey outreach was targeted at nature conservation employers with a goal of gathering sector-specific data and insights.

Follow-up interviews

Novel insights gathered from the interviews and survey triggered targeted outreach to key nature conservation organizations. The aim of this final interview phase was to elaborate on topics of interest that were identified by stakeholders and gather additional information to strengthen findings presented throughout this report.

Mapping occupations and industries

ECO Canada used two approaches to identify industries that are included in the definition of the nature conservation sector:

- 1) Survey respondents were asked to identify a sector group that best described the organization's main business activities using a populated list based on the North American Industry Classification System (NAICS).
- 2) Organizations identified in the stakeholder matrix were mapped to an industry using the D&B Hoovers database.

Survey respondents and interview participants identified positions that are employed by the organization and briefly described the functional role or activities of nature conservation workers. These descriptions were then mapped to occupations using the National Occupational Classification (NOC) system, resulting in a total of 66 occupational groupings attributed to the nature conservation workforce.

Research limitations

ECO Canada's analysis of the nature conservation sector and its workforce is based on a subset of organizations that employ nature conservation workers. While this study is not exhaustive, the development of a preliminary sector profile helped to document labour market insights for the cross-sectoral nature conservation workforce. Further research is needed to evaluate the size of the workforce and the distribution of workers across industries based on the definitional framework presented in this report.

Appendix 2: Interview Checklist

This table provides a summary of objectives for each of the stakeholder engagement activities of the project. The information presented was used to guide the development of the interview guides and the online survey questionnaire. 40 interviews were conducted to gain a detailed understanding of the nature conservation workforce.

Inquiry Focus	Governments & Industry Associations	Charitable Organizations	Companies by Conservation Type	Labour Supply Organizations
Primary Research Objective	To gain insight into context and business drivers for nature conservation, workforce needs and gaps for public protected and conserved areas and a detailed review of conservation types to define the nature conservation sector in Canada.	To gain insight into the context and business drivers for nature conservation and workforce needs and gaps for private and community protected and conserved areas.	To gain insight into context and business drivers for nature conservation, workforce needs and gaps for natural resources establishments, and a detailed review of occupations and skills/certifications required.	To identify challenges and opportunities associated with delivering qualified nature conservation workers.
The context of nature conservation	Business, regulatory, social, and technological trends impacting workforce capacity: <ul style="list-style-type: none"> Regional differences Other considerations: COVID-19 	Economic, social, and cultural trends impacting workforce capacity: <ul style="list-style-type: none"> Regional differences Other considerations: COVID-19 	Perspectives on the current state of nature conservation relevant to workforce capacity (industry level or broader): <ul style="list-style-type: none"> Business, investment, and policy environment Regional differences 	Perspectives on the current state of nature conservation training, education, and skills development
Business case/drivers	Business case/drivers <ul style="list-style-type: none"> Differences across conservation type Regional differences 	Business case/drivers <ul style="list-style-type: none"> Area of focus Conservation type 	Drivers for decision-making and potential opportunities and barriers: <ul style="list-style-type: none"> Conservation type Regional differences 	Business case/drivers for nature conservation training, education, and skills development

Inquiry Focus	Governments & Industry Associations	Charitable Organizations	Companies by Conservation Type	Labour Supply Organizations
<p>Factors that impact occupations and skills arising from nature conservation initiatives</p>	<p>Explore impacts to in-scope occupations and skills driven by:</p> <ul style="list-style-type: none"> Standards and policy Land procurement Natural disasters, weather patterns, climate and adaptation Economic instruments Public interest Business profit Activities and processes 	<p>Explore impacts to in-scope occupations and skills driven by:</p> <ul style="list-style-type: none"> Standards and policy Land procurement Natural disasters, weather patterns, climate and adaptation Economic instruments Public interest Business profit Activities and processes 	<p>Explore impacts to in-scope occupations and skills driven by:</p> <ul style="list-style-type: none"> Standards and policy Land procurement Natural disasters, weather patterns, climate and adaptation Economic instruments Public interest Business profit Activities and processes 	<p>Share key findings from interviews to date: governments & industry associations, key charitable organizations and companies:</p> <ul style="list-style-type: none"> Solicit feedback Validate
<p>Current assessment of the workforce related to nature conservation^{5,6}</p>	<p>Labour, occupation and skill gaps and challenges related to nature conservation.</p> <p><i>Where are shortages (e.g. occupations and skill sets)?⁷</i></p> <ul style="list-style-type: none"> Regionally Short-term vs Longer term Differences by governance type <p><i>Workforce needs:</i></p> <ul style="list-style-type: none"> Occupations and skills 	<p>Labour, occupation and skill gaps and challenges related to nature conservation.</p> <p><i>Where are shortages (e.g. occupations and skill sets)?</i></p> <ul style="list-style-type: none"> Regionally Short-term vs Longer term Differences by conservation type <p><i>Workforce needs:</i></p> <ul style="list-style-type: none"> Occupations and skills 	<p>Labour, occupation and skill gaps and challenges related to nature conservation.</p> <p><i>Where are shortages (e.g. occupations and skill sets)?</i></p> <ul style="list-style-type: none"> Regionally Short-term vs Longer term Differences by conservation type <p><i>Workforce needs:</i></p> <ul style="list-style-type: none"> Occupations and skills 	<p>Curriculum and enrolment:</p> <ul style="list-style-type: none"> Courses, programs, and initiatives Demand for graduates Student registrations <p><i>Gaps and challenges?</i></p>

5 As this topic is a key focus, interview questions were set up to devote adequate time for discussion.

6 Topics of reflection were prompted, where feasible: (i) nature conservation targets; (ii) current and potential labour supply sources/potential sources of talent; (iii) the supply chain considerations and, in particular, training offered through suppliers (and where there are gaps/needs related to this); and (iv) the role of awareness and of 'process' – e.g., is it gaps, or is the workforce there and more awareness, process and some upskilling are needed?

7 Specific examples were asked (e.g., what occupations, what skillsets, etc. – rather than broad language) including supporting information or rationale.

Inquiry Focus	Governments & Industry Associations	Charitable Organizations	Companies by Conservation Type	Labour Supply Organizations
Labour supply system to support the delivery of talent	Typical supply sources and the current state of supply system: <ul style="list-style-type: none"> • Working with “touchpoints” including educators and trainers, industry associations, Indigenous communities, and other stakeholder groups • Internal training • External hiring • Gaps • Regional differences 	Typical supply sources and the current state of supply system: <ul style="list-style-type: none"> • Working with “touchpoints” including educators and trainers, industry associations, Indigenous communities, and other stakeholder groups • Internal training • External hiring • Gaps • Regional differences 	Typical supply sources and the current state of supply system: <ul style="list-style-type: none"> • Working with “touchpoints” including educators and trainers, industry associations, Indigenous communities, and other stakeholder groups • Internal training • External hiring • Gaps • Regional differences 	Delivering qualified workers to support the labour market for nature conservation: <ul style="list-style-type: none"> • Gaps/challenges • Opportunities and solutions
Economic potential	Revenue generating activities, funding opportunities and employment	Revenue generating activities and funding or donation opportunities	Revenue generating activities, economic instruments and employment	

Appendix 3: Occupational Clusters⁸

Management occupations

Occupations are broad and include legislators and middle to senior management.

NOC (4-digit)	Class Description
Legislators (NOC 0011)	Participate in the activities of a federal, provincial, territorial or local government legislative body or executive council, band council or school board as elected or appointed members.
Senior government managers and officials (NOC 0012)	Plan, organize, direct, control and evaluate, through middle managers, the major activities of municipal or regional governments or of provincial, territorial or federal departments, boards, agencies or commissions. They establish the direction to be taken by these organizations in accordance with legislation and policies made by elected representatives or legislative bodies.
Senior managers – financial, communications and other business services (NOC 0013)	Develop and establish objectives for the company, and develop or approve policies and programs, as well as plan, organize, direct, control and evaluate, the operations of their organization in relation to established objectives.
Senior managers – health, education, social and community services and membership organizations (NOC 0014)	Plan, organize, direct, control and evaluate, membership and other organizations or institutions that deliver health, education, social or community services. They formulate policies which establish the direction to be taken by these organizations, either alone or in conjunction with a board of directors.
Banking, credit and other investment managers (NOC 0122)	Plan, organize, direct, control and evaluate activities of operational departments and manage overall performance in accordance with established strategic directions and policies.
Advertising, marketing and public relations managers (NOC 0124)	Plan, organize, direct, control and evaluate the activities of establishments and departments involved in commercial, industrial and e-business advertising, marketing and public relations.
Other business services managers (NOC 0125)	Plan, organize, direct, control and evaluate the operations of establishments that provide services to business, and ensure the quality of those services and client satisfaction. They work in fields such as management consulting, market research, personnel and payroll services, contact centre services and security services.
Engineering managers (NOC 0211)	Plan, organize, direct, control and evaluate the activities of an engineering department, service or firm.
Architecture and science managers (NOC 0212)	Plan, organize, direct, control and evaluate activities of a landscape architecture, scientific or statistical department, service or firm.
Government managers – economic analysis policy development and program administration (NOC 0412)	Plan, organize, direct, control and evaluate economic policy, research and programs in the areas of taxation, labour markets, transportation or agriculture. These occupations focus on economic analysis, policy development and program administration to promote industrial and commercial business development in urban and rural areas for all levels of government.

⁸ Descriptions of occupational groups have been adapted from the [National Occupational Classification \(NOC\)](#) system to best describe each category in the context of the nature conservation sector.

NOC (4-digit)	Class Description
Government managers – education policy development and program administration (NOC 0413)	Organize, direct, control and evaluate elementary, secondary, and post-secondary education policies and programs for all levels of government.
Other managers in public administration (NOC 0414)	Plan, direct, control and evaluate the development of policies and programs that govern legislation such as activities unique to government for all levels of government. These occupations advise professional and non-professional staff conducting research and administer budgets for projects.
Managers in social, community and correctional services (NOC 0423)	Plan, organize, direct, control and evaluate the programs and activities of social service and community agencies, correctional institutions, labour organizations, professional associations, political parties and non-governmental organizations.
Administrators – post-secondary education and vocational training (NOC 0421)	Manage the academic and related activities of faculties of colleges or universities including academic records systems of colleges or universities and the operations of vocational schools specializing in trades, technology, business or other vocational subjects.
Managers in agriculture (NOC 0821)	Plan, organize, direct, control and evaluate the operations and functions of farms. They are responsible for growing crops, raising and breeding livestock, poultry and other animals and marketing farm products. They usually own and operate their own establishment.
Managers in aquaculture (NOC 0823)	Manage operations of facilities which cultivate and harvest fish, shellfish or marine plants for replenishment of wildlife stocks or for commercial sale.

Business, finance and administration occupations

Occupations that promote public awareness, engage stakeholders, strategize and design customized programs, conduct public opinion and attitude surveys to organize workshops or other events, to facilitate publicity, fundraising and information dissemination, and to promote educational programs and informational materials that increase awareness.

NOC (4-digit)	Class Description
Financial auditors and accountants (NOC 1111)	Examine and analyze the accounting and financial records to ensure accuracy and compliance with established accounting standards and procedures.
Professional occupations in business management consulting (NOC 1122)	Provide services to management such as analyzing the structure, operations, managerial methods or functions of an organization in order to propose, plan and implement improvements.
Professional occupations in advertising, marketing and public relations (NOC 1123)	Analyse, develop and implement communication and promotion strategies and information programs on behalf of governments, businesses, social agencies, public interest groups and cultural organizations.

NOC (4-digit)	Class Description
Administrative officers (NOC 1221)	Oversee and implement administrative procedures, establish work priorities, conduct analyses of administrative operations.
Purchasing agents and officers (NOC 1225)	Occupations that purchase general and specialized equipment, materials, land or access rights and business services for use or processing by an establishment for public and private sectors. These occupations negotiate land acquisition or access rights for public or private use and conduct field investigations of properties.
Accounting technicians and bookkeepers (NOC 1311)	Maintain complete sets of books, keep records of accounts and verify procedures used for recording financial transactions.
Assessors, valuers and appraisers (NOC 1314)	Determine the value of land, businesses, estates and other real property for the purposes of taxation, grants and regional planning.

Natural and applied sciences and related occupations

Occupations that manage natural resources and provide technical services related to agriculture, forestry, environmental protection, and plant and animal biology. These occupations focus on abiotic and biotic factors and conduct applied research in both field and laboratory settings.

NOC (4-digit)	Class Description
Geoscientists and oceanographers (NOC 2113)	Conduct applied research to extend knowledge of physical, chemical and biological systems as well as the impact of human activity on oceans and marine ecosystems. Individuals identify and extract hydrocarbon, mineral and groundwater resources, analyse physical characteristics of atmospheric and geological environments, and assess and mitigate the effects of development and waste disposal projects. Employers include petroleum and mining companies, geophysics and engineering firms, governments and educational institutions, and private companies engaged in the exploration of seafloor deposits and seafarming areas.
Other professional occupations in physical sciences (NOC 2115)	Conduct theoretical and applied research in fields of physical science. Metallurgists, soil scientists and physical scientists and researchers are included in this unit group.
Biologists and related scientists (NOC 2121)	Conduct research to provide knowledge about living organisms, to manage natural resources and to develop new practices related to agriculture. Employers include governments, environmental consulting companies, resource and utilities companies, chemical, pharmaceutical and biotechnical companies, and education institutions.
Forestry professionals (NOC 2122)	Conduct research, develop plans, and administer and direct program related to the management and harvesting of forest resources. Employers include the forest industry, provincial and federal governments, consulting companies, educational institutions and other industries.
Agriculture representatives, consultants and specialists (NOC 2123)	Provide assistance and advice in the area of agriculture for farm management, cultivation, fertilization, harvesting, composition, disease prevention, nutrition and crop rotation. Employers include businesses, institutions and governments.

NOC (4-digit)	Class Description
Engineers (NOC 2131-2148)	Includes civil, mechanical, electrical and chemical, mining, geological, petroleum, computer engineers, as well as other professional engineers, n.e.c.
Urban and land use planners (NOC 2153)	Plan and recommend policies for managing land use and associated services for urban areas, rural areas and remote regions. Employers include governments, land development, and engineering and consulting companies.
Land surveyors (NOC 2154)	Plan, direct and conduct legal surveys to establish the location of properties, parcels of land, provincial and Canada Lands, Indigenous land claims, wellsites, mining claims, roadways and highways, and maintain official plans, records and survey documents. Employers include government, private sector and land surveying establishments, real estate development, natural resource, engineering and construction firms.
Information systems analysts and consultants (NOC 2171)	Analyze and test systems requirements, develop and implement information systems, development plans, policies and procedures, and provide advice on a wide range of information systems issues. Employers include firms with information technology units throughout the private and public sectors.
Database analysts and data administrators (NOC 2172)	Design, construct, modify, integrate, implement and test data models and data management systems. They may also develop and implement data administration policy, standards and models. Employers include firms with information technology units throughout the private and public sectors.
Chemical technologists and technicians (NOC 2211)	Provide technical support and services on chemical engineering, biochemical research, quality control and environmental protection. Employers include research and development laboratories, engineering companies, utilities, health, education and government establishments.
Biological technologists and technicians (NOC 2221)	Provide technical support to scientists, engineers and other professionals in the area of resource management, environmental protection, and biological and health sciences. Employers include government, biotechnology companies, research and educational institutions, environmental consulting companies, and resource and utilities companies.
Forestry technologists and technicians (NOC 2223)	Perform technical and supervisory functions in support of environmental protection, resource conservation and forestry research, management and harvesting. Employers include the forest industry sector, provincial and federal governments, consulting firms, and other industries and institutions.
Conservation and fishery officers (NOC 2224)	Enforce federal and provincial regulations for the protection of fish, wildlife and other natural resources. These individuals also collect and relay information for resource management and are employed by federal and provincial government departments.
Civil engineering technologists and technicians (NOC 2231)	Provide technical support and services to scientists, engineers and other professionals, or may work independently in fields such as structural engineering, municipal engineering, construction design and supervision, highways and transportation engineering, water resources engineering, geotechnical engineering and environmental protection.
Land survey technologists and technicians (NOC 2254)	Conduct or participate in surveys to determine the exact locations and relative positions of natural features and other structures on the earth's surface, underground and underwater.
Technical occupations in geomatics and meteorology (NOC 2255)	Gather, analyze, interpret and use geospatial information for applications in natural resources, geology, environmental research and land use planning.

NOC (4-digit)	Class Description
Engineering inspectors and regulatory officers (NOC 2262)	Inspect transportation vehicles such as aircraft, watercraft, automobiles and trucks and weighing and measuring devices such as scales and meters as well as industrial instruments, processes and equipment for conformity to government and industry standards and regulations.
Inspectors in public health and environmental health and occupational health and safety (NOC 2263)	Evaluate and monitor health and safety hazards and develop strategies to control risks in public facilities, industrial establishments, municipal water systems and ensure compliance with government regulations regarding areas such as pollution control, sanitation and workplace safety.

Education, law and social, community and government services

Occupations with a focus in law, teaching, counselling, conducting social science research, developing government policy, and administering government programs. This includes experts in the areas of public administration, natural resource sustainability, regulatory enforcement and environmental impact assessment. Activities include defining and implementing standards and criteria, permit granting, compliance and auditing, and penalty, sanction, and compensation enforcement.

NOC (4-digit)	Class Description
University professors and lecturers (NOC 4011)	Teach courses to undergraduate and graduate students and conduct research at universities.
Post-secondary teaching and research assistants (NOC 4012)	Assist university professors, community college and CEGEP teachers and other faculty members in teaching and research activities at universities and colleges.
College and other vocational instructors (NOC 4021)	Teach applied applied arts, academic, technical and vocational subjects at community colleges, CEGEPs, agricultural colleges, technical and vocational institutes.
Secondary school teachers (NOC 4031)	Prepare and teach academic, technical, vocational or specialized subjects at public and private secondary schools.
Lawyers and Quebec notaries (NOC 4112)	Advise clients on legal matters, represent clients before administration boards and draw up legal documents such as contracts and wills.
Natural and applied science policy researchers, consultants and program officers (NOC 4161)	Conduct research, prepare reports, provide consultation, advise and administer programs specific to natural and applied sciences. Employers include governments, educational institutions, research organizations, consulting firms, and environmental and conservation organizations.
Business development officers and marketing researchers and consultants (NOC 4163)	Conduct research, formulate policies and manage programs to stimulate commercial business investment or tourism in urban and rural areas. Employers include government departments, marketing firms and business associations.

NOC (4-digit)	Class Description
Social policy researchers, consultants and program officers (NOC 4164)	Conduct research, develop policy, and implement or administer law enforcement. Employers include government departments and agencies, industry, educational institutions, professional associations, research institutes, and NGOs.
Health policy researchers, consultants and program officers (NOC 4165)	Conduct research, produce reports and administer health care policies and programs. Employers include government departments and agencies, consulting establishments, universities, research institutes, hospitals, community agencies, professional associations and non-governmental organizations.
Other professional occupations in social science, n.e.c. (NOC 4169)	Conduct studies and research on human activity and relationships to understand the economic, social and political facets of society. Employers include universities, and public and private sectors.
Social and community service workers (NOC 4212)	Administer and implement a variety of social assistance programs and community services. Employers include government agencies, school boards, correctional facilities and other establishments.
By-law enforcement and other regulatory officers, n.e.c. (NOC 4423)	Enforce by-laws and regulations of provincial and municipal governments.

Art, culture, recreation and sport

Occupations in the area of art and culture that include the reporting and dissemination of information using platforms such as video, performance, broadcasting, journalism, publications, libraries and museums. These occupations include librarians, archivists, conservators, curators, writers, translators, interpreters and artists.

NOC (4-digit)	Class Description
Producers, directors, choreographers and related occupations (NOC 5131)	Oversee and control the technical and artistic aspects of film, television, radio and theatre productions. Employers include film production companies, television stations, broadcast departments and advertising companies.
Authors and writers (NOC 5121)	Plan, research and write books, storyboards, essays, etc. for publication or presentation. Employers include advertising agencies, governments, private consulting companies, publishing firms and multimedia/new-media companies.
Technical occupations related to museums and art galleries (NOC 5212)	Occupations that classify, catalogue, restore and maintain information in support of conservation activities. Employers include museums, parks, aquariums, zoos, interpretive centres, botanical gardens, cultural centres, nature sanctuaries and heritage sites.
Photographers (NOC 5221)	Operate still cameras to photograph people, events, scenes, and materials. Employers include newspapers, magazines, museums and government.

Trades helpers, construction labourers and related occupations

Occupations that provide essential support to programs and projects and perform labouring activities such as construction, maintenance, repair, and other services.

NOC (4-digit)	Class Description
Contractors and supervisors, heavy equipment operator crews (NOC 7302)	Supervise and co-ordinate the activities of workers classified in the following unit groups: Crane operators (7371), Drillers and blasters – surface mining, quarrying and construction (7372), Water well drillers (7373), Longshore workers (7451), Material handlers (7452), Heavy equipment operators (except crane) (7521), Public works maintenance equipment operators and related workers (7522), Railway yard and track maintenance workers (7531), and Public works and maintenance labourers (7621).
Construction trades helpers and labourers (NOC 7611)	Assist skilled tradespersons and perform labouring activities at construction sites, in quarries and in surface mines.
Other trades helpers and labourers (NOC 7612)	Assist skilled tradespersons and perform labouring activities in the installation, maintenance and repair of industrial machinery, refrigeration, heating and air conditioning equipment, in the maintenance and repair of transportation and heavy equipment, in the installation and repair of telecommunication and power cables and in other repair and service work settings.
Public works and maintenance labourers (NOC 7621)	Perform a variety of labouring activities to maintain sidewalks, streets, roads and similar areas.

Natural resources, agriculture and related production occupations

Occupations that supervise resource extraction operations in the areas of forestry, mining and quarrying, oil and gas, and agriculture/aquaculture services. These occupations involve a variety of duties related to the management, improvement and conservation of lands, land surveying and maintenance, and geophysical prospecting.

NOC (4-digit)	Class Description
Silviculture and forestry workers (NOC 8422)	Manage, improve and conserve forest lands. Employers include logging companies, contractors and government services.
Landscaping and grounds maintenance labourers (NOC 8612)	Perform manual duties to assist and maintain landscaped areas for public works departments and private establishments.
Aquaculture and marine harvest labourers (NOC 8613)	Perform manual duties to gather and harvest aquaculture and fishing for commercial aquatic farms, and public or private fish hatcheries.
Logging and forestry labourers (NOC 8616)	Perform manual tasks to assist with woodlands operations, clean up landing areas, clear trails and plant trees for logging companies and contractors.

About ECO Canada

ECO Canada is the steward for the Canadian environmental workforce across all industries. From job creation and wage funding to training and labour market research, we champion the end-to-end career of an environmental professional. Our efforts promote and drive responsible and sustainable economic growth to ensure that environmental care and best practice are a priority.

We are thought leaders in the environmental labour market. Our workforce knowledge spans nationally across all provinces and territories, as well as within major Canadian industries including energy, forestry, mining, agriculture, manufacturing and construction.

We gather and analyze trends within the environmental workforce and provide up-to-date, relevant data and insights for policy, business and educational purposes. Our reports support our stakeholders in four key areas: (1) employers—plan and attract qualified candidates, (2) individuals—prepare for and build their environmental careers, (3) governments—develop programs and update policies, (4) educators and trainers—adapt their offerings to prepare the workforce that is and will be in demand.





CONTACT US

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ECO Canada
Suite 400, 105 12 Avenue SE
Calgary, Alberta T2G 1A1

P : 1-800-890-1924

E : research@eco.ca

W : eco.ca

ECO Canada relies on employees and partners from Vancouver to Windsor to Montreal and Halifax, as well as our Territories. Visit our website or contact us for more information.



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