



Evaluation Report

Gender and Leadership in Wildland Fire Project

**An Outcome Evaluation of a Royal Roads
University Graduate Student Research Project**

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Cover photo: BCWS Wildland Firefighter. British Columbia. Photo: R. Reimer

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List of Acronyms

ACMG	Association of Canadian Mountain Guides
ADM	Assistant Deputy Minister
AR	Action Research
ARE	Action Research Engagement
BC	British Columbia
BCGEU	British Columbia Government and Service Employees' Union
BCWS	British Columbia Wildfire Service
CIFFC	Canadian Interagency Forest Fire Centre
EDI	Equity, Diversity and Inclusion
EoP	End-of-project
GBA+	Gender-Based Analysis Plus
GD	Gender Discrimination
GLWFP	Gender and Leadership in Wildland Fire Project
KASR	Knowledge, Attitudes, Skills, and Relationships
MAL	Master of Arts in Leadership
NDP	New Democratic Party
NSERC	National Sciences and Engineering Research Council of Canada
OM	Outcome Mapping
PI	Principal Investigator
QAF	Quality Assessment Framework
RFP	Request for Proposal
RRU	Royal Roads University
SRE	Sustainability Research Effectiveness
SSHRC	Social Sciences and Humanities Research Council
TDR	Transdisciplinary Research
ToC	Theory of Change
WTREX	Women's Prescribed Fire Training Exchange

Executive Summary

Introduction

This report presents an outcome evaluation of a research project undertaken by a Royal Roads University (RRU) Master of Arts in Leadership (MAL) student. The Gender and Leadership in Wildland Fire Project (GLWFP) intended to raise discussion on gender and leadership in the wildland fire community by: identifying the gap between academic knowledge of issues pertaining to gender and leadership within the profession and organizational awareness of the gendered experience of wildland firefighters; creating a forum for discussion on the topic and building capacity (e.g., conflict resolution strategies); uncovering organizational and government awareness of the issue through a series of interviews with wildland firefighters and government actors, and a survey with the British Columbia Wildfire Service (BCWS) community; and presenting recommendations to address issues of gender discrimination at the BCWS. Wildland fire culture is described as a masculine space with clearly defined gender roles (Reimer, 2017a, p.12). Previous research reveals that gender discrimination is a prominent factor in the everyday experiences of wildland firefighters and fosters the cultural norm; however, in the BCWS, self-awareness of and reflection on gender is low. Recently, the wildland fire community has taken steps to broaden its diversity to challenge the status quo of this traditionally “highly masculinized occupation” (Pacholok, 2013, p.3). Gender discrimination and the broader concern of a hyper-masculine culture creates challenges at both the individual and organizational level that could lead to potential harm faced by male and female wildland firefighters alike, and has implications for diversity in leadership, decision-making, and risk management (Reimer, 2017a). The GLWFP intended to contribute to a more inclusive and diverse culture within the wildland fire profession by guiding organizational practice through discourse, advancing the professional skills and capabilities of the principal investigator (PI), and contributing to the academic discussion on the topic. This outcome evaluation assesses whether and how the GLWFP contributed to these outcomes.

Methodology

The evaluation investigates whether and how the GLWFP generated new knowledge, attitudes, skills, and relationships among key actors to increase the discussion on gender and leadership in the wildland fire community. The objective of the evaluation is to critically assess the GLWFP by collecting and analyzing information about its activities, outputs, and outcomes to support learning for research effectiveness.

The Outcome Evaluation approach used in this evaluation is designed to be applied to research projects and specifically transdisciplinary research, sustainability research, research-for-development, and other change-oriented approaches (Belcher et al., 2020). The approach assesses whether and how a research project contributed to the realization of outcomes through the use of a theory of change (ToC). A ToC can be used to provide a detailed description and model of why a change is expected to occur within a specific problem context using the underlying mechanisms of behaviour change conceptualized as changes in knowledge, attitudes, skills, and/or relationships (KASR). It models the causal relationships between a project’s activities and results, and how these are expected to manifest in outcomes, giving particular attention to the impact pathways, actors, and steps involved in the change process.

The evaluation team led a participatory workshop in November 2018 to define the scope of the evaluation, document the implicit ToC for the GLWFP (Figure 1), and identify possible sources of evidence to empirically test the ToC. The Outcome Evaluation method collects participant and stakeholder perspectives to identify and assess the contribution of factors within a change process (Belcher et al., 2020). To gather these perspectives, we conducted 26 interviews with 27 informants and reviewed 28 documents such as personal communications, journal articles, blog posts, and magazine articles. These sources of evidence were used to evaluate actual outcomes against the ToC, and answer the following questions:

1. Research Outcome Evaluation:

- a. *To what extent and how were outcomes realized?*
- b. *Were there any positive or negative unexpected outcomes from this project?*
- c. *Could the outcomes have been realized in the absence of the project?*

- d. Were the assumptions pertaining to why these changes were expected sustained?*
- e. Are the higher-level changes likely to be realized?*

Project design and implementation were characterized using a modified version of Belcher et al.'s (2016) Transdisciplinary Research Quality Assessment Framework (QAF). The QAF was used to highlight elements of research design and implementation that contributed to the achievement of outcomes. This assessed the degree to which the GLWFP incorporated recognized quality criteria of transdisciplinary research¹, organized under the principles of Relevance, Credibility, Legitimacy, and Positioning for Use. The project assessment was guided by the following questions:

2. Research Project Assessment:

- a. What elements of the research design and implementation supported outcome realization, and how?*
- b. To what extent and how did the project engage effectively with relevant stakeholders?*
- c. To what extent were the research findings sufficiently relevant to achieve the stated objectives?*
- d. To what extent and how are target audiences aware of and using the project outputs?*
- e. How does RRU support student success in research?*
- f. What lessons about effective research practice can be learned from this case study?*

Results were analyzed and grounded in the context of social change theories to address shortcomings acknowledged within literature (Weiss, 1997; Stachowiak, 2013) that the theoretical basis for many ToC's are weak. Researchers seldom make explicit the theories underlying why change is expected from their research. Social change theories used within the GLWFP include dialectical theory of organizational change, social capital theory, and empowerment theory to explain the implications of outcome realization.

Project Overview

By gaining insights into organizational, academic, and government knowledge on the topic of gender and leadership in wildland fire through scoping exercises, literature review, and primary data collection, the GLWFP aimed to facilitate a conversation about the experience of gender and leadership within the BCWS by creating a forum for discussion and subsequently presenting recommendations to guide organizational change. The GLWFP used a feminist appreciative approach to action research (AR) and followed the Action Research Engagement (ARE) model to focus on creating organizational readiness for change through open conversation (Reimer, 2017a). The GLWFP utilized the ThoughtExchange™ tool to collect qualitative data on participants thoughts perceptions, and feelings, and subsequent quantitative ranking by participants to indicate their agreement or disagreement of that thought (Reimer, 2017a). Additional qualitative data was collected through five semi-structured interviews representing diverse standpoints that emerged in the survey data to gain a deeper understanding of major themes. The key outputs of the GLWFP included: the identified gap between academic knowledge of issues pertaining to gender and leadership within the profession and low organizational awareness of such issues; new findings for academic audiences, such as men are also negatively affected by gender issues within the wildland fire culture; a forum for discussion and capacity-building (e.g., conflict resolution strategies); organizational knowledge and awareness on the topic (e.g., gender discrimination is occurring at BCWS and self-awareness is low, diversity in workforce is desirable, etc.); and evidence-based recommendations to acknowledge and resolve issues surrounding gender at the BCWS, cultivate capacity for organizational learning, and build partnerships to address issues pertaining to gender and leadership through organizational learning. The GLWFP aimed to contribute to key intended outcomes such as: uncovering participants' self-awareness about BCWS culture; fostering discussions on gender and leadership at multiple levels within BCWS; uptake and integration of recommendations by the BCWS; supporting the PI to continue work in gender and leadership in high-risk occupations; and increasing the conversation on gender and leadership within the academic community. Further detail regarding the GLWFP ToC is included below.

¹ The QAF is not meant to be a measure of excellence, but rather characterizes the project design and implementation in terms of the degree of its transdisciplinarity.

Project Theory of Change

The research aimed to contribute to positive change through dialogue, gender responsive leadership, and organizational learning through three interconnected pathways: a discourse guiding organizational practice pathway, a personal/professional pathway, and an academic pathway. Each impact pathway intersects and complements the others to support the realization of outcomes. The key steps in these pathways are illustrated in Figure 1.

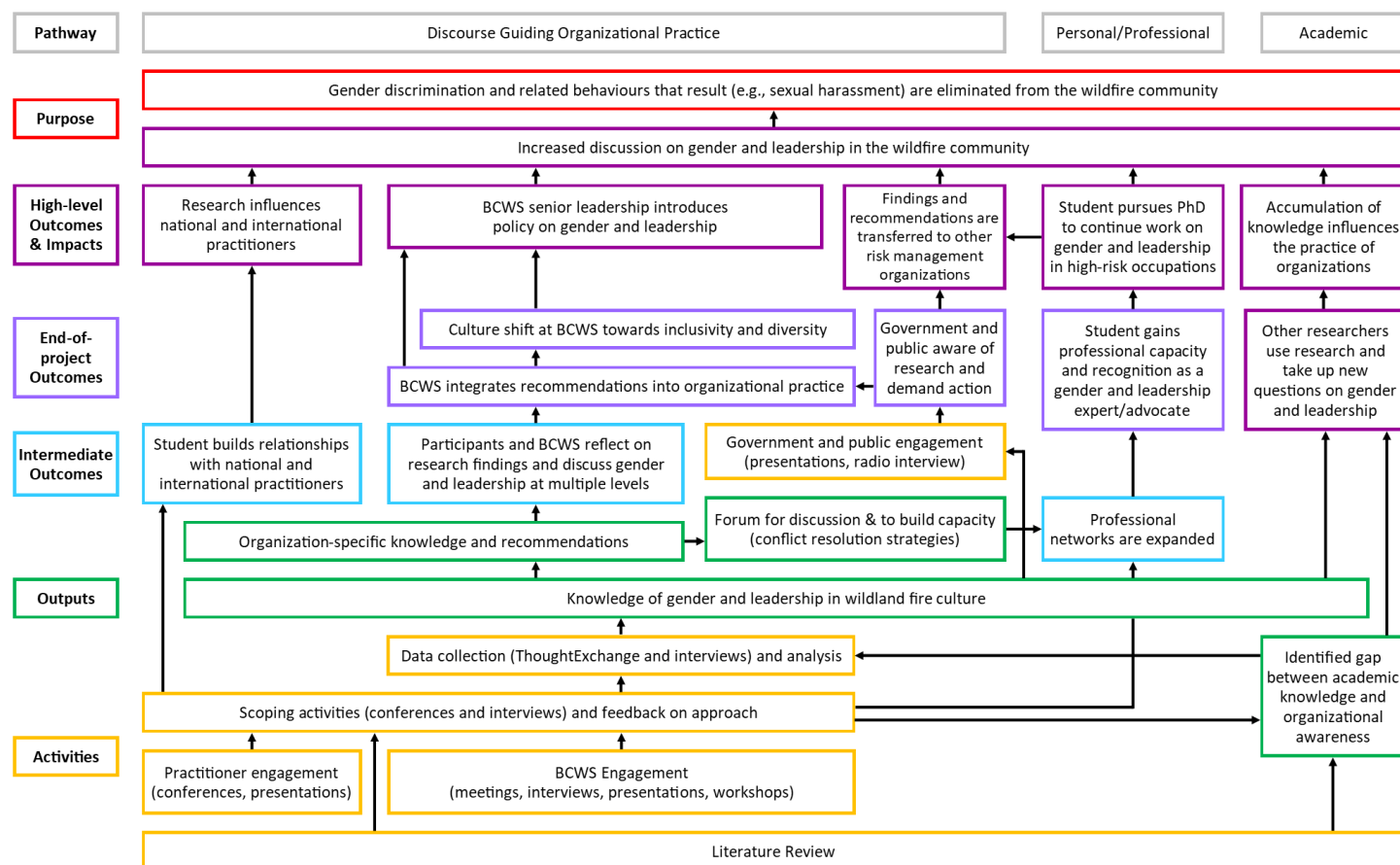


Figure 1. Simplified GLWFP Theory of Change

To influence organizational practice at the BCWS, the PI engaged relevant stakeholders including all levels of the BCWS (from ‘boots on the ground’ to senior management) by leveraging the PI’s existing professional connections due to their own experience of working as a wildland firefighter. The PI shared knowledge and GLWFP findings back to these groups by disseminating via presentations, publications, workshops, and webinars. By participating in the research, it was expected that participants’ self-awareness about organizational culture would be uncovered. The BCWS was expected to recognize gender discrimination as a valid subject for discussion, support gender responsive leadership, and subsequently integrate the GLWFP recommendations into organizational practice. With a culture shift at the BCWS towards inclusivity and diversity as the organization implements recommendations, BCWS’ reputation as a progressive organization would increase to contribute to gender discrimination and related behaviours that result being eliminated from the wildland fire community.

The research intended to provide a personal/professional experience for the PI to expand their capacity and recognition as a gender and leadership expert and continue work on the topic as a consultant and through their subsequent PhD. The PI was expected to expand their professional networks as a result of the GLWFP, which along with developing their professional capacities would lead to their recognition as an expert in the field. The PI was expected to become an advocate to keep gender as a priority for the wildland fire community due to their increased confidence instilled by GLWFP.

In the academic pathway, the GLWFP findings were disseminated through the publishing of results in peer-reviewed journals and through presentations at conferences to contribute to other researchers becoming aware of the research and taking up new questions on the topic. It is expected that this increased traction in academic discussions would lead to an accumulation of knowledge that influences the practice of the BCWS and other organizations to develop greater receptivity for diversity and inclusivity. Overall, all activities, outputs and outcomes were expected to support gender discrimination and related behaviours that result (e.g., sexual harassment) becoming eliminated from the wildland fire community.

Results

Outcome Evaluation: To what extent and how were outcomes realized?

Table 1 summarizes the extent to which outcomes were realized. The GLWFP leveraged multiple impact pathways and mechanisms to realize outcomes. Outcomes in the discourse guiding organizational practice pathway were partially realized through the involvement of key stakeholders in the data collection process and by creating and strengthening coalitions. As an AR project, the GLWFP identified organizational knowledge and presented evidence-based recommendations which were shared through targeted dissemination of findings (e.g., inclusion of stakeholders in meetings, discussions throughout the research process, formal presentations to the BCWS). Leveraging the PI's insider status as a wildland firefighter within the BCWS enabled them to gain access to a hard-to-reach population and collect data from the target group. The PI's reputation was also leveraged to transfer knowledge gained through the GLWFP to the PI's colleagues at BCWS. The GLWFP contributed to the increased capacity of actors in the system by ensuring that the conversation on gender and leadership is conducted openly and becomes part of BCWS' practice. Participation in the GLWFP was an empowering experience for participants and acted as an avenue for informal support networks to form. Personal/professional outcomes were realized and supported outcomes in the discourse guiding organizational practice pathway. The GLWFP provided an opportunity for the PI to develop their research capacities, and be equipped with new knowledge, skills, and perspectives to apply in future work within wildland fire and other risk management contexts. Outcomes in the academic pathway were realized via dissemination of GLWFP findings within peer-reviewed publications and conferences, which built awareness of the research among wider research audiences.

Table 1. Summary of outcome realization and GLWFP contributions

Outcome	Assessment
PI builds relationships with national and international practitioners [intermediate outcome]	Realized, clear project contribution
BCWS acknowledges the study [intermediate outcome]	Realized, clear project contribution
Participants' self-awareness about BCWS culture is uncovered [intermediate outcome]	Realized, clear project contribution
Members of BCWS create informal support network [intermediate outcome]	Realized, clear project contribution
Gender and leadership is a focus of discussion for national and international practitioners [end-of-project (EoP) outcome]	Realized, unclear project contribution
Victims of gender discrimination at BCWS have courage to speak up [EoP outcome]	Partially realized, clear project contribution
BCWS recognizes gender discrimination as a valid subject for discussion [EoP outcome]	Realized, clear project contribution
BCWS discusses gender and leadership (multiple levels) [EoP outcome]	Realized, clear project contribution
BCWS supports gender-responsive leadership [EoP outcome]	Partially realized, unclear project contribution
BCWS integrates recommendations into organizational practice [EoP outcome]	Partially realized, unclear project contribution

Culture shift at BCWS towards inclusivity and diversity [EoP outcome]	Partially realized, unclear project contribution
Provincial government aware of gender discrimination in BCWS and takes action based on recommendations [EoP outcome]	Partially realized, unclear project contribution
Public aware of gender discrimination in BCWS and demands action [EoP outcome]	Insufficient evidence
Public organizations held accountable for transparency around gender discrimination [EoP outcome]	Insufficient evidence
Competencies developed through experiential learning for constructive dialogue around the topic [intermediate outcome]	Realized, clear project contribution
Professional networks are expanded [intermediate outcome]	Realized, clear project contribution
PI gains professional capacity and recognition as gender and leadership expert [EoP outcome]	Realized, clear project contribution
PI becomes an advocate to keep gender as priority for wildland fire community [EoP outcome]	Realized, clear project contribution
Other researchers become aware of the research [intermediate outcome]	Realized, clear project contribution

Few unexpected outcomes were discussed by informants. However, some tensions inevitably rose from the research process of completing action research on a controversial topic. This included the negative reaction to and reception of the research by some male and female firefighters, the personal strain faced by the PI during the research process by working on a contentious topic as a member of the community under study, and the loss of momentum behind GLWFP. The PI underestimated the amount of personal hardship and did not fully anticipate the personal costs of completing the GLWFP. It is important to note that constructive conflict and tension is sometimes necessary to stimulate legitimate change (Lederach, 1995; Bush & Folger, 1994). While the recommendations were national in scope and were developed from BCWS participants' own perspectives, the BCWS has not followed through in the implementation of the recommendations owing to an end in the collaborative relationship with the PI. Although the BCWS did implement policy following the GLWFP, the delivery and implementation was unexpected and resulted in a punitive approach leading to feelings of shame and blame. The logic of the GLWFP and its underlying assumptions appear to be sustained. The GLWFP used an interdisciplinary approach and leveraged the PI's position as an insider to the organization to gain support for the organization, access hard to reach participants, and disseminate knowledge through their established connections to support the realization of outcomes across pathways.

Alternative Explanations of Outcome Realization

Evidence indicates alternative explanations (i.e., processes external to the GLWFP) for outcome realization. For example, the GLWFP was part of a wider BCWS organizational catalyst for change influencing the conversation on culture and gender. Informants discussed both the safe reporting line created by the BCWS to support staff in sharing their experiences within the workplace, and the People First initiative which has contributed to a shift in organizational culture to create a more inclusive and diverse workplace. Parallel with the GLWFP, the BCWS also partnered with the Roy Group to invest in stronger leadership development. Informants suggested that there was focus on the topic of gender and leadership in wildland fire exploring the challenges and barriers faced by female firefighters prior to the GLWFP. Several reports in wildland fire and other land management agencies were released in parallel with the GLWFP that quantified and articulated systemic challenges surrounding gender discrimination in the United States, New Zealand, and Australia, bringing more attention to the topic at the international level. National and international organizations have also focused efforts on issues around gender and leadership within the wildland fire community including the Women's Prescribed Fire Training Exchange (WTREX) and the creation of recommendations by the Canadian Interagency Forest Fire Centre (CIFFC) to increase the awareness of issues around gender discrimination. There have also been high-profile cases within British Columbia (BC) regarding discriminatory factors surrounding firefighter fitness tests which were taken to

the Supreme Court of Canada. An increase in the wider cultural understanding of the topic, including through the #MeToo movement has renewed focus on the topic at the societal level. In the academic pathway, there are other scholars exploring gender in wildland fire contexts that are contributing to the research agenda.

Project Assessment: What elements of the research design and implementation supported outcome realizations, and how?

The QAF assessment reveals that the GLWFP's design and implementation aligns with some principles and criteria of relevant, credible, and legitimate research that is positioned for use, and produced knowledge that is useful and used (see Appendix 5 for QAF results and justifications for the project assessment).

Under the relevance principle, the PI's position as an insider to the organization was a key factor in supporting the completion of research on a sensitive topic. The GLWFP also effectively engages with the problem context with a breadth and depth of understanding as a result of the PI's previous experience as a former wildland firefighter and crew leader. The GLWFP addressed a socially relevant research problem by supporting the BCWS to deliver on its strategic goal of excellence in people, and undertaking the research at a time of interest in the experiences of female firefighters and gender in the wildland fire community. However, the GLWFP does not utilize an explicit ToC which likely would have supported critical thinking and collective visioning among target audiences and facilitated transparency and accountability of results. GLWFP results used overly academic language; the use of more appropriate terminology would have improved the accessibility of results among target audiences.

Regarding credibility, the GLWFP's design and resources were appropriate to carry out the research. The support and sponsorship from the BCWS as well as the inquiry team supported the feasibility of the research project in terms of having adequate social capital to garner participation in the project. The GLWFP reviews and integrates a breadth and depth of literature and theory from relevant disciplines including leadership studies and gender studies, conveying and understanding from multiple disciplines revealing the projects interdisciplinarity. However, a singular objective for the project was documented; a better formulation of objectives would have aided the structure and purpose of the project. A more thorough exploration of the dissonance in findings would have also supported the defensibility and credibility of the arguments presented.

Under legitimacy, the GLWFP received ethical approval by RRU Research Ethics Board and a section of the GLWFP documentation is dedicated to ethical issues and power dynamics within the context of the research, showing an in-depth understanding and prioritization of ethics. A range of system actors were involved in the research, including representation of all levels of the BCWS, and efforts were made to include and enable diverse perspectives to participate. GLWFP documentation discusses the PI's positionality and briefly acknowledges the implications for the findings, although this could have been expanded upon to support disclosure of perspective. Full transparency of positionality and how this affected the interpretation of results would have improved the research and intended audiences' trust in and use of the research findings.

The GLWFP clearly contributed to the partial or full realization of eleven of the nineteen intermediate and EoP outcomes. The GLWFP resulted in positive outcomes for individuals and was a catalyst for the BCWS to focus on the topic of gender, despite challenges that arose. However, the extent of organizational changes remains unclear with no official engagement in terms of a strategy or policy change following the completion of the GLWFP. The GLWFP also contributed to shifting existing power dynamics, as some participants had their experiences acknowledged and validated through the research experience. The PI learned lessons from the GLWFP in terms of how to stimulate change within the wildland fire context and became a better leader in practice. The PI has transferred these problem-solving skills to other aspects of their professional life, including their doctorate. The GLWFP also contributed to the PI's personal knowledge on the topic, although the extent to which system actors' knowledge gaps were filled is unclear.

Evidence indicates RRU programming supported the realization of GLWFP outcomes in the personal/professional and discourse guiding organizational pathways. The interdisciplinary nature of the program enabled the PI to draw on literature from diverse disciplines, complete research that was relevant to their role as

a wildland firefighter, and learn how to implement change through a research process. The RRU MAL program offers distanced learning which supported the PI in continuing to stay connected in the rural context of wildland firefighting and maintain a collaborative relationship with firefighters. The MAL program positively influenced the GLWFP and enabled the PI to create a robust research methodology that provided data that could be triangulated to get to the core of issues surrounding the topic of gender and leadership in wildland fire. The PI gained encouragement from the program, and relied on the MAL's training which enabled the PI to engage with research participants using an approach that acknowledged the researcher as a leader in their own right.

Lessons Learned

Project Lessons

- Leveraging the PI's position within the organization and social capital were effective strategies to collect data and ensure knowledge-to-practice through dissemination.
- Aligning the research with current initiatives and organizational strategy means the research is better positioned for use.
- Engaging all levels of system actors as participants (e.g., 'boots on to ground', government actors, and senior leadership) in the development of recommendations fosters the relevance of outputs.
- Strategically leveraging partnerships with organizational leaders and leading academics supports the acknowledgement of the research and fosters organizational change. Organizational buy-in for the GLWFP was crucial to its success in gathering data from a hard-to-reach population and fostering support for recommendations. Sponsoring organization relationships should be managed carefully to gain access, support, resources, and networks.
- Utilizing an interdisciplinary approach supported the GLWFP in building a bridge between academic and practitioner spheres.
- Effective communication, particularly regarding methods and the expectation for change after the presentation of results, is key to stimulate and sustain action from the research. Perception of research agenda and researcher positionality can lead to skepticism of research findings and diminish the likelihood for application of outputs and can also create tension.

Contextual Lessons

- Leveraging insider knowledge allows access to hard-to-reach participants and offers an understanding of internal organizational cultural dynamics.
- Gender and leadership in wildland fire are complex issues, and exploration into the topic can lead to tensions if collaborative relationships are not managed throughout the research process. Full transparency and positionality should be discussed and reflected upon in detail throughout the project to avoid research being perceived to have a predetermined direction. When doing further research within this context, it is suggested that a wider lens of inclusivity should be used to minimize perceptions of bias.
- Due to the traditional focus on natural science within this context, future research should expose audiences to the value of social sciences and leadership studies to support the effective functioning of risk management organizations.
- Providing meaningful data on a topic that is grounded within the local context is more likely to raise attention to the issue and encourage action.
- For research to be both useful and used by target audiences, it must be presented in accessible formats. The use of more appropriate terminology would have improved the accessibility of results throughout the organization.

Evaluation Limitations

Limitations of the analytical framework: Having the PI identify informants to test the outcomes can also increase the risk of introducing bias into data collection as informants may be selected for their likelihood to reflect

positively on the project's results and outcomes. To address this limitation, snowballing for additional perspectives and sources of information was undertaken.

Limitations of the data and results: Assessments using the Outcome Evaluation approach rely on informant perspectives. Interviews were conducted a few years after the project concluded, making recall of project details and processes difficult for informants. Some informants struggled to draw connections between contributions made by the GLWFP and other initiatives underway within the BCWS related to gender and leadership. This led to several outcomes being assessed to have unclear project contributions. However, informants that have continued to have a close working relationship with the PI could recall more details of the project and its contributions. As there have been few discussions on the topic of gender and leadership in wildland fire within Canadian media, outcomes relating to public perceptions had insufficient evidence to make an assessment.

Recommendations

Considering the results of the case study evaluation, we propose the following recommendations for the design and implementation of future research projects on gender and leadership in risk-management organizations:

1. Align research with a clearly defined academic, political, and organizational problem to position outputs for use. Aligning research with the organization's strategic direction will support implementation and uptake.
2. Leverage strategic partnerships and actively seek collaboration with relevant actors and boundary partners to foster organizational change through gaining access to data, support for the project, and supporting dissemination and outreach.
3. Tailor communications to target audiences and use language that is appropriate for target audiences to ensure the uptake and use of findings to ensure the effectiveness of the message.

For solutions-oriented research projects:

1. Use a ToC to plan and monitor progress and identify boundary partners that will support intended outcomes.
2. Develop research objectives that aid the structure and purpose of the research project. A set of clearly defined objectives provide a clear direction and scope of the research.
3. Discuss alternative explanations and limitations (including bias) in relation to effect on results to support rigour and transparency.

Introduction

This report presents an outcome evaluation of a research project undertaken by a Royal Roads University (RRU) Master of Arts in Leadership (MAL) student. The focus of the Gender and Leadership in Wildland Fire Project (GLWFP) was to create positive change by enabling an open space for dialogue about gender at the British Columbia Wildfire Service (BCWS) from multiple perspectives; utilize this conversation as the foundation for gender-responsive leadership to emerge in the organization; and share the experience of proactive organizational learning to influence positive change in the broader wildland fire community (Reimer, 2017a). The GLWFP intended to raise discussion of gender and leadership at all levels of the BCWS and contribute to a culture shift towards inclusivity and diversity by presenting evidence-based recommendations for organizational change; support the professional development of the principal investigator (PI); and contribute to the academic discussion on gender and leadership. This evaluation investigates the extent to which and how the GLWFP contributed to intended outcomes. The purpose of this evaluation is to critically assess project design, implementation, and outcome contributions to elicit lessons from the project.

RRU has an explicit mission to teach and generate research that contributes to transformation in students and the world (RRU, 2019). The MAL program encourages the study of relevant real-world problems using interdisciplinary, multi-sectoral, and intercultural approaches to problem-solving for organizations, communities, and society (RRU, 2020). In order to uphold the University's mission and support continuous learning, it is critical to analyze the extent to which and how student research contributes to change and how programming facilitates those contributions. The Sustainability Research Effectiveness (SRE) program at RRU is dedicated to understanding how research contributes to social change, and how those contributions can be improved through research design, implementation, and adaptive management. The SRE program conducts a series of participatory outcome evaluations to support learning for research effectiveness.

This Master's research project is part of a wider assessment of RRU student projects to inform learning for more effective research at the graduate level, but also to inform planning for enabling research effectiveness (Claus, Belcher, Davel, and Jones, 2020; 2021). The GLWFP was selected for its likelihood to make contributions to social change. It had a clearly stated problem and a socially relevant research question; used contextually appropriate research design and methodology; included stakeholders or community members in the research process; and its conclusions demonstrated potential for outcomes.

The evaluation follows a participatory theory-based evaluation approach, using a theory of change (ToC) as the analytical framework. The ToC articulates the theoretical relationships and sequences of steps through which the research project intended to realize outcomes and impacts. The evaluation is an empirical test to assess the extent to which and how the intended outcomes modelled in the ToC were realized. Research design, implementation, and outputs are assessed using an adapted version of Belcher et al.'s (2016) transdisciplinary research quality assessment framework (QAF). The QAF is used to highlight elements of the transdisciplinary research process that were sufficiently implemented by the GLWFP to support the realization of outcomes, and elicit learning on where future considerations could be made when designing and implementing transdisciplinary research (Belcher et al., 2016). The findings of the evaluation are grounded in broader theories of social change processes to explain how and why the project contributed to change.

The evaluation has three main objectives, to:

1. Assess the project's influence;
 - i. Document and test intended outcome realizations and pathways;
 - ii. Draw conclusions about the extent to which intended outcomes were realized and mechanisms of realization, with specific attention given to research project design and implementation;
2. Provide an opportunity for learning and reflection for researchers pertaining to promising research design and implementation practices, and lessons to guide future graduate research; and
3. Critically reflect on the evaluation methodology for future research project evaluations.

Outcome evaluations aim to assess two components of a research project: i) whether or not outcomes are realized; and ii) the extent of the project's contribution to outcome realization. The second component of assessing the project's contribution is especially challenging (Mayne, 2001; 2012; Forss, Marra, & Schwartz, 2011). When projects are situated in complex systems, with multiple actors and processes that affect outcomes in some way, the attribution to any one cause is not possible (Mayne, 2001; 2012). This evaluation acknowledges these challenges by explicitly considering alternative explanations for the documented results, seeking stakeholder perspectives, and applying expert judgement to assess the project's contributions.

Research contributions are typically framed in terms of new knowledge production, such as testing and improving theory and methods, conceptual framework development, and theoretical and empirical analysis, among others (Belcher, 2020). Increasingly, research-based knowledge contributions are solutions-oriented, providing information and options to improve policy and practice. In addition to knowledge, research activities can facilitate and support social processes of change, such as building social and scientific capacities, influencing public discourse and research agendas, and creating new fora or facilitating solution negotiations as ways to influence policy and practice (Belcher, 2020).

The presentation of the report begins with a brief overview of the GLWFP. The methodology section explains in detail the analytical framework used and how data were collected and analyzed to respond to the evaluation questions. The results section answers the evaluation questions using evidence collected from interviews and document review. The lessons learned section discusses the implications of the findings and what was learned from the case study evaluation. The recommendations section outlines considerations for future research in light of the evaluation findings. The appendices provide supplemental information pertaining to the evaluation methods and results.

Case Study Overview

Prior research describes wildland fire culture as a masculine space with clearly defined gender roles, "where wildland firefighters who embody the masculine ideal as a way of being, live, work and interact with perceived freedom from social norms, including perceived freedom from gender diversity" (Reimer, 2017a, p.12). Previous studies reveal that gender discrimination is a prominent factor in the everyday experiences of wildland firefighters and fosters the cultural norm. In the case of the BCWS, self-awareness of and reflection on gender was low. Recently, the wildland fire community has taken steps to broaden its diversity to challenge the status quo of this traditionally "highly masculinized occupation" (Pacholok, 2013, p.3). Within popular media, there was also a growing criticism of the status quo based on the sense that "organizations are not keeping workers safe from gender discrimination and sexual harassment within the wildland fire community" (Reimer, 2017a, p.16). Gender discrimination and the broader concern of a hyper-masculine culture creates an issue at both the individual and organizational level that can lead to potential harm faced by male and female wildland firefighters alike, and has implications for diversity in leadership, decision-making, and risk management (Reimer, 2017a).

An Action Research Engagement (ARE) model framed the GLWFP approach. The PI situated organizational change within appreciative inquiry, which aims to assist organizations in creating "new, generative images for themselves" (Bushe, 1998, p.41). This theoretical approach envisions organizations and their internal challenges not as problems to be solved but "as a solution designed in its own time to meet a challenge or satisfy a need of society, taking a positive, strengths-based stance towards organizational change" (Cooperrider & Whitney, 2005, p.1). GLWFP scoping exercises, including attending conferences early within the research process and preliminary interviews with BCWS leadership, identified the lack of conversation on gender and leadership within the organization; if conversation did take place, it was often covert owing to associated stigma and polarized around legal action. Although the topic was not openly discussed at the practitioner level, the PI's literature review revealed that several academic studies identified dissonance between academic and practitioner knowledge (despite substantial previous research, as findings have failed to be disseminated to research participants and stakeholders resulting in a lack of awareness at the practitioner level). With the practitioner community unaware of previous studies, research was having little to no impact within the day-to-day conversations about gender

within the wildland fire community. In response, the GLWFP aimed to discover and document attitudes and experiences regarding gender and leadership within BCWS. By directly engaging BCWS leadership and members of the organization within research activities, the PI aimed to address the dissonance between academic knowledge and practitioner awareness of gendered experiences and related issues, and organizational culture. This positioned the PI as a knowledge translator and facilitator of an organization-wide conversation on gender in wildland fire. Supporting discussions of gender in the wildland fire community presented an opportunity to create greater receptivity for diversity and inclusivity amongst the wildland fire profession, as well as ensure that diversity in leadership and thinking enables the wildland fire community to mitigate risk effectively and efficiently.

Evaluation Methodology

A series of RRU Doctoral and Master's research projects were selected for evaluation through a systematic review process from an online repository. Seven selection criteria were applied including: (1) a clearly stated problem/issue; (2) a socially relevant research question; (3) inclusion of community or other stakeholders; (4) an articulation of how the project would lead to expected outcomes (implicit or explicit ToC); (5) appropriate research design and application of methods; (6) conclusions with demonstrated potential for outcomes (e.g., provides applicable recommendations); and (7) completed within five years of primary data collection. The GLWFP was selected for its likelihood to contribute to social change. It fulfilled a number of the above criteria in a document review of the abstract and thesis. For example, the GLWFP had a clearly stated problem; used contextually appropriate research design and methodology; included stakeholders or community members in the research process; and its conclusions demonstrated potential for outcomes.

This evaluation examines whether and how the project contributed to organizational practice change that would influence social and environmental change in the study area and beyond. The assessment uses a theory-based evaluation approach to model the intended activities, outputs, outcomes, and impacts, test whether intended results were realized, and analyze the mechanisms of change.

The analysis was guided by the following questions:

1. Research Outcome Evaluation:

- a. To what extent and how were outcomes realized?*
- b. Were there any positive or negative unexpected outcomes from this project?*
- c. Could the outcomes have been realized in the absence of the project?*
- d. Were the assumptions pertaining to why changes were expected sustained?*
- e. Are the higher-level changes likely to be realized?*

2. Research Project Assessment:

- a. What elements of the research design and implementation supported outcome realization, and how?*
- b. To what extent and how did the project engage effectively with relevant stakeholders?*
- c. To what extent were the research findings sufficiently relevant to achieve the stated objectives?*
- d. To what extent and how are target audiences aware of and using the project outputs?*
- e. How does RRU support student success in research?*
- f. What lessons about effective research practice can be learned from this case study?*

The evaluation follows a participatory theory-based evaluation approach, using a ToC as the analytical framework (Figure 2). The Outcome Evaluation method draws on the Payback Framework, Contribution Analysis (CA), and Outcome Mapping (OM), among others, to develop a method to assess research contributions in complex socio-ecological systems (Belcher et al., 2020). It takes a systems perspective, acknowledging that any project operates in conjunction with other actors and social processes and recognizes that causal processes are often non-linear (Belcher et al., 2020). The ToC models the theoretical relationships and sequences of steps through which the research project intended to realized outcomes and impacts. It describes the causal relationships between a project's activities and results, and how these are expected to manifest in outcomes, focusing on the associated

impact pathways, actors, and steps involved in the change process (Belcher et al., 2020). The model works back from long-term goals to identify the conditions that theoretically must be in place for the intended high-level results to occur (Belcher et al., 2020). The necessary evidence to assess the actual achievements that have occurred against the expected outcomes at each stage can then be identified and collected.

Several key concepts from other frameworks have been drawn on including OM's explicit recognition that the relative influence of a project or program declines the further it moves from the project boundary (Belcher et al., 2020). For example, the influence of a research project declines as the project moves from its activities (sphere of control) and who they work with (sphere of influence) to the improved conditions it hopes to effect (sphere of interest) (Belcher et al., 2020). Another key concept borrowed from OM is the focus on outcomes that are proximate to the intervention and occur within the sphere of influence (Belcher et al., 2020). We conceptualize outcomes as changes in knowledge, attitude, skills, and relationships (KASR). A key element of the Outcome Evaluation approach is the explicit distinction of end-of-project (EoP) outcomes, defined as ambitious but reasonable to expect within the timeframe and resources of the project (Belcher et al., 2020). By modelling the ToC developed in a participatory workshop, the Outcome Evaluation method makes relationships between what the project does (activities and outputs) and its aims (outcomes and impacts) explicit. Assumptions are also documented to explain why a change is expected to occur in a particular circumstance. These explicit assumptions can then be tested to inform learning about how a particular change occurs under the conditions of the project and context within which it is situated (Belcher et al., 2020). The Outcome Evaluation method also builds on the RAPID approach by gathering participant and stakeholder perspectives to assess the contribution of various factors, activities, and outputs within a change process. The method also follows the CA approach of articulating and testing alternative hypotheses that can explain key changes (Belcher et al., 2020).

ToC Documentation

The GLWFP did not have an explicit ToC in place. Therefore, as a first step, a participatory ToC workshop was held with the PI in November 2018. During the workshop, the SRE team worked with the PI to document the implicit ToC. The evidence required to empirically test whether or not the outcomes were realized was also identified during the workshop. Data needed to assess each outcome and potential data sources were organized in an evidence table.

Data Collection

Mixed-methods were used to collect the breadth of data needed for a comprehensive outcome evaluation. Data were collected through a review of 28 relevant documents (including project e-mail correspondence, journal articles, magazine articles, blog posts, presentation transcripts, etc.) and 26 semi-structured interviews with 27 informants from three different informant categories (Table 2) (see Appendix 1 for a full list of data sources).

Table 2. Informant and interview details

Informant Group	Number of Interviews Conducted
Researcher	4
Practitioner	21
Government	2
Total	27

Interview questions were formulated to ascertain informant perceptions of the problem context, key challenges and developments, decision-making, and the project's approach and contributions (see Appendix 2 for the interview guide). Snowballing from former project participants for additional perspectives and sources of information was undertaken. Interviews were recorded with informants' permission and transcribed. The evaluation team maintains commitment to the anonymity of these and all evaluation informants by removing identifying information from interview transcripts and evidence presented in this report.

Alternative research metrics (altmetrics) were analyzed to assess the GLWFP outputs as a supplementary data source for outcomes pertaining to the academic pathway to capture the use of a knowledge product or service.

Data were gathered in February 2021 from Google Scholar, ResearchGate, and YouTube. The PI's name, dissertation title, and outputs identified from the dissertation were used as search terms. Altmetric data include usage (e.g., clicks, downloads, views, etc.), mentions (e.g., blog posts, comments, reviews, news media, etc.), and citations (e.g., citation indexes, policy citations, etc.).

Analysis

All evidence was coded thematically and analyzed using NVivo to systematically organize data corresponding to the evaluation questions. Deductive coding was employed using codes adapted from previous evaluation experiences and new codes framed by the specific outcomes of the project. The coding process organizes objective and subjective data from a variety of sources to help understand contextual factors, project contributions, and how outcomes were realized. Two codebooks were used: one to analyze outcome realization; and one to assess elements of research design and implementation (see Appendix 3).

The evaluation team supplemented the research design and implementation assessment by scoring the GLWFP according to an adapted version of Belcher et al.'s (2016) transdisciplinary research quality assessment framework (QAF) to assess the degree to which the project employed transdisciplinary characteristics. The QAF organizes criteria for assessing research design and implementation under the four principles of Relevance, Credibility, Legitimacy, and Positioning for use. Relevance refers to the appropriateness of the problem positioning, objectives, and approach to the research for intended users. Credibility pertains to rigour of the design and research process to produce dependable and defensible conclusions. Legitimacy refers to the perceived fairness and representativeness of the research process. Positioning for use refers to the utility and actionability of the research's knowledge and social process contributions. Full definitions of the criteria can be found in Appendix 4. Four evaluators reviewed project documentation and interviews prior to scoring. Each evaluator scored the criteria independently on a Likert scale (0 = the criterion was not satisfied; 1 = the criterion was partially satisfied; 2 = the criterion was completely satisfied); and averages were calculated for final scores. The scores indicate characteristics that were strong, present but incomplete, or absent in the project.

Typically, theories of change guiding research projects lack grounding in available applied theory about how and why changes occur. To address this shortcoming and in an effort to build more theoretical understanding for project contributions to outcomes, results of the outcome analysis are grounded in theories of social change processes to better understand the theoretical explanations of why changes did or did not occur. We apply theoretical principles from dialectical theory of organizational change (Eskola, 2017), social capital theory (Putnam, 2000), stakeholder engagement theory (Freeman, 1984), and empowerment theory (Perkins and Zimmerman, 1995) to help explain why expected changes did or did not occur in the case of the GLWFP and test whether project assumptions were sustained. These social theories were selected as they are appropriate to the project context and support the casual logic to ground the ToC within relevant theory.

GLWFP Theory of Change

The GLWFP ToC that was developed collaboratively with the PI (Figure 2) illustrates how the PI hypothesized the project's contributions to change at the time of the evaluation. While the project could not anticipate how outcomes would manifest, there were deliberate aspects of the research design and implementation that allowed the project to be responsive to and generate opportunities to support outcome realization.

GLWFP Activities and Outputs

The GLWFP implemented a number of scoping exercises including: a literature review on three main topics of gender, leadership, and wildland fire culture; attending conferences early within the research process to present and develop ideas to the wider wildland fire community; and, preliminary interviews with BCWS leadership to gather organizational knowledge and support for the GLWFP. An inquiry team comprised of organizational members with diverse standpoints and positions of trust, was utilized to pilot test questions and provide feedback on data and subsequent recommendations. The main research activity involved the participation of 240 BCWS members through ThoughtExchangeTM, an anonymous online conversational tool which allowed participants to

GLWFP Theory of Change

Legend ● Activities ● Outputs ● Intermediate Outcomes ● End-of-Project Outcomes ● High-level Outcomes ● Purpose

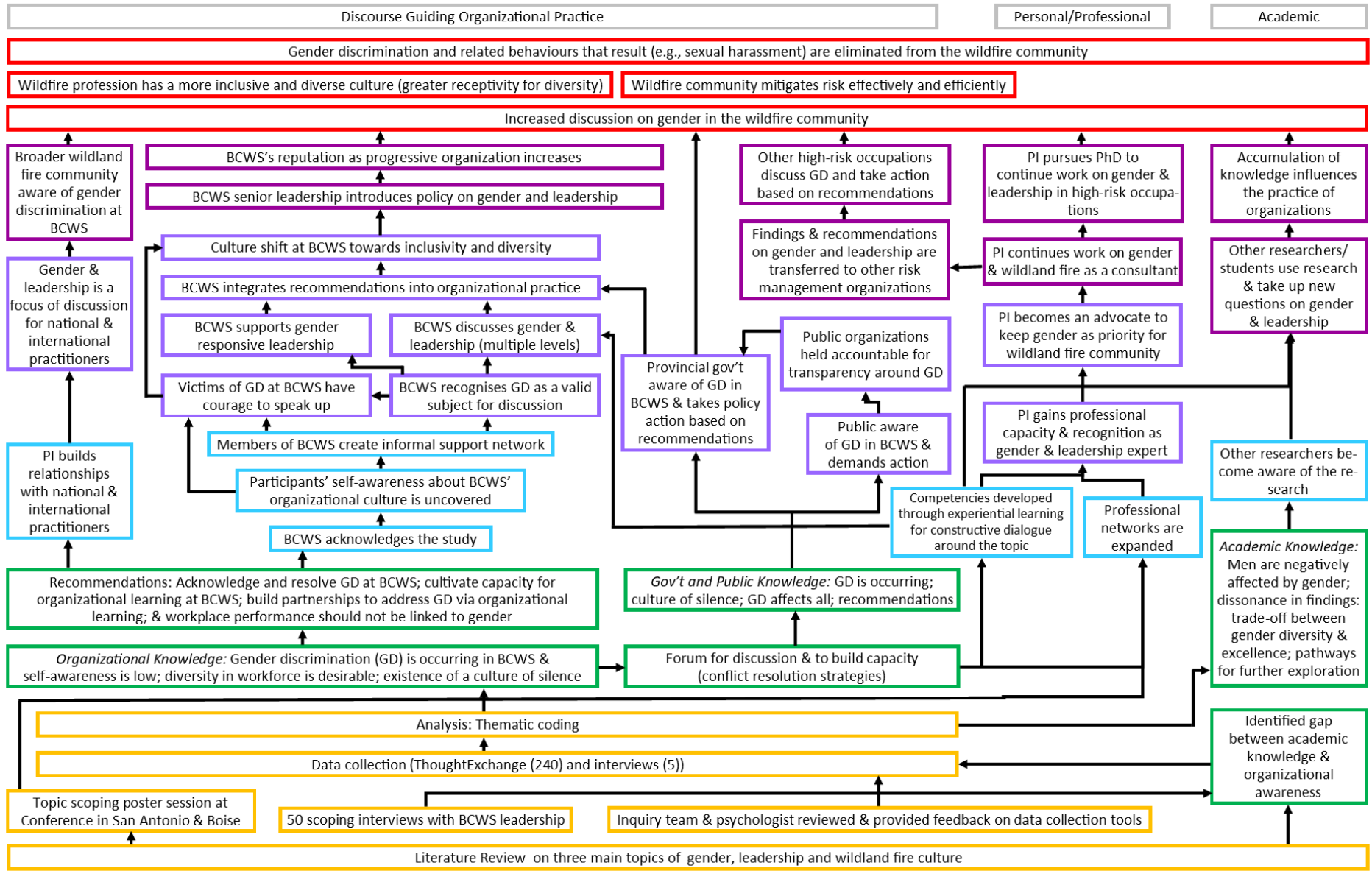


Figure 2. Elaborated GLWFP Theory of Change

share their opinions and perceptions in response to questions, as well as rank other participants' responses in subsequent rounds. This participatory method allowed the PI to view the culture in action. The PI also conducted follow-up interviews with five participants who had contributed to the ThoughtExchange™ activity, which were used to member-check the information gathered and contextualise themes. GLWFP findings reveal that gender discrimination does occur at BCWS and affects how people are treated at work. Dissonance in the findings reveal that negative experiences affecting females were generally not recognised or agreed with in the ranking exercise: for example, in the first round of scoring, some participants indicated that they had experienced gender discrimination and/or sexual harassment. Though when asked to rank importance in the second round, experiences of gender discrimination were not highly ranked. Findings also demonstrate the trade-offs between gender diversity and excellence. The PI suggested that the interaction between gender and leadership is described in a way that positioned feminine leadership characteristics as both desirable and problematic, with the perception that leaders must perform a certain type of leadership to achieve success (e.g., excellence in leadership), yet only leadership performed in more masculine ways is accepted. However, participants desired diversity within the workforce and a number of action steps were suggested by participants that focus on creating conversations about organizational culture more broadly.

By directly engaging all levels of members of BCWS in the research process (from 'boots on the ground', to management, to senior leadership), the GLWFP uncovered evidence that gender discrimination is occurring within the organization and affects both men and women. Other findings include the lack of practitioner self-awareness of gender discrimination, the culture of silence (where the discussion of gender is often stigmatized and silenced within day-to-day conversation), as well as the desire for diversity in the workforce. The GLWFP also created a forum for discussion and capacity-building around topics of gender, leadership, and conflict resolution strategies. With this knowledge, the PI generated recommendations for BCWS to acknowledge and address gender discrimination, cultivate capacity for organizational learning, and build partnerships to support these aims. The PI also assembled and disseminated these findings into outputs targeted for practitioner audiences, government and public audiences, and academic audiences, and engaged these different groups via workshops, conferences, magazine articles and radio interviews.

Intended Outcomes

The GLWFP aimed to contribute to outcomes and impacts through three interconnected pathways: a discourse guiding organizational practice pathway, a personal and professional pathway, and an academic pathway. Each impact pathway identified within the ToC intersects and complements one another to realize outcomes.

Discourse Guiding Organizational Practice

The core impact pathway of this research relates to organizational practice, both at BCWS and beyond. With the GLWFP's intent to support the organization's strategic direction, the identification of dissonance between academic knowledge and practitioner awareness in wildland fire led the research to focus on facilitating a conversation about gender that would influence organizational practice through enhanced self-awareness. Through active knowledge-sharing, it was expected that BCWS would acknowledge the GLWFP and participants directly involved in the research process would become increasingly self-aware of the organizational culture. By providing evidence that gender discrimination exists at an organizational level and creating space for open discussion, it was expected that members of BCWS would create an informal support network around issues raised. Changes in knowledge and awareness across the organization were expected to lead BCWS to recognize gender discrimination as a valid subject for discussion, which would result in further facilitated dialogue at multiple levels in BCWS. The recognition of gender discrimination at multiple levels, as well as the uncovering of participants' self-awareness, would provide victims of gender discrimination at BCWS with the courage to speak up about their experiences which would improve the organizational culture around such issues. It was expected that this would ultimately lead to a culture shift at BCWS towards inclusivity and diversity by influencing organizational self-reflection and increasing awareness of gender experiences at all levels. With a broader awareness of gender discrimination and related issues across the organization, it was expected that BCWS

would integrate GLWFP recommendations and reflect the research findings in policy. It was expected that resulting actions taken to shift organizational culture, improve policies and procedures, and develop gender-responsive leadership would improve practice and staff experiences, and ultimately increase BCWS' reputation as a progressive organization. By sharing findings with public audiences, greater awareness would lead to public desire for accountability and transparency within public organizations. Subsequently, this was expected to influence pressure on the government to act on gender discrimination issues and support a wider discussion on gender discrimination in the public arena. By sharing GLWFP findings and recommendations with relevant ministries of the BC government, such as the Ministry of Forest, Lands, and Natural Resource Operations, the government was expected to support the recommendations proposed by the GLWFP which would facilitate BCWS' uptake and integration within policy. Targeted knowledge-sharing with the international wildland fire community would help build relationships with national and international practitioners who were expected to use the research findings to inform the discussion of gender and leadership within their communities. As gender and leadership becomes a focus of discussion for national and international practitioners, it was assumed that the broader wildland fire community would learn lessons about gender discrimination from the BCWS case.

Personal and Professional

Overall, the research would provide a significant personal and professional development experience for the PI through confidence-building and personal growth. This would enable the PI to expand their expertise, research capacity, and professional recognition as a gender and leadership expert. Engaging in the research experience, particularly in the scoping activities, was expected to expand the PI's professional network and build capacity through enhanced skills. By sharing the research findings and recommendations with BCWS, various ministries within BC government, the public, and within academia, the PI was expected to gain professional capacity and recognition as a gender and leadership expert which would subsequently enhance opportunities for influence and career prospects. Enhanced career prospects would support the PI in continuing their work on gender and leadership as a consultant at BCWS and in other high-risk sectors. As a consultant for BCWS, the PI would be able to actively support the implementation of project findings and recommendations, such as through the design and development of workshops for the BCWS community. Opportunities to increase discussion on gender in the wildland fire community were expected to support a more inclusive and diverse culture that would subsequently improve staff experiences at BCWS. Through additional consultancy work with other high-risk and nature-based sectors, the PI's findings and recommendations would be transferred to other risk management organizations. It was expected that the MAL research experience would lay the foundations for the PI's professional and academic trajectory to pursue additional post-graduate studies.

Academic

The GLWFP was expected to advance academic knowledge on gender and leadership topics and wildfire practice. A combination of feminist and appreciative inquiry approaches in conjunction with an ARE approach was expected to capture the PI's direct experiences of working as a female initial attack crew leader in BCWS. This approach, as well as the data collected through the participatory research process with BCWS staff, would highlight the role that gender plays in firefighting culture and wildland fire leadership. The research would identify several pathways for further exploration including perceived favoritism towards females in wildland fire and the experiences of female wildland firefighters as they transition from crewmember to crew leader. Through dissemination to the academic community, it was expected that other researchers would become aware of the GLWFP, cite it, and use it to take up new questions on gender and leadership in wildland fire or other contexts. Other researchers would be able to contribute to knowledge and discourse on gender and leadership by testing and sharing conflict facilitation and resolution strategies to address gender discrimination in similar male-dominated risk-prone professions. It was expected that this increased traction in academic discussions would lead to an accumulation of knowledge that influences the practice of BCWS and other organizations to develop greater receptivity for diversity and inclusivity.

Assumptions

Assumptions were documented for each outcome and then aggregated to the project level on the basis of common themes. The ToC rests on the following ten assumptions:

1. The GLWFP exposes participants to interdisciplinary perspectives on the topic of wildland fire, gender, and leadership
2. Partners are receptive to and develop an interest in the topic
3. The PI's insider perspective within the organization positions them well to influence change
4. There is a need for improved policy and practice to respond to gender discrimination in wildland fire, and partners recognise this need
5. There are appropriate support systems in place for open dialogue on gender and leadership in wildland fire, and participation in the GLWFP is an empowering experience
6. The recommendations are useful, practical, and accessible for implementation, and were sufficiently rigorous to be taken seriously
7. Dissemination through networks and knowledge-sharing are effective means to raise attention to an issue
8. The research effectively identified a gap and made an original contribution to the topic
9. Researchers already have an interest in the topic and seek out new and available information
10. A Master's degree holds universal recognition and provides the opportunity to expand on research capacities and expertise (professional networks, etc.)

Results

Outcome Evaluation

To what extent and how were outcomes realized?

Extent of Outcome Realization

Detailed results and supporting evidence of outcomes are provided in Appendix 6. The GLWFP clearly contributed to the partial or full realization of eleven of the nineteen intermediate and end-of-project outcomes. Most outcomes related to developing and sustaining a conversation on gender and leadership within the BCWS by raising awareness of the study within the organization and giving victims of gender discrimination the courage to speak up about their experiences. Intermediate and end-of-project outcomes relating to the PI's professional development were realized and focused on the PI's development of networks and competencies to continue work on gender and leadership, and be recognized as an expert in the topic. However, direct contributions by the GLWFP to BCWS changes or improvements in policy were questioned by some informants. For example, although the PI worked in partnership with the BCWS following the completion of the GLWFP to implement some of the suggestions made by research participants, resistance to organizational change within the BCWS and an end to the collaborative relationship led to GLWFP recommendations not being integrated into the organizational practice. Although the GLWFP may have indirectly contributed to changes in the BCWS around gender and leadership, it is difficult to attribute any changes directly to the GLWFP due to a number of alternative initiatives taking place at the same time as the project.

There is insufficient evidence to assess whether the GLWFP supported outcomes related to the public sphere. For example, there have been minimal discussions on the topic of gender and leadership in wildland fire within the media, with the media continuing to portray the stereotypical masculine, male-firefighter which makes it challenging for feminine firefighters to see themselves moving to leadership positions. Due to the nature of the occupation, it is also unlikely that the public consider wildland fire services unless there is a direct threat of fire; it is therefore unlikely that the public would be aware of gender discrimination within the BCWS. Lastly, there is minimal evidence as to whether provincial government have taken action on gender discrimination based on the GLWFP recommendations. Due to difficulty accessing government informants, only two individuals were interviewed for this evaluation. Having been directly involved in the GLWFP, these informants were aware of the project but note that there have been few changes that have been taken which are a direct result of the work by the GLWFP. We summarize the findings of the outcome evaluation in Table 3. Figure 3 illustrates the assessment of outcome realizations using the ToC.

Table 3. Summary of the GLWFP outcome assessment, supporting evidence, and consideration of contextual factors and causal mechanisms affecting outcome realization (see Appendix 6 for a more detailed assessment).

Results	Illustrative Evidence	
Outcome Assessment	Summary of supporting evidence for the assessment	Contextual factors and causal mechanisms affecting how the outcome was realized
PI builds relationships with national and international practitioners [intermediate outcome]	<ul style="list-style-type: none"> 25 of 27 interview informants were aware of the GLWFP including members of the BCWS, researchers, wildland firefighters from other Canadian agencies, and international practitioners from wildland firefighting and national park organizations Comments from national and international wildland firefighters show a large network of practitioners who know 	Facilitating factors: <ul style="list-style-type: none"> The PI's professional relationships with practitioners were a key component to raising awareness of the GLWFP and its results Completing the MAL at RRU allowed the PI to build relationships with other research-practitioners outside of wildland firefighting, and provided the PI with perspectives from other risk-management

<p>Realized, clear project contribution</p>	<p>the PI and the GLWFP. Relationships also expand outside of wildland firefighting to individuals in other risk-management organizations (interviews)</p>	<p>organizations who had explored the topic, and coaching of how to deal with personal challenges of researching a sensitive topic</p> <ul style="list-style-type: none"> • Presenting GLWFP findings at conferences supported network- and relationship-building with national and international practitioners • PI built relationships with other researchers exploring similar topics, which resulted in collaborations on academic articles <p>Alternative explanations:</p> <ul style="list-style-type: none"> • The PI built some relationships with national and international practitioners through initiatives external to the GLWFP (e.g., WTREX)
<p>BCWS acknowledges the study [intermediate outcome]</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> • The majority of respondents believed that the BCWS acknowledged the study, found it valuable, shared communications about the GLWFP to all levels of staff, and was interested to follow-up action in line with broader issues of a safe and welcoming work environment (interviews) • The GLWFP was successful at facilitating conversations on the topic with the leadership team to gain organizational acknowledgement (documents) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • The relationships and connections that the PI had with the senior members of BCWS prompted leadership to acknowledge the GLWFP and the issue of gender discrimination within the organization • Allowing the PI to explore the topic on an organizational level sent a message to all members of the BCWS that leaders (particularly support from female leadership at highest levels of the BCWS and government actors) acknowledge the topic to be an important area of focus <p>Barriers:</p> <ul style="list-style-type: none"> • Obtaining support from some leadership at the start of the GLWFP and following the presentation of recommendations was challenging • There were suggestions for a focus on all types of diversity, rather than focusing solely on gender which resulted in momentum for implementing the GLWFP recommendations to be lost
<p>Participants' self-awareness about BCWS culture is uncovered [intermediate outcome]</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> • As the BCWS discussed and acknowledged the GLWFP, members of the organization started to understand the organizational culture in more detail and became aware of gender discrimination (interviews) • Some participants' perspectives on the topic of gender and leadership within wildland fire have been permanently changed by the GLWFP (interviews). For example: <ul style="list-style-type: none"> • Participants gained awareness of their hidden assumptions about masculinity and femininity in leadership during the research process (documents) • Participants became more aware of discrepancies between the male and female experience of organizational culture and how both genders experience male-dominated groups (interviews) • Participants gained a better understanding and validation of their own experience and increased awareness to help navigate interactions in the workplace (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • Taking part in the GLWFP enabled participants to become more aware of the BCWS culture and have a deeper understanding of gender within the organization • The act of participating in the research process may have prompted participants to think about the issue in different ways and raise their awareness of the organizational culture <p>Barriers:</p> <ul style="list-style-type: none"> • Historically, the wildland fire community has struggled with the topics of gender and leadership and remain an issue across the sector as a whole, not just within the BCWS <p>Alternative explanations:</p> <ul style="list-style-type: none"> • Participants have also become more aware of organization culture and power dynamics through the increased number of voices and personal experiences that are being shared on the topic in day-to-day interactions

	<ul style="list-style-type: none"> Without the GLWFP, awareness of gender discrimination and BCWS culture would not be as high as it is now (interviews) 	
<p>Members of BCWS create informal support network [intermediate outcome]</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> The GLWFP motivated some female leaders within the BCWS to become role models for women starting their careers who aspire to become leaders themselves (interviews) The PI became an informal support network for members of the BCWS; for example, some BCWS managers and supervisors put individuals who had faced issues of gender discrimination in contact with the PI (interviews) <ul style="list-style-type: none"> Managers and supervisors at the BCWS have also used the PI as a form of support and knowledge for what to do in situations of gender discrimination (interviews) At the organizational level, it was suggested that the GLWFP supported the creation of a helpline established by Wildfire Services to provide support to staff who had experienced issues related to gender discrimination. The GLWFP was a catalyst for the safe reporting line which is considered an asset to the BCWS and its employees, not only in terms of gender discrimination, but other supports (e.g., mental health) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> The GLWFP succeeded in starting a conversation on the topic and normalized discussion of gender and leadership within the organization The GLWFP encouraged members of the BCWS to discuss their own experiences of gender discrimination more openly and feel more comfortable doing so
<p>Gender and leadership are a focus of discussion for national and international practitioners [EoP outcome]</p> <p>Realized, unclear project contribution</p>	<ul style="list-style-type: none"> Since the PI's presentation of the GLWFP results at the Wildland Fire Canada Conference in 2016, informants have witnessed increased discussion on the topic (interviews) The success the PI had in creating an open discussion with BCWS on the topic demonstrated to practitioners that it is possible and how to facilitate a dialogue within their own agencies (interviews) American practitioners have used the GLWFP to acknowledge that there is a wider cultural problem within wildland fire and the topic should be a focus for discussion (interviews) The GLWFP is said to have been the catalyst for the CIFFC gender forum which created a series of recommendations including the need to look into approaches that can be taken nationally to increase the awareness of issues around gender discrimination (interviews) The GLWFP also contributed to the argumentation around the need for a national survey on equity, diversity and inclusion (EDI), and supported CIFFC in securing federal funding as it is one of the papers that is commonly referenced to show that there is a gender issue within wildland fire (interviews) The Association for Fire Ecology published a position paper on gender discrimination and harassment in 2015 which 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> Presenting at conferences throughout the research process supported increased awareness of the topic for national and international practitioners Publishing in widely read and well-respected sources of information, such as the Wildland Fire Lessons Learned publications, expanded influence of the GLWFP to an international audience <p>Alternative explanations:</p> <ul style="list-style-type: none"> An increase in the wider public and cultural understanding of the topic, including the #MeToo movement Within the United States, there have been a number of high-profile cases within land management agencies that have increased focus on sexual harassment, sexual discrimination, and sexual assault

	supported the topic in becoming a focus of discussion for national and international practitioners. The PI was involved in the data analysis stages of this paper due to their increased professional exposure through the GLWFP (interviews)	
<p>Victims of gender discrimination at BCWS have courage to speak up [EoP outcome]</p> <p>Partially realized, clear project contribution</p>	<ul style="list-style-type: none"> • There have been increased numbers of individuals speaking up about gender discrimination at the BCWS, which has had a positive impact on the wider wildland fire community (interviews) <ul style="list-style-type: none"> • For example, fewer employees are leaving the BCWS without having discussed their experiences of the organizational culture providing learning opportunities for the BCWS (interviews) • The GLWFP started a conversation on the topic and encouraged victims to discuss their experiences and feel more comfortable doing so (interviews) <ul style="list-style-type: none"> • For example, victims of gender discrimination have turned to the PI to share stories, which has given some victims the courage to continue their work and make sense of their experiences (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • The methodology used by the PI (e.g., ThoughtExchange™ process) enabled individuals to share and self-reflect their perceptions and experiences while protecting their anonymity <p>Barriers:</p> <ul style="list-style-type: none"> • Despite the existence of avenues for victims of gender discrimination to speak up, some informants believe that ostracization still occurs <p>Alternative explanations:</p> <ul style="list-style-type: none"> • The GLWFP has been a part of a wider organizational catalyst for change to open the conversation on culture and gender within the BCWS • An individual letter from a female firefighter which discusses the daily rhetoric of the organizational culture was cited as the main catalyst for change within the organization as the letter indicated strong mental health impacts which sparked a conversation to reflect on how people treat each other within the organization • The safe reporting line created by the BCWS has supported staff in sharing their experiences within the workplace
<p>BCWS recognizes gender discrimination as a valid subject for discussion [EoP outcome]</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> • Members of the BCWS at all levels are aware that there is discrimination happening in the workplace and conversations on gender discrimination are now being comfortably had at all levels of the organization (interviews) • Resources have been allocated to address issues pertaining to the topic of gender discrimination at the BCWS and issues related to inclusivity and diversity are now foci within the BCWS (documents, interviews) • The safe reporting line, to which the GLWFP was a catalyst for its creation, is an indication of raised awareness of the issue and recognition of gender discrimination as a valid subject for discussion (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • The GLWFP created space for gender to be discussed at the BCWS, which spread awareness of experiences of gender discrimination within the organization • Women in senior leadership positions at the BCWS supported the project, the organization's recognition of gender discrimination, and putting gender-related issues on the agenda <p>Barriers:</p> <ul style="list-style-type: none"> • Some leaders stated that the BCWS should focus on all types of diversity rather than focusing solely on gender <p>Alternative explanations:</p> <ul style="list-style-type: none"> • External factors such as the #MeToo movement and other societal events have highlighted the topic and encouraged momentum within organizations to implement change • Stories of personal experiences of staff within the BCWS have been increasingly shared with senior leadership, which have also been a strong catalyst for change

<p>BCWS discusses gender and leadership (multiple levels) [EoP outcome]</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> • The GLWFP enabled the topic to become more openly discussed at the senior leadership level of the BCWS, including within meetings, with the topic also being discussed throughout the organization (interviews) <ul style="list-style-type: none"> • Fire centers across BC have held team discussions on gender and leadership, gender discrimination, and other issues of inequality within the BCWS which has supported both full-time and seasonal staff feeling more comfortable discussing the topic (interviews and documents) • There has been an increase in staff approaching managers one-on-one to discuss gender-related issues and experiences (interviews and documents) • The GLWFP provided some individuals with knowledge and information to answer questions on the topic of gender and leadership posed to them within their roles at BCWS <ul style="list-style-type: none"> • The GLWFP equipped informants with well-informed, credible information which enabled them to drive the topic forward (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • The GLWFP successfully facilitated conversations on the topic with the leadership team and worked closely with senior leaders to prompt reflection and build momentum for conversation on the topic • Conversations with the PI provided senior leaders with the knowledge and framing for how to have dialogue on the topic of gender and leadership <p>Alternative explanations:</p> <ul style="list-style-type: none"> • Some members of the BCWS were having discussions on gender and leadership prior to the GLWFP • At the executive level, the letter from a female member of the BCWS is noted to have been the driving force by sparking a conversation to reflect on how staff treat each other within the organization and showed that change was needed
<p>BCWS supports gender-responsive leadership [EoP outcome]</p> <p>Partially realized, unclear project contribution</p>	<ul style="list-style-type: none"> • There has been more support for gender-responsive leadership, as well as increased encouragement for women to apply for leadership positions within the BCWS; the GLWFP was a catalyst towards gender-responsive leadership, but it was not the only catalyst (interviews) <ul style="list-style-type: none"> • The BCWS now supports members of the organization to progress to positions where they can have the most influence, rather than hiring within stereotypical norms (interviews) • There has also been a recent shift in the way the BCWS hires leaders (e.g., a focus on hiring leaders as opposed to ‘good’ firefighters) (interviews) <ul style="list-style-type: none"> • However, there are certain leadership positions that remain male-dominated (e.g., operations chief, zone management roles) (interviews) 	<p>Barriers:</p> <ul style="list-style-type: none"> • Only a small number of female hires are retained long enough to gain the experience needed to move into leadership roles • Leadership is not yet based fully on merit. For example, it is suggested that some hiring of women can be seen as ‘overcompensating’ or ‘ticking a box’ • Meaningful change to culture has been slow; to see the full effects in hiring practice change, more time will need to pass • Organizationally, informants suggest that the BCWS supports gender responsive leadership, but it is not endorsed as much in certain fire centers; informants are not convinced that gender responsive leadership is happening across the organization <p>Alternative explanations:</p> <ul style="list-style-type: none"> • BCWS have used GBA+ training partially, but larger delivery of this training needs to be invested in by the organization
<p>BCWS integrates recommendations into organizational practice [EoP outcome]</p> <p>Partially realized, unclear project contribution</p>	<ul style="list-style-type: none"> • Following the GLWFP, the PI worked in partnership with the BCWS to implement some of the suggestions made by research participants <ul style="list-style-type: none"> • For example, the PI developed a program of workshops in partnership with the BCWS to address leadership issues within the organization (interviews) • These kick-off training sessions and increased discussion on the topic due to the GLWFP has since evolved into a 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • The BCWS saw the GLWFP as valuable and were interested in continuing work on the topic of gender and leadership which aligned with broader issues of workers’ health, safety, and well-being • The PI was proactive in attempting to influence change by continuing to collaborate with the BCWS on the topic via consultations • The GLWFP recommendations are national in scope and are transferable to diverse contexts

	<p>new stream of BCWS' work and supporting staff leadership development (interviews)</p> <ul style="list-style-type: none"> • However, some participants suggested that the BCWS have not implemented any GLWFP recommendations (interviews) • There are also indirect parallels between current BCWS initiatives and the GLWFP recommendations (interviews) <ul style="list-style-type: none"> • Provinces across Canada have started to implement change that aligns with the GLWFP recommendations, but this is not a direct result of the project (interviews) 	<p>Barriers:</p> <ul style="list-style-type: none"> • Resistance to organizational change within the BCWS persists • The GLWFP was viewed as a small case study that was not applicable to the wider organization
<p>Culture shift at BCWS towards inclusivity and diversity [EoP outcome]</p> <p>Partially realized, unclear project contribution</p>	<ul style="list-style-type: none"> • The GLWFP contributed to an overall shift in culture, was a catalyst, and has been used as a justification to continue work on the topic <ul style="list-style-type: none"> • The GLWFP fed into the People First initiative, a program focused on equality within the BCWS (interviews) • The GLWFP was suggested by some informants as a catalyst for change on the gender element of workplace culture; however, culture also includes aspects of mental health, stress, ethnicity, etc. (interviews) • Wildland fire as a profession is currently undergoing cultural transformation <ul style="list-style-type: none"> • The BCWS has taken steps to create more diverse opportunities for all employees, which has led to positive growth, although this may not be a direct result of the GLWFP (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • The BCWS recognizes gender discrimination as a valid subject for discussion and identified the need to create a culture of inclusion <p>Barriers:</p> <ul style="list-style-type: none"> • Cultural change is a slow and gradual shift; it will take time for the results of initiatives to be realized <p>Alternative explanations:</p> <ul style="list-style-type: none"> • There has been a shift for cultural improvement across the BCWS which is focusing on all aspects of equality; culture is broader than gender <ul style="list-style-type: none"> • The BCWS has invested time, resources, and energy into the creation of a more inclusive and diverse workforce • The People First initiative has contributed to a shift in culture to create a more inclusive and diverse workplace • The BCWS's partnership with Roy Group invested in stronger leadership development
<p>Provincial government aware of gender discrimination in BCWS and takes action based on recommendations [EoP outcome]</p> <p>Partially realized, unclear project contribution</p>	<ul style="list-style-type: none"> • Two government informants were aware of the GLWFP and noted that they were aware of gender discrimination occurring at the BCWS (interviews) • However, there is minimal evidence as to whether the provincial government has taken action based on GLWFP recommendations. Some informants suggested that there has not been any policy or government changes that are a direct result of the GLWFP (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • Having two female leaders in senior positions of the BCWS and within government supported the topic being placed on the organizational agenda and enabled conversation at the national level among key stakeholder groups
<p>Public aware of gender discrimination in BCWS and demands action [EoP outcome]</p>	<ul style="list-style-type: none"> • There is insufficient evidence to assess whether the GLWFP supported public awareness of gender discrimination within the BCWS and demanding action <ul style="list-style-type: none"> • The PI was invited to discuss the GLWFP and preliminary findings on the CBC Radio in Kamloops, BC; the reach of this on-air interview is unknown (Doc7) 	<p>Barriers:</p> <ul style="list-style-type: none"> • The media generally portray and reproduce a narrative of masculinity with the firefighting profession; this creates difficulties in changing the stereotype, and also presents challenges for women and more feminine individuals to believe that they can succeed

<p>Insufficient evidence</p>	<ul style="list-style-type: none"> Although repeatedly asked about their own experiences, the PI chose to speak from the objective perspective of a researcher within this radio interview. The PI did not want to draw sensationalized attention by sharing personal experiences; this likely explained why there were lower levels of public awareness (sensationalizing the issue as a whistleblower would have likely garnered more reactive attention, but detracted from the academic lens the PI wanted to build) (personal communication) Informants were unaware of any discussions other than the PI's radio interview on the topic within media (interviews) 	<ul style="list-style-type: none"> The public do not usually consider wildland fire services unless there is a direct threat of fire. Therefore, it is unlikely that the public would be aware of gender discrimination within the BCWS Micro issues such as gender discrimination within the BCWS are challenging to make macro issues within society; it is unlikely that the public are aware of or demand action on the topic
<p>Public organizations held accountable for transparency around gender discrimination [EoP outcome]</p> <p>Insufficient evidence</p>	<ul style="list-style-type: none"> There is uncertainty as to whether public organizations are held accountable for transparency around gender discrimination <ul style="list-style-type: none"> The GLWFP did not provide local unions with the opportunity to hold the BCWS accountable to allegations of gender discrimination (interviews) The PI did have a meeting with a union colleague to explore options to hold public organizations accountable. However, the only option presented to the PI was not viable due to their transition out of employment with the BCWS at the time. This would have been viewed as a personal complaint rather than utilizing the GLWFP as a general input to improve employment standards or address gender issues (personal communication) However, the GLWFP brought the issue of gender and leadership to the forefront of discussion for the BCWS, which has encouraged the organization to be more transparent in addressing issues as they arise (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> Through the applicability of the findings for wildland fire agencies in both the Canada and the US, the GLWFP encourages agencies to be accountable and take action on the topic <p>Barriers:</p> <ul style="list-style-type: none"> It is suggested that victims do not feel like they are getting support when a union investigation is carried out, rather they feel like they are being revictimized. Victims require support from both their employer as well as their union <p>Alternative explanations:</p> <ul style="list-style-type: none"> The wildfire subcommittee (Article 29) has both wildfire and union representatives to discuss how to make the workplace safer and improve employment. It is focused on collaborative problem solving to create a safe and inclusive workplace
<p>Competencies developed through experiential learning for constructive dialogue around the topic [intermediate outcome]</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> The MAL provided the PI with the opportunity to develop their competencies to implement and continue a constructive dialogue on the topic (interviews) The PI continues to use skills and competencies developed within their current work to lead and manage constructive dialogues on the topic (interviews) The PI was eager to continue to enhance their competencies by implementing the lessons learned to create change at the BCWS (interviews) The PI enhanced their presentation and writing skills via presentations, peer-reviewed publications, and professional magazines (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> Coursework and engagement with research participants developed the PI's competencies as a lead researcher The research experience enabled the PI to learn how to manage power within focus groups and ensure a constructive conversation

Professional networks are expanded [intermediate outcome] Realized, clear project contribution	<ul style="list-style-type: none"> • The PI built professional connections within the MAL cohort, which resulted in a mentor-like relationship <ul style="list-style-type: none"> • Other students in the cohort had insights and experience working on gender in high-risk occupations (interviews) • The PI has opportunities to expand their professional networks with researchers and practitioners while attending conferences (interviews) • The GLWFP was shared with professionals outside of the BCWS, including those working in other risk management organizations; these networks emerged from the project and were not established prior to the GLWFP (documents) 	Facilitating factors: <ul style="list-style-type: none"> • The mentor-like relationships within the cohort offered the PI insights into how other risk management organizations had approached and addressed similar issues on gender and gender discrimination • By sharing their research at conferences throughout the research process, the PI successfully built professional connections and networks with practitioners across the sector • By publishing articles within academic journals and well-known wildland fire publications, the PI built connections with practitioners across the sector
PI gains professional capacity and recognition as gender and leadership expert [EoP outcome] Realized, clear project contribution	<ul style="list-style-type: none"> • The PI gained professional capacity and recognition as a gender and leadership expert both within the practitioner sphere and the academic sphere; informants expect this recognition will continue to grow (interviews) • For example, the PI is viewed as a leader in the topic and the first person many practitioners and academics associate with gender and leadership in Canadian wildland fire (interviews) <ul style="list-style-type: none"> • Informants have also referred others looking for information on the topic to the PI (interviews) • Following the GLWFP, the PI was hired by the BCWS as a gender and leadership consultant and was invited to present at a number of conferences (interviews) • The PI has also been hired by the US Forest Service as a consultant on gender and leadership (interviews) 	Facilitating factors: <ul style="list-style-type: none"> • The PI received a number of academic awards for the GLWFP, supporting their recognition as a topic expert • Completing a Master's degree provides a level of credentialization which gave the PI the confidence and motivation to continue working on the topic • Completing the GLWFP and creating a productive discussion on the topic gave the PI the perceived legitimacy to be viewed as an expert in the field and led to other risk-management organizations hiring the PI as a consultant Alternative explanation: <ul style="list-style-type: none"> • It is difficult to discern if the PI is recognized as a gender and leadership expert at the international level as much of the PI's work has focused on the Canadian context
PI becomes an advocate to keep gender as priority for wildland fire community [EoP outcome] Realized, clear project contribution	<ul style="list-style-type: none"> • The PI continued to advocate to keep gender as a priority following the GLWFP by working as a consultant at the BCWS (interviews) • As a consultant, the PI was a source of information for BCWS staff, having shared relevant articles on the topic and ensuring gender remains a priority within the organization (interviews) • The PI has continued to work with the Wildland Fire Lessons Learned Centre to increase discussion and awareness on gender in wildland fire (interviews) • The PI is a leader in the movement within Canada to address gender and leadership in wildland fire (interviews) 	Facilitating factors: <ul style="list-style-type: none"> • Graduating from the MAL program with a distinction provided the PI with the confidence and motivation to continue work on the topic • The PI has the knowledge and experience on the topic and can empathize with staff who may be facing challenges around gender and leadership, making the PI a source of support for practitioners Barriers: <ul style="list-style-type: none"> • Barriers and constraints, including a resistance to organizational change and a change in leadership within the organization led to the end of the PI's consulting work at the BCWS
Other researchers become aware of the research [intermediate outcome]	<ul style="list-style-type: none"> • Researchers within the practitioner and academic spheres have become aware of the GLWFP through the PI sharing the findings at conferences, through professional networks, and by publishing articles to support knowledge dissemination (interviews, documents) 	Facilitating factors: <ul style="list-style-type: none"> • The PI proactively presented at and attended conferences throughout the GLWFP research process

<p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> • Altmetrics reveal that the GLWFP thesis has been cited by three articles, including by leading researchers within the field <ul style="list-style-type: none"> • Other academic outputs published by the PI received a further seven citations and focus on issues related to gender and wildland fire internationally • The PI's presentations at conferences have increased awareness of the topic, the GLWFP findings, and may have led to the creation of the CIFFC gender forum (interviews) • Direct conversations with the PI have inspired others to explore the topic, including elements of gender and leadership they were not aware of prior to the GLWFP (interviews) • Informants in other high-risk occupations are aware of the GLWFP owing to the professional networks built with the PI; the GLWFP solidified their own perceptions on the topic and provided other high-risk organizations with the opportunity to complete their own research on gender and leadership (interviews) • Informants have referred other researchers interested in exploring the topic to the GLWFP which has led to further references and citations of the findings (interviews) 	<ul style="list-style-type: none"> • The PI continues to publish in academic and practitioner-focused journals to share results and findings from the GLWFP • The MAL program continues to use the GLWFP as an example of excellence for future students, which has resulted in increased awareness of the GLWFP by researchers • Some researchers have used their senior positions within the academic community to share the PI's findings and ensure the research is heard by a larger audience <p>Barriers:</p> <ul style="list-style-type: none"> • Some researchers in other high-risk occupations are unaware of the GLWFP and note that there continues to be barriers between knowledge-sharing in academic and practitioner spheres <p>Alternative explanations:</p> <ul style="list-style-type: none"> • The increased sharing of wildland firefighters' first-hand experiences of gender discrimination has been a driving factor for some informants to conduct further research on the topic
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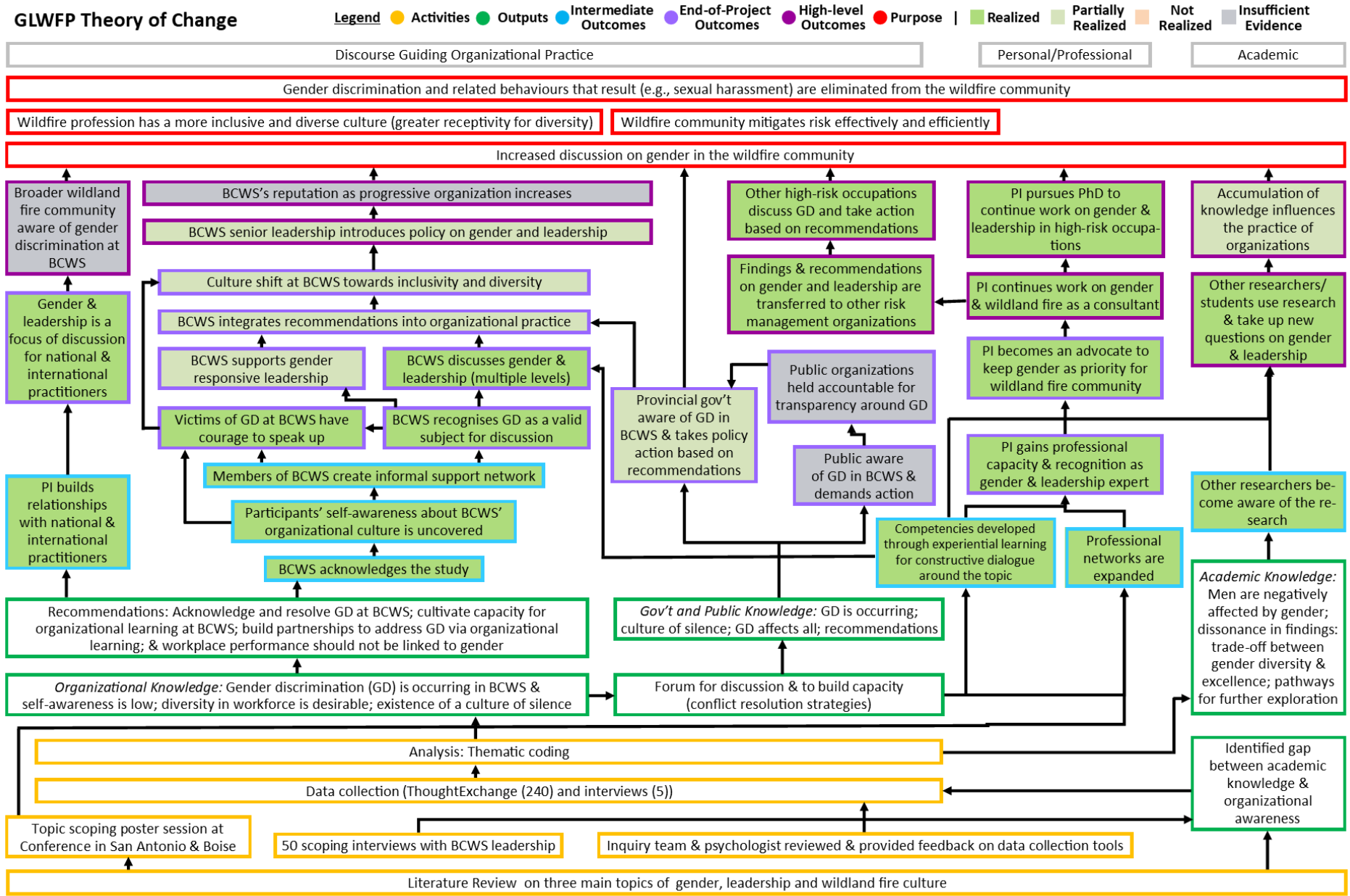


Figure 3. GLWFP Theory of Change, with outcomes colour-coded to reflect extent of outcome realization

Mechanisms Leveraged by the Project

The GLWFP leveraged mechanisms of change that spanned across multiple impact pathways (Table 4). Some of the same mechanisms supported outcome realization in different pathways, demonstrating the multiple ways in which a single mechanism can be leveraged to support various change processes.

Table 4. Mechanisms of outcome realization by pathway leveraged by the GLWFP using Belcher et al.'s (2019) classification

Mechanism	Pathway		
	Discourse Guiding Organizational Practice	Personal/Professional	Academic
Scientific knowledge increased/knowledge gap filled	✓	✓	✓
Methods developed and/or refined	✓		✓
Knowledge co-produced	✓		
Research agenda influenced			
Alignment of research with parallel issues/initiatives	✓		
Capacity of actors in system improved	✓	✓	
Coalitions strengthened or created	✓		
Policy window opportunity realized			
Reputation leveraged or enhanced	✓	✓	✓

Within the discourse guiding organizational practice pathway, the GLWFP was designed to: facilitate a conversation about the experience of gender and leadership within the BCWS by identifying gaps in current research by adding the voices of wildland firefighters to the academic conversation (Reimer, 2017a). The GLWFP was the first survey of its kind within the BCWS, and the BCWS is noted to have been the first wildland fire agency to engage with research into the topic of gender and leadership (Reimer, 2017a). The GLWFP was also the first AR project undertaken on gender within the wildfire profession globally (Reimer, 2017a). Thus, the BCWS case study filled a scientific knowledge gap. The GLWFP also exposed participants to interdisciplinary perspectives on the topic of fire and gender. By involving a wide range of participants from all levels of the BCWS, from 'boots on the ground' to senior leaders, the GLWFP stimulated reflection that increased participants' self-awareness about BCWS' organizational culture and served to fill individual knowledge gaps. The GLWFP was the first published study that used the ThoughtExchange™ tool, providing an opportunity to test and refine the tool as a method. The tool enabled the collection of a unique set of layered data and stimulated a reflective and data-interactive process for participants that likely would not have been possible using more traditional research methods. GLWFP partners were receptive to and developed an interest in the research owing to the alignment of the research with parallel issues, such as leadership. Recommendations were co-produced with participants and built from suggested action steps put forward by participants within the data collection process as well as ongoing conversations with the project sponsors within the BCWS (Reimer, 2017a). The inquiry aligned with the delivery of BCWS' strategic goal of excellence in people and was undertaken at a time of substantial international interest in the experiences of female firefighters and gender discrimination in the wildland fire community (Reimer, 2017a). In addition to increasing academic and political conversations on the topic, the GLWFP also aligned with significant interest among popular and investigative media on the topic including the increased discussion of gender discrimination raised from personal stories, and the media conversation around the #MeToo movement. Some outcomes would not have been contributed to without these alignments, such as gender and leadership are a focus of discussion for national and international practitioners. Capacity-building was a mechanism built into the GLWFP to support intended changes within the BCWS. The project aimed to build the capacity of actors in the system to discuss gender openly in wildland fire by encouraging reflection and self-awareness of the role of gender in day-to-day interactions, in efforts to shift the cultural norm within the BCWS. Capacity-building also supported victims of gender discrimination to gain courage and be equipped to express their experiences, although this is not discussed in detail in GLWFP documentation. Following the project, managers were also better equipped to discuss sensitive topics with staff related to gender and recognize potential signs of gender discrimination in the workplace. Participation in the GLWFP was an empowering experience for

participants and there are now appropriate support systems in place to improve the capacity of actors in the system, such as coalitions of support. Unfortunately, the GLWFP was unable to leverage a potential organizational policy window as a result of the end in the formal collaboration between the PI and the BCWS. This halted formal uptake of GLWFP recommendations into the organization's policies. The PI's reputation within the BCWS was an important mechanism that enabled the PI to conduct the research. The PI's insider status as a wildland firefighter within the BCWS granted them access to a hard-to-reach population. The PI's reputation was also leveraged to transfer knowledge gained through the GLWFP to the PI's colleagues in the BCWS. The PI's experience in the organization and established professional networks positioned them well to influence change.

In the personal and professional pathway, the graduate research experience provided the PI with multiple opportunities for professional development. The PI learned alternative research techniques and developed skills that enabled them to handle challenging situations, such as power dynamics within focus groups, and offered opportunities to present GLWFP progress and findings at national conferences. The research experience allowed the PI to fill personal knowledge gaps by expanding on their understanding of gender and leadership from an interdisciplinary perspective, and build on their previous academic and practical work at the BCWS. A Master's degree holds universal recognition and authority, and was an important mechanism enhancing their reputation and recognition as a gender and leadership expert within the BCWS and wider wildland fire community. Professional capacity gained through the research process, coupled with expanded networks and recognition of expertise enabled the PI to advocate for gender as a priority within the wildland fire community, continue to apply their learning to other contexts, and pursue a doctorate

Lastly, within the academic pathway, scientific knowledge on the topic increased as the GLWFP was the first survey of its kind within the BCWS and offered a case study perspective absent from the existing academic knowledge base. The GLWFP laid a framework for future research to build upon and has inspired researchers to explore the topic with Altmetrics revealing ten individual citations of GLWFP outputs (Prac21, Res1). The GLWFP revealed that it is possible to make change within a difficult context (Prac21, Res1). The ThoughtExchange™ tool was a novel method and the GLWFP tested its utility as a viable tool for participatory research. The GLWFP's application helped refine the tool, as the PI provided feedback to developers on the practicality of the software. Dissemination through networks and knowledge-sharing are effective means to raise attention to an issue among researchers also exploring gender in wildland fire, and there are other researchers and students taking up new questions on gender in wildland fire which indicates that the GLWFP has had some influence on the research agenda. This helped raise awareness among of the GLWFP other researchers, and the Master's experience offered the PI an opportunity to work with leading academics in the sector as part of the GLWFP advisory committee. The PI's reputation was enhanced within the academic community as a result of dissemination through peer-reviewed articles, webinars, and conferences.

Alternative Explanations of Outcome Realization

Before the GLWFP, at the BCWS there was prior interest in the topic and bringing greater awareness to issues pertaining to gender and leadership in wildland fire, as well as other aspects of diversity to the organization. The GLWFP has been part of a wider organizational catalyst for change to increase conversation on gender and culture at the BCWS, contributing to the outcome BCWS discusses gender and leadership (multiple levels) within the discourse guiding organizational practice pathway. Prior to the GLWFP, there were already female senior leaders within the BCWS who were interested and motivated to bring a greater focus on gender and other aspects of diversity to the organization (Gov1, Gov2). For example, females in other leadership positions such as the Assistant Deputy Minister (ADM) which had previously been held by men, were working to raise topics related to gender and leadership and place them on the organizational agenda. As these factors of supporting female leadership were already in place, the GLWFP likely had an easier time getting support for the research contributing to gender and leadership becoming discussed at multiple levels throughout the organization. Another illustrative alternative explanation is the increased sharing of firefighters' experiences and personal stories of gender discrimination prior to the start of the GLWFP. This has raised awareness of organizational culture and power dynamics as greater numbers of voices are shared on the topic. For example, an individual letter from a

female firefighter in BC was perceived to be a notable catalyst for change within the BCWS (Prac4, Prac6). The letter discussed the daily rhetoric of the organizational culture and elicited a response from leadership. For example, this letter is noted to have been the driving force behind the implementation of the safe reporting line at the executive level and supported the BCWS in exploring other supports in the workplace (e.g., mental health) (Prac4). The letter also supported the organizational conversation to reflect on how BCWS members treat each other both in and out of the workplace (Prac4).

The BCWS also recently focused on the notion of cultural change, wider than gender alone, to examine and develop how staff interact with each other (both inside and out of the workplace) to create a more inclusive and diverse work environment contributing to the outcome culture shift at BCWS towards inclusivity and diversity (Prac1). For example, at the individual fire centre level, a focus on culture that is wider than gender has identified factors that allow staff to be retained in a supportive environment and gain experience needed to advance to leadership positions (Prac1). Parallel to the GLWFP, the BCWS also partnered with the Roy Group to invest in stronger leadership development (Prac6). Informants stated that there is a “*significant appetite in [the] organization to see these kind of societal changes*” (Prac16) as the BCWS views itself as being on the leading edge within the sector. Informants discussed both the BCWS’ safe reporting line for staff to report discrimination or workplace harassment and the People First initiative which has contributed to a shift in organizational culture for a more inclusive and diverse workplace.

A number of alternative explanations have also contributed to organizations outside of the BCWS having an increased focus on issues related to gender and leadership. At the national level, there have been a number of high-profile cases within BC regarding discriminatory factors surrounding firefighter fitness tests which were taken to the Supreme Court of Canada and resulted in increased participation among wildland fire members in issues of gender and leadership from a union perspective (Prac14). Gender and leadership have also become a focus of discussion for national practitioners (end-of-project outcome) via work completed by CIFFC. For example, In April 2017, CIFFC hosted the National Forum on Gender and Diversity Issues and issued a national statement about gender and diversity which was signed by all Canadian wildland firefighting agencies (Doc4, Gov1). The CIFFC gender forum created a series of recommendations, including the need to look into approaches that can be taken nationally to increase the awareness of issues around gender discrimination. Since then, the recommendations have been implemented by staff working under the portfolio, one of those recommendations being a national survey of each provincial wildland fire agency (Prac12). This CIFFC survey collects demographic information across the provincial firefighting agencies, Parks Canada, and members of CIFFC to explore gender and diversity; agencies were then provided with their own data, and collaborative discussions were held in terms of potential solutions and tools to address the survey findings (Prac12). This work by CIFFC has contributed to the increased national discussion on the topic, with provinces now showing more transparency and awareness around gender and wildland firefighting (Prac12).

At the international level, gender and leadership are a focus for practitioners as a result of several alternative explanations including the WTREX yearly women’s prescribed fire event and training program. The WTREX teaches a diversity issues in fire, is a source of information exchange, builds attendees’ capacity in empathy and collegial support, and aims to identify and disrupt broader cultural norms in wildland fire (E-mail6). The WTREX offers a hands-on space that is “purposively shame-free, safe-to-fail, and open to conversations about skills, as well as pressures to perform in the role” (Blog2). The WTREX provides an opportunity for international attendees, open to both male and female firefighters from Canada, Australia, and South America to recognize and share gendered experiences within the occupation, as well as complete prescribed fire training (Blog2). Former attendees of WTREX testified that the experience transformed them, allowing them to share their stories and develop empathy through workshops that focus on gender equity, fire ecology, and policy, contributing to outcomes within the discourse guiding organizational practice pathway (Blog2, Prac11). Within the United States, there has also been a number of high-profile cases within land management agencies that have increased focus on sexual harassment, sexual discrimination, and sexual assault prior to the start of the GLWFP. Congressional testimonies from female members of staff encouraged an expedited inquiry to determine whether there was a

basis for the complaints and raised awareness of the topic on an international scale (Doc9, Prac11). Much of the increased attention to the topic is noted to have come from the political legislative bodies as well as the public interest and public outcry when firefighter experiences and stories are shared (Prac13). Following high-profile cases of gender discrimination in the United States, the WTREX event received media attention, featuring on the front page of the Washington Post (Prac11). This increased public attention on the topic and generated further interest in the event, which has increased demand for the event and its training (Prac11). Informants suggested that there was a focus on gender and leadership in wildland fire internationally prior to the GLWFP, notably with the exploration of challenges and barriers women face within the profession (E-mail1). A number of reports released in parallel to the GLWFP also quantified and articulated systemic challenges surrounding gender discrimination in the United States, New Zealand, and Australia which brought more attention to the topic internationally (Gov1).

Within the academic pathway, other factors have contributed to researchers taking up new questions on gender and leadership (high-level outcome). Researchers such as Eriksen (2014) and Pacholok (2013) have also contributed to the increased discussion on gender and leadership in wildland fire. Informants referred to the Association for Fire Ecology (2016) Sexual Harassment Position Paper as a turning piece for understanding and discussion on gender (Doc2). As previously mentioned, the recent increased sharing of wildland firefighters' first-hand experiences of gender discrimination has also contributed to some researchers pursuing further questions on the topic of gender and leadership in wildland fire (Prac12).

Alternative explanations have also contributed to the public becoming aware of gender discrimination within the BCWS and demanding action (end-of-project outcome). For example, the wider public understanding of the topic through the #MeToo movement has brought public attention to gender-related issues via social media (Prac12). Informants reflected on some of the unintended consequences of the #MeToo movement, which they do not want to repeat within their own organizational development, highlighting the need to be strategic in how organizations move forward to change the culture (Prac16). Moreover, the emergence of multiple high-profile cases within land management agencies in Canada and the United States has drawn additional public attention (Prac13). One informant suggested that having a New Democratic Party (NDP) government in power in BC increased provincial focus on the topic in response to government requirements for all public service organizations to improve diversity (Prac14).

Summary

The above evidence demonstrates that a number of external initiatives and processes have contributed to outcome realization, including efforts by the BCWS, international wildland fire organizations, social movements, and external research. Efforts by national and international wildland fire organizations, including the implementation of safe reporting lines and the People First initiative highlight the GLWFP's social relevance as a research problem. For example, the People First initiative recognizes the importance of creating a safe and diverse workforce, which mirrors GLWFP findings. The implementation of safe reporting lines and subsequent use of this resource suggests that the GLWFP correctly identified the prevalence of gender discrimination within the BCWS. Although it may not be a direct contribution of the project, the GLWFP reinforces many initiatives currently underway in the national and international wildland fire sectors.

Were there any positive or negative unexpected outcomes from this project?

There were few unexpected outcomes, which is in part an artefact of the ToC's retrospective development, which can make the distinction between expected and unexpected outcomes difficult to discern. That is, most intermediate and EoP outcomes had already manifested when the ToC was documented, so they do not present as 'unexpected'. However, some informants discussed challenges such as the extent of negative pushback by some male and female firefighters, the personal strain the PI faced completing research on a controversial topic, and the loss of momentum behind the implementation of GLWFP findings.

Informants attested that the GLWFP uncovered "*hard truths*" (Prac9) regarding gender and leadership within the BCWS and wider society, which was initially uncomfortable for the organization and highlighted the need for

improvement (Prac1). Acceptance of the findings was difficult internally, as the critical outlook of the GLWFP challenged and contested norms within the BCWS (Prac4, Prac19). While pushback was originally anticipated, the extent of negative reactions was not. One informant believed the GLWFP was reverse discrimination, and regarded the research as an attempt to promote a specific gender type which goes against the notion of employing the best individual for the job, alluding to negative undercurrents of the work (Prac19). Misunderstandings about the methodologies used in the GLWFP, in particular the notion of action research and the need for intervention following the presentation of findings, also led to confusion and a level of disagreement between the PI and some senior leaders within the BCWS (Prac6). Friction between the PI and members of the BCWS occurred as the PI moved into a consulting role following the GLWFP which was “*not what the [BCWS] was looking for*” (Prac6) at that time. One informant perceived that the PI was interested in having a more leading role in supporting the organization moving forward in the topic, with some members of senior leadership under the belief that it would be the organization’s decision on how to implement action (Prac8). Firefighters who were comfortable with the status quo may have felt threatened by the GLWFP and where the BCWS’ response might lead (Prac8). Some firefighters may also have experienced fear of engaging with issues around gender and leadership, with the risk of the GLWFP manifesting to shame and blame (personal communication).

Although it was expected that the BCWS may publish policy as a result of integrating the GLWFP recommendations into organizational practice, the delivery and implementation of the policy was unexpected. For example, the BCWS Respectful Workplace Policy was “dropp[ed] on people’s desks [for staff signatures] without much time to acknowledge and reflect on how to best approach [its implementation]” (personal communication). It is suggested that this policy implementation resulted in elements of “shame” or “accountability” with some staff not wanting to acknowledge the “negative” side of the organization and the belief that gender discrimination “wouldn’t happen here” (personal communication). This essentially de-valued the intentions of the policy (Prac5). Although the PI supported the BCWS in implementing policy, a non-punitive approach was advocated for which unfortunately did not resonate (personal communication). However, organizational time takes time and is an iterative learning process, it is important to note that organizations may not get it right the first time (personal communication).

The PI also experienced personal strain and backlash by researching a controversial topic (Res1). As the PI began to discuss the GLWFP at the beginning of the research process, a number of professional relationships broke down with colleagues; the PI recognized that some individuals were uncomfortable with being associated with a controversial research topic (personal communication). The PI is suggested to have underestimated the amount of personal hardship that would occur and did not fully anticipate the personal costs of completing the GLWFP (personal communication). The PI had to deal with the consequences of the negative feedback and reactions to the GLWFP from within the wildland fire community, which was an emotionally difficult time (Res2). The PI experienced sexism in various ways, whether direct and confrontational from survey responses or through ostracization within the wildland fire community (personal communication). Other researchers noted that they are now aware of the potential challenges of completing gender research within the profession because of the impact the GLWFP had on both the PI and the BCWS (Res1). However, by overcoming these personal challenges, the PI developed skills and competencies to complete research in a controversial topic, which has equipped the PI to continue to use these skills in their current work (Res2). Ultimately, the PI left the wildfire service (Prac14). This, along with other factors such as the renewed focus on wider culture rather than focusing on gender alone, were thought to have contributed to the loss of momentum behind further work on the topic and an end to the workshops led by the PI at the BCWS (Prac3, Prac4, Res2).

Could the outcomes have been realized in the absence of the project?

Despite no direct policy or organizational changes in the BCWS since the completion of the GLWFP, the project supported an increased focus on the topic and started a conversation within the organization that is now conducted openly at all levels and is becoming part of the cultural norm to support outcomes in the discourse guiding organizational practice pathway (Prac3). The GLWFP succeeded in normalizing discussion on the topic to ensure

that discussion was had at all levels of the BCWS (Prac18). Without the GLWFP, some believe that the topic would have continued to be a low priority issue within the organization (Prac14, Prac20); the GLWFP highlighted the need and urgency to focus on the topic and brought it to the forefront. Some suggest that the conversations about gender and inclusivity would have happened at the BCWS in the absence of the project, but with a different focus; the GLWFP provided context to the topic, providing specifics and tangibility to the conversation which was necessary (Prac13). Although the BCWS may have eventually raised the topic by its own accord, the GLWFP advanced the conversation and enhanced focus on the topic to move more quickly and provided a clear path of action to support the EoP outcome culture shift at BCWS towards inclusivity and diversity (Prac1, Prac2, Prac4, Prac8, Prac17, Prac20). The GLWFP was at “*the right time, [with] the right person, [and] the right place*” (Prac1) to produce outputs that can be utilized by the BCWS supporting the EoP outcome BCWS integrates recommendations into organizational practice. According to one informant, there would be less motivation within the BCWS to address gender-related issues and less of an organization-wide conversation (Prac20). The conversation may also not have progressed as much as it has today; while there remains a long way to go, the GLWFP added nuanced insights to gender and brought in an understanding of gender as a spectrum, which may not have been highlighted in the absence of the project (Res1). The GLWFP also instigated organization-wide thinking and discussion to begin the change process, which may not have happened in the absence of the project (Prac10). The academic language and credibility of the GLWFP worked in partnership with the first-person perspective within the individual letter sent by a female firefighter; it is suggested that both sources of evidence would have had less impact without the other (personal communication). The GLWFP provided the author of the letter with the courage to write and submit the letter, particularly the ThoughtExchangeTM tool which enabled multiple voices to be shared. The GLWFP contributed to the BCWS’ and individuals’ knowledge on the topic of gender and leadership supporting outcomes in the discourse guiding organizational practice pathway. Informants believed that the BCWS would not have been as well-informed and equipped to answer questions around the topic to drive progress forward (Gov1, Gov2, Prac7). By uncovering the issue, the GLWFP increased awareness on the topic and contributed to some receptivity for change within the BCWS and also at the national level (Gov1, Gov2). In the absence of the project, some suggested that the status quo would remain; the GLWFP supported the BCWS in exploring the topic from a variety of perspectives (Prac19). Individuals would have continued to operate with their unconscious biases on gender and leadership within the wildland fire occupation (Prac21).

Without the GLWFP, there would be one less academic and credible source of information for others to point to when justifying future work on the topic supporting the high-level outcome other researchers/students use research and take up new questions on gender and leadership within the academic pathway (Prac11). The academic nature of the GLWFP provided discrete evidence to hold the BCWS accountable (Prac7). Informants also suggested that practitioners in the BCWS would otherwise be drawing upon case studies outside of the Canadian context; having completed the research in Canada shows local managers that this is a relevant problem that occurs within Canadian organizations (Prac12). In the absence of the project, some informants suggested that there would not be a growing movement within BC and Canada to address gender and leadership within wildland fire (Res1). In terms of the international wildland fire community, the GLWFP contributed to a growing number of case studies that are demonstrating the need and urgency for leadership development (Res2).

Were the assumptions pertaining to why changes were expected sustained?

Project assumptions underpin why the GLWFP would contribute to social change in the problem context. Nine of the ten assumptions were sustained, and one is too early to assess (Table 5). The GLWFP used an interdisciplinary approach and leveraged the PI’s professional networks within the BCWS to foster support for the research, access participants through their established networks, and disseminate knowledge through academic and practitioner spheres. These characteristics help explain why the project was successful in realizing outcomes. Facilitating a conversation about the experience of gender and leadership within the BCWS was a deliberate intent of the GLWFP, which supported the acknowledgement of the issue by the organization and enabled some victims of gender discrimination to speak up. Principles from dialectical theory of organizational change (Eskola, 2017), social capital theory (Putnam, 2000), stakeholder engagement theory (Freeman, 1984),

and empowerment theory (Perkins and Zimmerman, 1995) help explain why expected changes occurred in the case of the GLWFP.

The GLWFP aligns with principles of dialectical theory of organizational change by leveraging the opportunity to disrupt the status quo within the BCWS (Eskola, 2017). For example, the PI situates the GLWFP within the increased diversity of the wildland fire workforce which “refers not only to the visible gendered, racial, or ethnocultural identities, but also to varied perspectives and approaches to work that members of different identity groups bring” (Reimer, 2017a, p.13). This increase in diversity challenged the status quo of the traditional male-dominated culture (Res1) and presents an opportunity for organizational and personal growth within the wildland profession (Reimer, 2017a). Dialectical theory of organizational change states that organizational change happens when the balance of power shifts enough to disrupt the status quo, as is the case within the GLWFP which provided valid evidence to support organizational change (Prac12). New knowledge, including identifying and characterizing the problem of gender and leadership and increasing the urgency to act, functioned as ‘disruptive’ evidence. The GLWFP also strengthened the base of support for change by engaging senior leaders of the BCWS as champions. However, due to factors beyond the control of the project, momentum for organizational focus on gender following the conclusion of the GLWFP was lost. Yet, remnants of the disruption remain as the BCWS has continued to address the status quo through a lens of inclusivity.

The PI’s experience as an insider within the BCWS was beneficial to the research process and extended the GLWFP’s influence on the organization and the wider wildland fire community. Social capital theory can be used to explain how social relationships can benefit individuals and organizations beyond their original context of development (Putnam, 2000). For example, social capital theory is defined as a collective asset in the form of shared norms, values, beliefs, trust, networks, social relations, and institutions that facilitate cooperation and collective action for mutual benefits (Bhandari & Yasunobu, 2009). For individuals or organizations to benefit from social capital, they must be well placed in the social network and there must be enough trust to enable interaction and exchange. For example, the PI had extensive knowledge of the context and professional connections and networks which supported practitioners’ receptivity to the project and the findings. The PI’s social capital also ensured that project design was relevant, as the PI requested inputs from members of the inquiry team. The PI leveraged their position as an insider and partnered with senior leaders in the organization to leverage their social capital to support change processes, such as increased knowledge-sharing, sharing of best practices, and access to other networks (e.g., research participants). The PI also expanded their networks with external wildland fire practitioners by attending conferences. The PI built trust with participants by maintaining anonymity, being aware of power dynamics, and making activities gender inclusive. The GLWFP also influenced the social capital of other actors in the BCWS by creating an informal support network that allowed some victims of gender discrimination to share their stories in a safe way (Reimer, 2017a). Hence, according to social capital theory, the PI was well-positioned to influence change.

Stakeholder theory explains how the GLWFP ensured effective transfer of knowledge to the BCWS through heightened levels of engagement with key organizational leaders to facilitate a transition of learning from the PI into the hands of organizational leaders (Doc8). Stakeholder theory seeks to enhance relations with stakeholders to improve efficiencies throughout the project or the organization (Freeman, 1984). The PI received support and sponsorship from the BCWS to complete the GLWFP and collaborated with senior leadership throughout the research to seek feedback and share findings. By collaborating with leaders, the GLWFP aligned with the strategic direction of the organization and addressed challenges that were relevant to senior leadership at the time (Reimer, 2017b). Engaging stakeholders within the research process can increase the quality and robustness of decisions, result in increased trust in decisions, and enhance the rate of knowledge-to-action while assuring that local needs are met (Freeman, 1984). By facilitating conversations on gender and leadership with senior leaders, the GLWFP supported the topic becoming more openly discussed within the BCWS (Doc12, Res4, Survey1). By ensuring that the GLWFP delivered value to stakeholders in the form of knowledge provision and strategic direction, the project aligned with elements of stakeholder theory to ensure that the project succeeded in delivering knowledge and recommendations that were relevant and useful for the BCWS.

Table 5. Project assumptions assessment

Assumption	Result
The GLWFP exposes participants to interdisciplinary perspectives on the topic of fire and gender [Discourse guiding organizational practice pathway]	Sustained. Project documentation conveys understanding from multiple disciplines including gender studies, feminist and masculinity theory, leadership studies, and organizational culture. An interdisciplinary perspective is identified as needed to close the gap between the academic and practitioner spheres on the topic of gender and leadership in wildland fire. The aim of the GLWFP was to create positive change by enabling an open space for dialogue among wildland firefighters in the BCWS from all perspectives (Doc8). Informants highlighted how academic theory is useful from a practitioner perspective to understand concepts related to gender and leadership, as most other high-risk occupations dismiss academia because of its theoretical nature (Prac10). Challenges remain in bringing theory in application to support organizational change, particularly the divide between theory and practice (Prac10, Prac16). The GLWFP acknowledges these factors and contributes to this first step by including practitioners within the research process and disseminating the findings through multiple avenues. Evidence suggests that the PI also brought different theoretical perspectives and ways of thinking to the WTREX, which were useful and interesting for participants (Prac17). Although informants did not always agree with the PI, the approach enabled others to see the topic of gender and leadership more clearly (Prac17). Participants became aware of their own place within the organizational culture through the GLWFP, which opened up new perspectives (Prac13).
Partners are receptive to and develop an interest in the topic [Discourse guiding organizational practice pathway]	Sustained. The GLWFP was undertaken at a time of “significant interest in the experiences of female wildland firefighters” (Doc8) and gender discrimination in the international wildland fire community. A number of high-profile cases within the international wildland fire community as well as wider social movements like #MeToo led to the topic of gender becoming a greater interest in high-risk occupations. Increased discussion in the political, academic, and public arenas contributed to the receptivity and interest of GLWFP partners in exploring the topic. Informants noted that the BCWS supported the PI in completing research on the topic (Prac7). Although the PI faced resistance from some members of BCWS at the start of the GLWFP, the PI was able to get the support of the organization to explore the topic (Prac10). Informants also noted their increased interest and receptivity to the topic of gender and leadership following the GLWFP, including the conceptions of masculinity, the need to conform to the organizational culture, and the personal experiences of gender discrimination faced by some female firefighters (Prac14). The GLWFP shined light on the topic and increased interest and receptivity in the topic of gender and leadership in wildland fire for the organization which may not have happened without the project (Gov1). With the GLWFP having been completed in Canada, this raised the interest of managers in the topic and demonstrated that the topic was relevant (Prac12). Other risk-management organizations noted how the GLWFP led to an increased interest and action on the topic of gender and leadership (Prac16).
The PI’s experience working in the organization positions them well to influence change [Discourse guiding organizational practice pathway] [Personal/professional pathway]	Sustained. The PI interacted sufficiently with the problem context to gain a breadth and depth of understanding through their personal experience as a BCWS firefighter and crew leader. The PI’s previous experience of having worked as a wildland firefighter for six years within the BCWS positions them well to influence the context through their access to networks and support from BCWS senior leadership. This personal experience within the context provided the PI with the necessary knowledge and research skills to complete the GLWFP, with informants commenting on the PI’s passion for their work (Prac1).
There is a need for improved policy and practice to respond to gender discrimination in wildland fire and partners recognize this need [Discourse guiding organizational practice pathway]	Sustained. The increased awareness brought by the GLWFP resulted in recognition of the need for and support from the BCWS to improve practice on gender-related issues (Gov1). The system-wide conversation instilled by the GLWFP enabled members of the wildland fire community to recognize that there is a problem and identify the need for cultural change and appropriate action steps (Doc8). However, although the BCWS showed a keen interest in continuing work on the topic in collaboration with the PI, this working partnership ultimately came to an end with “ <i>no official engagement in terms of strategy or policy change</i> ” (Res4) (Doc15). Since then, the BCWS released the Respectful Workplace Policy and are currently working on a diversity strategy, revealing that partners have recognized the need for improved policy and practice to respond to gender discrimination in the wildland fire community (Res4). Other factors such as the increased legal discussion from high-profile discrimination and harassment cases have also influenced policy (Res3). This increased

	discussion has ensured that policy-makers can no longer ignore the systemic issues related to gender and leadership (Res2). The GLWFP also increased awareness and action in other risk management organizations (Prac16). Although some individual wildland firefighters disagreed with the need for improved policy and practice due to their level of comfort with the status quo, the fact that the BCWS have continued to support gender through the wider lens of culture and inclusivity reveals the recognition by partners.
There are the appropriate support systems in place for open dialogue on gender and leadership in wildland fire and participation in the GLWFP is an empowering experience [Discourse guiding organizational practice pathway]	Sustained: The GLWFP ensured the research was an empowering experience for participants by providing them with the choice to complete interviews in-person or via the phone to enhance trust and share power, and utilized purposeful sampling to ensure participants were empowered to provide “substantive” (Doc8) responses. Participants were also involved in the development of recommendations to increase feelings of empowerment (Doc8). Although a small number of wildland firefighters who were comfortable with the status quo were not willing to acknowledge issues pertaining to gender and leadership, the continued work on implementing support systems by the BCWS reveals its importance. The BCWS have implemented appropriate support systems through the creation of a safe reporting line to provide those who have experienced issues related to gender discrimination the opportunity to share their experiences with trained professionals (Gov1). The PI also became a support system to supervisors and those who have experienced gender discrimination by empathizing, sympathizing, and providing knowledge and information to individuals (Prac1). The GLWFP ensured that the topic of gender and leadership can be held comfortably and openly at all levels of the organization (Prac3).
The recommendations are useful, practical, and accessible for implementation, and were sufficiently rigorous to be taken seriously [Discourse guiding organizational practice pathway] [Personal/professional pathway] [Academic pathway]	Too early to assess. Although the recommendations were perceived by informants to be national in scope and were developed from participants’ own perspectives following processes to support academic rigour, the BCWS has not implemented changes directly as a result of what was presented in the GLWFP (Prac1, Prac12). However, this may be owing to the end in the collaborative relationship between the PI and the BCWS, and is not a reflection on the utility of the recommendations. For example, wildland fire agencies across Canada are noted to be implementing similar initiatives as presented in the GLWFP recommendations, but this is not a direct result of the GLWFP (Prac12). The BCWS was thought to have implemented the GLWFP recommendations indirectly, revealing their utility and practicality (Prac6). Some note the perceived bias and possible hidden agenda behind the GLWFP, which highlights the need for effective communication and disclosure of perspective to ensure the recommendations are sufficiently rigorous to be taken seriously.
Dissemination through networks and knowledge sharing are effective means to raise attention to an issue [Discourse guiding organizational practice pathway]	Sustained. The GLWFP was disseminated via multiple academic and practitioner avenues, including peer-reviewed articles, blog posts, webinars, workshops, presentations, discussions with senior leaders, and the PI’s website, among others. This raised attention to the GLWFP and issues around gender and leadership in wildland fire amongst the international community. By disseminating the GLWFP findings through diverse networks, the PI opened windows of inquiry for others to explore the topic further (Prac13). Sharing the research through practitioner avenues, such as through trade publications, has contributed to the practitioner dialogue and discussion within the wildland fire community (Prac13). The presentation of the GLWFP at national wildland fire conferences has increased conversation on the topic amongst the community and raised attention to issues pertaining to gender and leadership (Prac12).
The research effectively identified a gap and made an original contribution to the topic [Academic pathway]	Sustained. Academic and practical gaps are identified and discussed within GLWFP documentation, including the GLWFP being the first applied research project undertaken within the wildland fire profession. As there was a lack of and resistance to a conversation on gender and leadership within the BCWS, the existence of organizational knowledge gaps was evident. The dearth of research on gender in wildland fire made identification of an academic gap clear, and the GLWFP acted as a bridge between the academic and practitioner spheres (Survey1). Using the BCWS as a case study makes the findings of the GLWFP an original contribution. In addition, the GLWFP makes an original contribution to the topic of gender and leadership by using the novel tool of ThoughtExchange™. Informants also reflected on the relevance and value of the study, particularly for the Canadian context (Res3). The BCWS acknowledges the gap in which the GLWFP aimed to fill by providing meaningful data that can be utilized to support decision-making (Prac19).
Researchers already have an interest in the topic and seek out new and available information	Sustained. The topic of gender and leadership in wildland fire is not a widely explored research area (Res1). However, by publishing on the topic, the GLWFP provided more evidence and credible documentation that cultural issues exist and validates the future work for other researchers to expand upon (Prac11, Res1). Owing to the relatively small group of academics who work in this area, there is an opportunity

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[Academic pathway]	for researchers to draw on each other's work, as researchers with an interest in the topic will seek out new and available information (Res2). The GLWFP provided researchers already exploring the topic with new perspectives as well as solidified the thoughts they already had on the topic (Prac10). However, some informants suggested that prior to becoming aware of the GLWFP, they did not have an interest in studying gender in wildland fire (Prac17). The PI's work, along with other factors, such as increased discussion of personal experiences, inspired researchers to include gender within their own work in wildland fire (Prac21). Informants stated that the PI has laid a framework for future work on the topic to build upon, and some researchers have referenced the GLWFP within their own work and transferred lessons to their own context (Prac21, Res1).
<p>A master's degree holds universal recognition and provides the opportunity to expand on research capacities and expertise (professional networks, etc.)</p> <p>[Discourse guiding organizational practice pathway]</p> <p>[Personal/professional pathway]</p>	Sustained. The experiential learning of the GLWFP provided the PI with increased knowledge, skills, and expertise for their future work as a gender and leadership consultant and within their doctorate. Having a Master's degree has provided the PI with credibility, and further opportunities to share knowledge and continue learning. Informants suggested that the PI's experience, competencies, and expertise were recognized partly as a result of their Master's.

The GLWFP provided an empowering experience for the PI and for participants. The GLWFP supported the PI to discover alternative ways to address issues related to gender and leadership in wildland fire, which empowered them to continue to work on the topic and implement positive change (Prac17). Participation in the GLWFP was also an empowering experience for participants, as they were involved in decision-making and the project created a safe space for individuals who felt disempowered (e.g., women, men who do not conform to rural masculinities, individuals who previously had their experiences invalidated, etc.) to share experiences and have their voices heard (Doc8). Empowerment theory focuses on processes that enable participation (e.g., creating a safe space for discussion), enhance control through shared decision-making (e.g., involving participants as collaborators), and create opportunities to learn, practice, and increase skills (e.g., knowledge dissemination through workshops, webinars, presentations, articles, etc.) (Perkins & Zimmerman, 1995). The GLWFP provided an opportunity for participants to uncover their self-awareness about BCWS organizational culture in ways that were accessible to them. The GLWFP fit with principles of empowerment theory by ensuring that participants have an active role in the research and associated change processes.

Are the higher-level changes likely to be realized?

All higher-level changes identified in the GLWFP ToC have the potential to be realized. At the time of the evaluation, there was evidence indicating that eight out of nine high-level outcomes have begun to or have already been realized (Table 6; see Appendix 6 for more detailed results). For the remaining high-level outcome, realization of respective antecedent outcomes (i.e., intermediate and EoP outcomes) shows promise for future changes to manifest. Some high-level outcomes will take longer to emerge as they are dependent on ongoing processes or factors beyond the scope of the GLWFP, such as future action taken by the BCWS.

The GLWFP supported key antecedent outcomes such as the PI's relationships built with national and international practitioners; participants' self-awareness about BCWS' organizational culture; and the emergence of informal support networks. As a result, some outcomes within the discourse guiding organizational practice pathway have preliminary evidence to suggest partial or full realization with clear project contribution. Evidence suggests a number of external factors currently underway also contributed to the high-level outcomes in this pathway including the wider #MeToo movement and initiatives by other wildland fire organizations like the Association for Fire Ecology. There is insufficient evidence to assess outcomes relating to the BCWS' reputation as a progressive organization as only a small number of informants discussed this outcome. The GLWFP provided the PI with the opportunity to expand their professional networks and develop competencies through experiential learning for constructive dialogue around the topic to support the achievement of high-level outcomes within the personal and professional pathway. High-level outcomes in the academic pathway have been or have the potential to be realized owing to the PI's ongoing efforts to publish academically on the topic. By providing meaningful data grounded within the BCWS, it is likely that the research will support the accumulation of knowledge to influence the practice of other organizations.

Table 6. Higher-level outcome assessments

Results	Evidence and Mechanisms	
Outcome Assessment	Summary of supporting evidence for assessment	Contextual factors and causal mechanisms affecting outcome realization
<p>Broader wildland fire community aware of gender discrimination at BCWS</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> • Of the nine informants working in wildland firefighting outside of the BCWS, all were aware of the GLWFP and its findings • There would not be a growing movement within the BCWS and other Canadian fire agencies to address gender and leadership without the PI and the GLWFP (interviews) • The broader wildland fire community, including agencies in Alberta, are aware of gender discrimination within the wildland fire community, although not solely as a result of the GLWFP (interviews) • Review of Altmetrics reveal relatively high levels of engagement with GLWFP outputs aimed at the broader wildland fire community. For example, a YouTube presentation by the PI has received 1,475 views, with practitioner focused publications receiving 230 views and several interactive comments 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • GLWFP findings were presented at Canadian and international conferences supporting the broader wildland fire community becoming aware of gender discrimination at the BCWS <p>Alternative explanations:</p> <ul style="list-style-type: none"> • The Association for Fire Ecology (2016) Sexual Harassment Position Paper and their survey on gender inclusion increased awareness of gender discrimination within the profession
<p>BCWS senior leadership introduces policy on gender and leadership</p> <p>Realized, unclear project contribution</p>	<ul style="list-style-type: none"> • There has been financial and resource backing of inclusivity and diversity within the BCWS (interviews) • People First initiative focuses on creating a diverse, healthy, and more equal workplace which retains its staff through all aspects of equality; elements of the GLWFP have filtered into this initiative (interviews) • Creation of the BCWS Diversity strategy; the PI played a role in the initial discussions of this strategy (interviews) • The Respectful Workplace Policy was released by the BCWS following the GLWFP. The PI advocated for a non-punitive approach to this policy which did not resonate with the BCWS at the time. This led to notions of “shame” and “blame” within the organization (interviews) 	<p>Barriers:</p> <ul style="list-style-type: none"> • The challenging fire seasons of 2017 and 2018 resulted in the organization running at maximum capacity in terms of operation and left little time for issues such as gender and leadership; some items not directly related to operational policy did not receive the attention they should have due to these extreme fire seasons <p>Alternative explanations:</p> <ul style="list-style-type: none"> • A recent nationwide meeting led to the creation of a statement of intent which focused on the fact that gender discrimination will not be tolerated across provinces • Other recent policies not linked with the GLWFP include Creation of Standards of Conduct that are specific to bias and harassment (interviews)
<p>BCWS’s reputation as progressive organization increases</p> <p>Insufficient evidence</p>	<ul style="list-style-type: none"> • There have been slow and gradual changes within the organization, with momentum behind the initiative to become a more progressive organization (interviews) • There is an increased awareness of the action steps needed to become a more progressive organization (interviews) 	<p>Barriers:</p> <ul style="list-style-type: none"> • It is suggested that the BCWS have taken a reactionary approach regarding issues of gender discrimination <p>Alternative explanations:</p> <ul style="list-style-type: none"> • New hiring practices have been implemented along with the People First initiative which have resulted in a culture shift toward a more diverse workforce

<p>Findings and recommendations on gender and leadership are transferred to other risk management organizations</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> • Risk management organizations have worked in partnership with the PI to explore the topic of gender and leadership within their own organizations <ul style="list-style-type: none"> • The GLWFP provided practitioners within other risk management organizations with new perspectives on which to view the topic (interviews) • The PI has continued their work as the chair for the gender diversity and mental health committee for the ACMG <ul style="list-style-type: none"> • The PI also continues the conversation of gender and leadership within other high-risk occupations by holding professional development sessions which have contributed to the gradual cultural change within these organizations (interviews) • As a result of collaborations with the PI, other risk management organizations have implemented changes, such as increased discussions on modifying member policy and the code of ethics to reflect findings (interviews) • GLWFP methodology and findings have been used in the United States to investigate line of duty deaths in the US Forest Service (interviews and documents) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • By sharing the GLWFP findings at conferences, the PI exposed their work as highly relevant to other risk management organizations and increased the wider interest on the topic • The GLWFP opened new windows of inquiry into the topic that were not held by practitioners prior to the project • At the national and international level, GLWFP recommendations and findings are applicable to the wildland firefighting community • GLWFP findings are transferable to contexts outside of wildland firefighting owing to the patriarchal hierarchy that is present in many aspects of society <p>Barriers:</p> <ul style="list-style-type: none"> • Patriarchal hierarchies and hyper-masculine power dynamics are systemic and will take time to change <p>Alternative explanations:</p> <ul style="list-style-type: none"> • Other provinces have implemented steps as outlined in the GLWFP recommendations
<p>Other high-risk occupations discuss gender discrimination and take action based on recommendations</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> • Other high-risk occupations have reflected gender and diversity within operational guidelines, procedures, and policies amongst staff (interviews) • A new collective vision statement across four high-risk occupations outlines goals of culture change around gender discrimination (interviews) • Other high-risk occupations have made financial commitments to explore the work on gender diversity and mental health, and take action to contribute to long-term change in organizational culture (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • Organizations have the desire to see changes related to the topic and see themselves as leaders in the sector • The PI has collaborated with other high-risk organizations on the topic of gender and leadership and provided new ideas and focused organizations on future goals • Collaborations with the PI produced numbers, statistics, and evidence from within other high-risk occupations which encouraged action within the organizations • Although gender was discussed prior to collaborations with the PI, the PI encouraged change to be implemented more quickly and was a source of organizational motivation <p>Alternative explanations:</p> <ul style="list-style-type: none"> • Other high-risk occupations have been working on the topic prior to partnering with the PI
<p>PI continues work on gender and wildland fire as a consultant</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> • The PI became an advocate to keep gender as a priority for the wildland fire community by continuing work as a gender and leadership consultant within the BCWS and publishing articles to increase discussion and awareness among the community <ul style="list-style-type: none"> • The PI worked collaboratively with the BCWS to present GLWFP findings, identify action steps for the organization, and create and implement workshops that addressed cultural norms; 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> • The PI was proactive in attempting to implement change through their consultancy work with the BCWS <p>Barriers:</p> <ul style="list-style-type: none"> • The move from focusing on research as a student to research for consulting presented unexpected challenges, which contributed to the end of the PI's consulting work at the BCWS

	<p>however, the PI no longer directly supports the BCWS on their gender work as a consultant (interviews)</p> <ul style="list-style-type: none"> Practitioners in the United States are interested in working with the PI to complete similar work as the GLWFP (interviews) 	<ul style="list-style-type: none"> The action research model employed by the GLWFP led to friction between the PI and senior leaders at the BCWS as the PI wanted a stronger role in leading the organization forward on the topic; finding the balance in this relationship was challenging
<p>PI pursues PhD to continue work on gender and leadership in high-risk occupations</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> The PI has received full funding for a PhD to explore gender, leadership, and well-being in the avalanche industry in Canada and New Zealand. The PI's PhD will utilize a similar methodology as the GLWFP (interviews) The PI continues to use skills developed in the GLWFP and remains engaged in the topic by contributing to academic and practitioner journal publications (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> Graduating with a distinction in their Master's provided the PI with the confidence and motivation to pursue further graduate research
<p>Other researchers/students use research and take-up new questions on gender and leadership</p> <p>Realized, clear project contribution</p>	<ul style="list-style-type: none"> Other students in the MAL program have pursued research on the male dominated culture of firefighting and have drawn on the GLWFP (interviews) The GLWFP thesis has been cited by three other articles at the time of the evaluation, with a further seven citations of the PI's journal article overview of the GLWFP (Doc4) <ul style="list-style-type: none"> These citations include a variety of new questions on the topic of gender in wildland fire internationally (e.g. gender sensitive approaches to wildland fire in Indonesia, and examining the Cultural Perceptions of Interagency and Private Wildland Firefighters) The GLWFP inspired researchers to look at new areas of the topic, including new modes of inquiry (interviews) Informants have referred other researchers to the GLWFP, which has resulted in references and citations (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> The GLWFP has also been used to justify other work on the topic. The academic foundation of the GLWFP and the fact that the findings have been published in peer-reviewed journals provides credibility for those using the findings to explore gender and leadership in wildland fire <ul style="list-style-type: none"> The GLWFP has contributed to the credible library of research cited to justify funding, sponsorships, or new partnerships to explore the topic in greater detail The MAL program continues to use the GLWFP as an example of excellence for current students, which has resulted in increased awareness of the GLWFP among student researchers <p>Barriers:</p> <ul style="list-style-type: none"> Some informants have personally not had success in researching the topic due to gaining access to target audiences and funding <p>Alternative explanations:</p> <ul style="list-style-type: none"> One-to-one discussions with female firefighters about their personal experiences of the male dominate factor also inspired researchers to include gender within their own work
<p>Accumulation of knowledge influences the practice of organizations</p> <p>Partially realized, unclear project contribution</p>	<ul style="list-style-type: none"> Collaborations with the PI provided other high-risk organizations with a strategic plan on how to move forward on the topic; accumulation of knowledge on gender and leadership supported by the PI's work has influenced some organizations (e.g., ACMG) to continue conversations and take action based on findings (interviews) However, some informants suggested that there have not been any significant initiatives or hiring changes within the BCWS based on the knowledge presented within the GLWFP (interviews) 	<p>Facilitating factors:</p> <ul style="list-style-type: none"> The GLWFP contributed to the library of work on the topic that organizations can use to justify future work and support funding applications, sponsorships, and new partnerships Research that provides meaningful data like the GLWFP is an important part of organizational change to support decision-making <p>Alternative explanations:</p> <ul style="list-style-type: none"> Changes to organizational culture and practice take time <ul style="list-style-type: none"> Organizational change is underway; other factors, such as increased sharing of workplace incidents, contribute to these shifts

Research Project Assessment

What elements of the research design and implementation supported outcome realization, and how?

An adapted version of Belcher et al.'s (2016) Transdisciplinary Research QAF is used to assess the degree to which the project employed inter- and transdisciplinary principles and elicit lessons for research design and implementation. Overall, the GLWFP's design and implementation aligns with principles and criteria of relevant, credible, and legitimate research that is well positioned for use, and it produced knowledge that is useful and used (Figure 4; see Appendix 5 for QAF results and justifications for the project assessment). Informants believed that the GLWFP was implemented appropriately as the PI's insider perspective positioned them well to influence change and the PI had the adequate research competences to undertake the research (Res2). The PI had extensive prior field experience as a crew leader and knowledge of the BCWS context to provide them with the necessary knowledge and access to stakeholders to complete the GLWFP. The project was feasible, appropriately designed, and tested new research tools that produced unique data and insights into the problem context. Recommendations were evidence-based, tailored for the BCWS, and national in scope (Prac1, Prac12). These characteristics supported the relevance, credibility, legitimacy, and positioning for use of the research process and the knowledge produced and supported outcome realization. However, GLWFP outputs used overly academic language proving a barrier to results under relevant communications highlighting some shortcomings of the project effecting outcomes relating to the uptake and use of GLWFP findings. The GLWFP also articulates only one objective that is not logically or appropriately related to the problem context. The implications of bias on conclusions is not discussed in great detail, and a more thorough explanation and exploration of the dissonance in findings would have supported the credibility of the argument and supported outcome realization across all impact pathways.

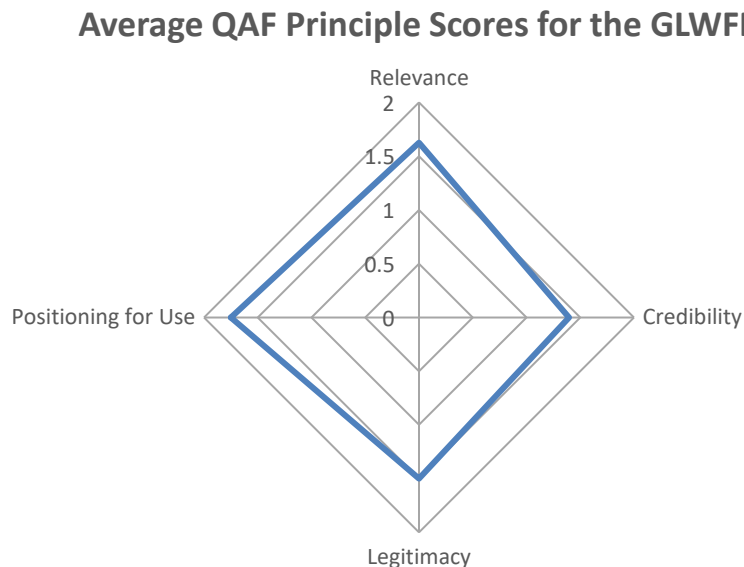


Figure 4. Scoring of the GLWFP against QAF principles of Relevance, Credibility, Legitimacy, and Positioning for Use (0 = the criterion was not satisfied; 1 = the criterion was partially satisfied; and 2 = the criterion was fully satisfied).

Relevance

Figure 5 presents the scores for criteria under the Relevance principle. The GLWFP effectively addressed a socially relevant research problem, effectively engaged with the problem context, and clearly defined the problem context to satisfy these criteria under Relevance. However, criteria such as explicit theory of change and relevant communication were not fully satisfied, and likely affected outcomes relating to the continued use of the research by the BCWS. Had the GLWFP further translated communications for the target audiences (e.g., using less academic language), it is likely that there would be a greater understanding of the research among the wider wildland fire community.

Average GLWFP Relevance Scores

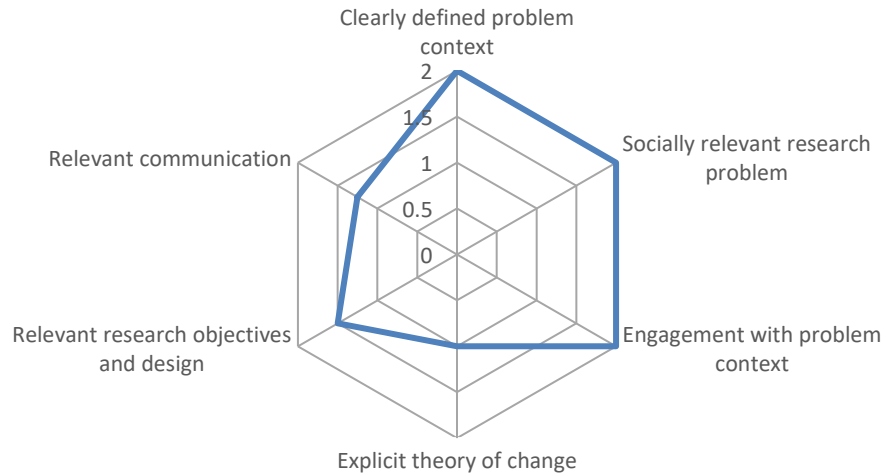


Figure 5. Project satisfaction of relevance criteria

The GLWFP clearly defines the problem context and provides a socio-cultural description of the BCWS and academic context. For example, the GLWFP documentation outlines the negative implications of the lack of a conversation about gender and leadership within the wildland fire context, drawing entry points from the literature, BCWS' documented cultural norms, and the PI's personal experience. The GLWFP also intended to support the BCWS in delivering on its strategic goal of excellence in people and was undertaken at a time of great interest in the experiences of female wildland firefighters and gender within the international wildland fire community which supported the realization of outcomes relating to the acknowledgement of the research and positioning outputs for use (Reimer, 2017a). The GLWFP also effectively engages with the problem context due to the PI's previous experience as a former wildland firefighter and crew leader to gain a breadth and depth of understanding. The PI also attended conferences at the start of the GLWFP and completed scoping interviews to discuss the topic on a wider scale and build networks, support, and interest in the GLWFP. The PI's personal experience, their access to personal networks within the context, and support from BCWS leadership positions them well to influence the context.

The GLWFP does not have an explicit ToC; however, the strong, implicit ToC highlights the hoped and intended changes, indicates opportunities to influence change via the BCWS and contributes to related academic debates on wildland fire communities and similar male-dominate professions. Relevant communications could have been improved by the GLWFP with evidence suggesting that results used overly academic language proving a barrier to results for the wider practitioner community; the use of more appropriate terminology would have improved the accessibility of results and contributed to outcomes related to gender and leadership becoming a focus of national and international practitioners. It is also suggested that some senior leadership did not fully understand the purpose or the approach of the GLWFP which created barriers in the implementation of results and managing expectations (Prac6). This may have led to challenges in realizing the EoP outcome BCWS integrates recommendations into organizational practice. However, multiple dissemination strategies were also planned and aligned with external processes including presentations at the BCWS and at international conferences. The PI's follow-up is noted to have been what made the GLWFP valuable (Prac2).

The analysis of relevance criteria highlights the importance of the PI's work in the context prior to the GLWFP to identify a socially relevant research problem and clearly define the problem context through situating the research within the literature and personal experiences. The GLWFP was aligned with the organizations strategic direction at the time ensuring that the research problem is both timely and there is a demand from system actors for the research problem to be addressed. The PI's experience as a female crew leader within the BCWS supports their engagement to gather firefighter perspectives and situates them to influence change. However, if the GLWFP

had leveraged an explicit ToC at the beginning of the research, this would have supported critical thinking, integration, and collective visioning among key stakeholders and collaborators, facilitated transparency and accountability of results, helped to identify and engage key actors at project boundaries and understanding diverse roles in change processes (Belcher et al., 2019). Tailoring dissemination to target audiences would also have supported the sharing of findings to practitioners outside of the academic community to ensure a greater awareness and use of the GLWFP results.

Credibility

Figure 6 presents the scores for criteria under the Credibility principle. The PI had the adequate competencies to undertake the research with the necessary networks to gather data from firefighters. Appropriate methods were utilized in order to collect data from participants and enable participant engagement with the data. Criteria such as comprehensive objectives did not score as highly because a singular unspecified objective guided the research. The criterion clear research question(s) did not score highly as the question cannot be answered empirically and minimal justification is given for how answering the research question will address the research problem.

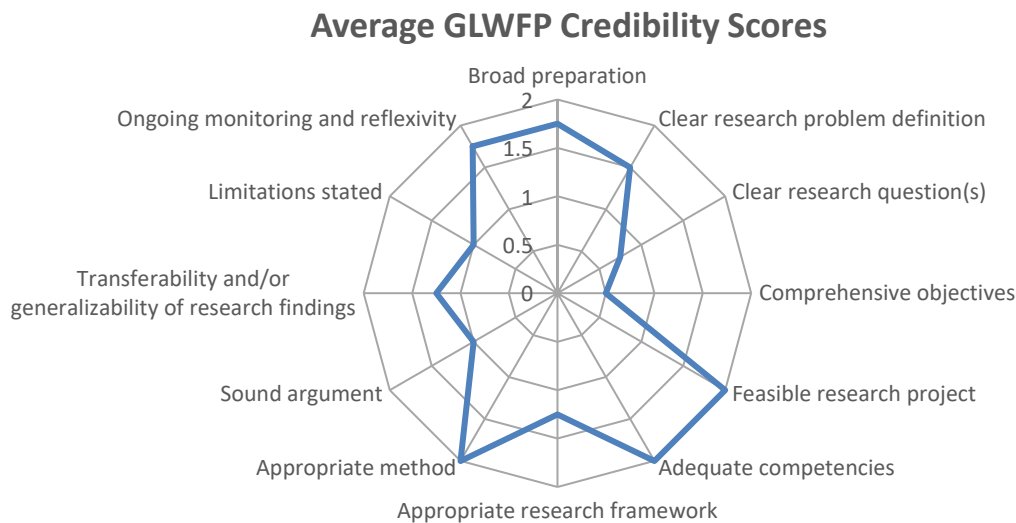


Figure 6. Project satisfaction of credibility criteria.

The GLWFP design and resources were appropriate to carry out the research. Sponsorship from the BCWS as well as the inquiry team supported the feasibility of the research project in terms of having adequate social capital to support participation in the project. This support within the BCWS contributed to outcomes within the discourse guiding organizational practice pathway. Project documentation includes some discussion of limiting scope to make the project manageable showing flexibility to accommodate unexpected changes (Res2). To address disagreement within the initial data set, the PI re-initiated a literature review on AR, and coding appreciative and feminist approaches to explore whether an analytic tool may emerge to address gender research specifically and the dissonance within data (Reimer, 2017a). The selection of methods is justified and logically connected to the objectives; given that gender within wildland fire has been shown to be resistant to change, the PI identified the relevance in spending additional time as part of an AR process to identify how members in the organization think, feel and respond to the topic (Reimer, 2017a). The PI utilized a reflective journal to contribute to the ongoing monitoring and reflexivity of the project and project documentation conveys an understanding from multiple disciplines.

The GLWFP does not articulate a thorough set of research objectives, as only one objective is documented. The stated objective is not logically or appropriately related to the problem context; a better formulation of objectives would have aided the structure and purpose of the project and supported its academic credibility to contribute to outcomes in the academic pathway. The GLWFP does not provide a thorough justification as to how answering the research question will address the problem. A more definitive stating of the research question would support

the structure of the GLWFP. Although there is a comprehensive presentation of the research process, findings, conclusions, recommendations, and organizational implications, the GLWFP does not explore alternative explanations of the results which would have supported the GLWFP in aligning the research with parallel projects ongoing within the sector. The dissonance in the first reflection of the data set was also not fully integrated leaving to gaps in the argument being fully logical and defensible (Doc8). The GLWFP discusses limitations in terms of the unequal amount of gender participants (disproportionate representation of females), limitations of the researcher's position, and the limitations of crew and non-crew rations. However, the limitations are not discussed in terms of the implications on the results; mostly shortcomings are discussed within the GLWFP.

Overall, the PI had the adequate competencies to support the GLWFP; the PI's intimate knowledge of the context and networks in the region were vital to the success of the research and allowed for the collection of a variety of perspectives. The GLWFP design and resources were appropriate to carry out the research aim. The GLWFP reviews and integrates a breadth and depth of literature and theory from relevant disciplines including leadership studies and gender studies to convey an understanding from multiple disciplines to support the interdisciplinary nature of the project and its subsequent utility for practitioners and academics. However, a more thorough objective and a research question that can be answered empirically would have aided the structure and the purpose of the project. Also, a more thorough exploration of the dissonance in findings would have supported the defensibility and credibility of the argument to position outputs for use.

Legitimacy

Figure 7 presents the scores for criteria under the Legitimacy principle. The GLWFP was successful at ensuring the research was ethical by following RRU ethical review processes and protecting the anonymity and confidentiality of informants. However, the GLWFP was less thorough at the disclosure of perspective; a more in-depth discussion of the PI's positionality and full transparency, and how this affected the interpretation of findings would have improved the research and increased the trustworthiness of results.

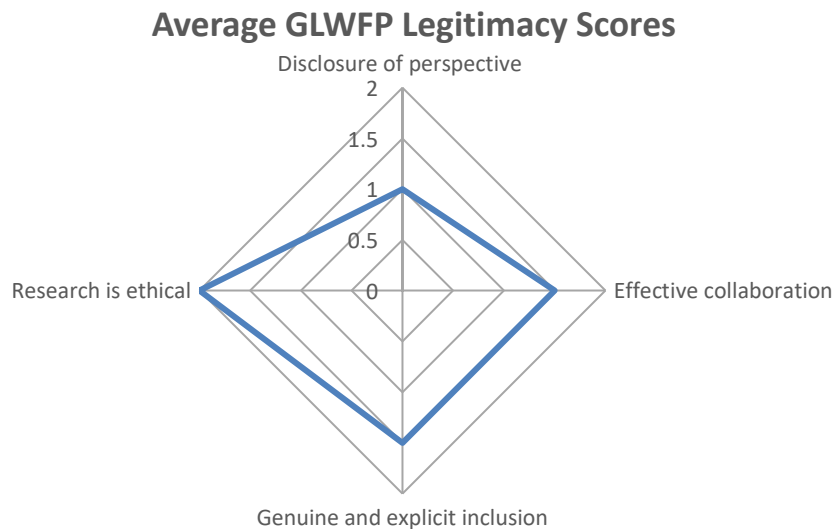


Figure 7. Project satisfaction of legitimacy criteria

The GLWFP received ethical approval by RRU Research Ethics Board; participants gave informed consent, and their anonymity and confidentiality were maintained. A section of the GLWFP documentation is dedicated to ethical issues, power dynamics, and gender within the context of the research showing an in-depth understanding and prioritization of ethics. Ethical practice has been followed so that the research was operating under the “best-known practices for gender research from the psychological intent to do no harm” (Reimer 2017a, pg. 85). A range of system actors were involved in the research (i.e., all representations from within the BCWS) and efforts were made to enable diverse perspectives to engage in the discussion. There is also the indication that the PI made

efforts to establish a positive relationship with participants to build trust, including involving participants in the development of recommendations to support their uptake and use by the BCWS (EoP outcome) (Reimer, 2017a). The PI received official support and sponsorship from the BCWS to complete the GLWFP with an initial shared understanding of goals and expectations (despite later change in leadership direction). However, some informants commented that the process was not as open and collaborative as the PI perceived it to be; for example, participation felt rigid and restricted rather than open (Prac6, Prac19). Assessing the project against its purpose, there was no expectation or requirement for collaboration, but this could have supported the realization of outcomes by collaborating with boundary partners to support project success within the discourse guiding organizational practice pathway.

GLWFP documentation discusses the PI's positionality and briefly acknowledges the implications for the findings, although this could have been expanded upon to support disclosure of perspective. For example, some suggested that individual firefighters perceived the GLWFP to be the PI's point of view and not an accurate portrayal of the organizational culture as a whole (Prac18). The PI also notes their own bias, which is highlighted by some informants who suggested there was a predetermined direction to the GLWFP (Gov1, Prac2). Some informants did not necessarily agree with how the research was framed and how its findings were characterized (Prac6). There is noted to have been a rejection from within the organization of wanting to know the results, or diminishing the results based on claims that GLWFP findings came from a small case study and are not applicable to the wider organization (Res2). This led to some resistance as respondents felt that the GLWFP was overstating the issue of gender discrimination in the organization which affected EoP and high-level outcomes in the discourse guiding organizational practice pathway (Prac13). The implications of bias on conclusions are not discussed in great detail. Full transparency of positionality and how this affected the interpretation of results would have improved the research and trust/use of the research findings. Some informants also suggested that the ThoughtExchange™ process was misleading (Prac19). There was some bias perceived by GLWFP respondents who suggested that "information was being solicited through the [ThoughtExchange™] questions" which led the method feeling somewhat restricted and misleading in terms of participation (Prac19). It is suggested that had the research been through a lens of inclusivity rather than solely focused on gender and leadership it may have been more accessible to the BCWS and perceived as less bias and without a predetermined agenda (Prac4).

The GLWFP was an ethical project that successfully operated under the intent of do no harm. A range of system actors were involved in the research and efforts were made to enable diverse perspectives to engage in the discussion to support the genuine and explicit inclusion of staff throughout the BCWS. Overall, there was scope to be both more collaborative and more transparent regarding possible bias and positionality of the research to improve transparency and subsequent uptake and use of the GLWFP findings and recommendations.

Positioning for Use

Figure 8 presents scores for criteria under the positioning for use principle. Positioning for use manifested clearly in the GLWFP's contribution to a significant outcome. The GLWFP strategically engaged senior leadership within the BCWS and leading academics in the field to position the research for use. The GLWFP developed the capabilities of the PI but did not contribute to notable capacity-building for participants or other system actors. The GLWFP supported bridging the gap between the academic and practitioner spheres to provide evidence-based recommendations that were intended for uptake.

The GLWFP clearly contributed to the partial or full realization of eleven of the nineteen intermediate and end-of-project outcomes to contribute to significant results. The GLWFP resulted in positive outcomes for individuals and was a catalyst for the BCWS to focus on the topic of gender despite challenges that arose (Prac4). Gender is now a more openly discussed topic at senior leadership level within the organization and is more comfortably had across all levels of the BCWS (Doc12, Survey1). The PI also identified individuals within the organization who were interested in organizational change and engaged them as part of the inquiry team; along with the PI's adequate competencies, this positioned the GLWFP well to have influence on the organization and realize outcomes in the discourse guiding organizational practice pathway. The GLWFP provided an opportunity to build

awareness within the organization around gendered perspectives and experiences of the wildland fire profession; participants gained newfound awareness of organizational and culture-driven power dynamics to influence attitudes. For example, the system-wide conversation that occurred through the GLWFP enabled some members of the BCWS to recognize a cultural problem and identify cultural change through conversation highlighting the awareness-building of the research problem and system actors gaining a different perspective (Doc8). The GLWFP also contributed to shifting power dynamics with some participants having their experiences acknowledged and validated through the research experience (Res1).

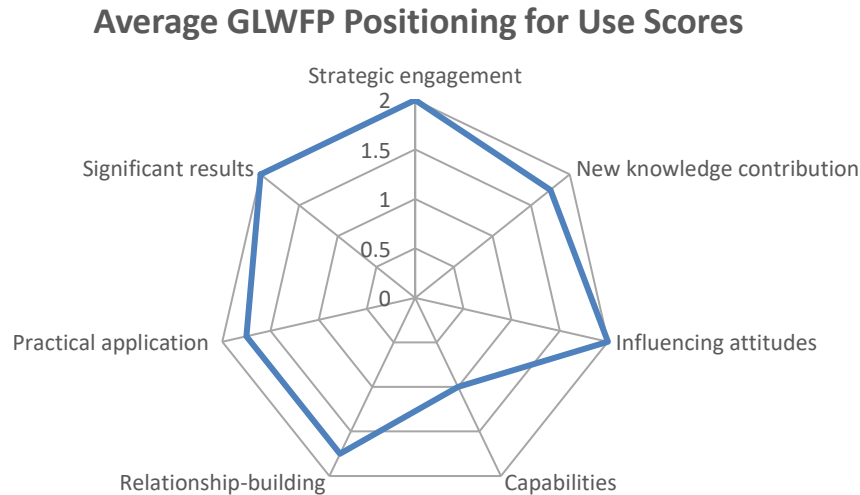


Figure 8. Project satisfaction of effectiveness criteria

Although the research capacity-building of the PI was high and equipped them for their doctoral research, it is unclear if capacity-building occurred for participants in the GLWFP or other system actors. The PI has transferred problem-solving skills to other aspects of their professional life including their doctorate (Res2). In an AR project, it can be expected that some capacity-building of research participants would occur, however the GLWFP did not document this other than the potential for some participants to engage in difficult conversations (Res2, Res1). The recommendations put forward by the GLWFP are intended for uptake, but it is unclear what extent this has happened to support the practical application as a result of the emergence of organizational barriers outside of the PI's sphere of control. For example, some resistance to organizational change under new leadership posed challenges in implementing the GLWFP recommendations (Res2). However, similar recommendations have been applied to other high-risk occupations including within the avalanche industry and participants are noted to now be thinking about the topic of gender and leadership in new ways (Prac2, Prac16). The extent of organizational changes remains unclear with no official engagement in terms of a strategy or policy change following the completion of the GLWFP (Res4).

Overall, the GLWFP contributed to significant results by instigating a catalyst for the BCWS to focus on the topic of gender and leadership. The GLWFP supported the topic being more openly discussed within the organization and on an individual level instilled some firefighters with the courage to discuss their personal experiences and supported a greater understanding of organizational culture. Strategically partnering with senior managers within the BCWS supported the completion of the GLWFP, although changes outside of the PI's sphere of control led to barriers in the implementation of results. The GLWFP contributed to the capacity-building of the PI and expanded their knowledge base to support their continued work on the topic within their doctorate.

To what extent and how did the project engage effectively with relevant stakeholders?

Informants believed that the GLWFP was “*very inclusive*” (Prac21), and involved all necessary stakeholders including BCWS firefighters, middle and senior management, and government informants. Moreover, engagement through the project supported some participants in becoming self-aware of the BCWS' organizational

culture and expanded the PI's professional networks. The GLWFP's stakeholder engagement is characterized by three stages: engagement during the project, end-of-project engagement, and post-project engagement.

Engagement During the Project

The GLWFP planned and implemented various engagement activities during the project to engage relevant actors within the BCWS and wider wildland fire community to contribute to outcomes pertaining to the increased discussion on the topic by national and international practitioners. The PI drew from relevant academic literature, the PI's personal experiences, and conversations with firefighters to develop the research and situate it within the problem context. The PI approached BCWS' senior leadership to get support to conduct the research. For example, the PI engaged the executive director, the deputy director, and the leadership team early in the research process by sharing drafts of survey and interview questions and requested feedback over the course of the project (Prac3, Res4). This kept senior leaders engaged in the project, and their guidance was sought when needed to ensure the relevance of project outputs (Prac3). Other members of the BCWS community were engaged for input to the research design. The PI's engagement with the inquiry team ensured the PI remained critical, maintaining a balance between their role as a researcher and as a member of the community being studied (Doc4). Efforts were made to enable diverse perspectives to engage in the discussion across the BCWS by involving all representations of staff. The GLWFP aimed to engage multiple standpoints and elicit "more valid and diverse construction of realities" (Doc4). The PI made an effort to establish respectful and positive relationships with participants and focused on inclusivity and collaboration to ensure diverse standpoints and ways of knowing were included within data collection. Use of the ThoughtExchange™ tool supported participants in expressing themselves within the group anonymously and "collaboratively rank group contributions [to] engage the whole system authentically" (Reimer, 2017a, p.83). For example, the ThoughtExchange™ method facilitated open engagement with the topic of gender by creating an online, anonymous conversation about gender among wildland firefighters, with participants being able to view other participants' responses contributing to the outcome participants' self-awareness about organizational culture is uncovered (Doc8).

By attending conferences throughout the research process the PI built relationships with national and international practitioners (Prac1, Res4). This engagement presented the PI with opportunities to develop networks with national and international practitioners, affirm the topic's relevance, share preliminary findings, gather additional perspectives on the topic, and exchange ideas (Prac1, Res4). Accessing these broader networks allowed the PI to disseminate findings to a wider audience and manage internal criticism in the research process by creating a support network (Res4).

End-of-project Engagement

The GLWFP identified opportunities for strategic engagement and discussions on gender and leadership nearing the conclusion of the project. The GLWFP's EoP engagement was predominantly for dissemination purposes. The PI attended a number of conferences, presented the findings at the BCWS, completed webinars, and published articles. The presentation of findings at the BCWS shed light on elements of the organization that could be improved (Prac1, Prac6). The heightened level of engagement with the BCWS as part of the research process "facilitated a transition of the learning that was part of [the GLWFP] from the hands of the lead researcher into the hands of organizational leaders" (Doc8). Conversations were held with BCWS senior leadership and the executive director, with findings also being presented to the Ministry of Forest, Lands and Resource Operations (Res4). The academic language used in GLWFP outputs also posed a barrier for wider organizational engagement in the findings. Reading a full research paper is time-consuming, so presenting the results and recommendations in a digestible format is vital and may have improved support for the project amongst organizational practitioners (Prac1, Prac11).

By attending conferences throughout the research process and by disseminating GLWFP findings through conferences, workshops, webinars, and peer-reviewed articles resulted in greater awareness of the GLWFP by other researchers with the project inspiring continued academic work on the topic to support the realization of outcomes in the academic pathway (Prac1, Res2, Res4). The PI presented the GLWFP at the Wildland Fire

Canada conference and won the award for best presentation, which drew additional attention to the topic within the community (Prac12). Informants suggested that the PI's reputation as a gender and leadership expert has grown as a result of their continued participation in conferences and academic engagement on the subject (Prac9).

Post-project Engagement

The PI continued to engage and strategically collaborate with the BCWS in a consultancy following the GLWFP to facilitate workshops on gender and leadership (Prac1). This was supported based on the PI's position as an insider within the community (Res2). This workshop program was developed to instigate awareness and behavioral change within the BC wildland fire community (Res2). Internal presentations to the BCWS helped shed light on elements where the organization could improve on aspects of gender and leadership (Prac1). Informants indicated that the PI was transparent when asked to speak within the BCWS (Prac6). However, this relationship later came to an end owing to resistance within the system to change (Doc13, Res2). The PI continues to keep in contact with the BCWS to share findings from the PI's current projects to continue the "the positive and supportive relationship" (Doc13). The PI continued to produce articles for wildfire magazines, as well as publish in peer-reviewed journals to continue to disseminate findings after the conclusion of the project which resulted in a large number of engagements including 230 views on practitioner articles and 1,475 views on YouTube presentations (Prac20). The PI is noted to have "*gone to lengths more so than most*" (Prac20) to disseminate the GLWFP findings and continue to move the academic dialogue forward. The PI has continued to engage on the topic by starting a PhD on gender and leadership in other high-risk occupations at the University of Wollongong (Doc5, Doc13, Prac3, Prac9, Res1, Res4). The PI also frequently transfers findings and recommendations to other risk-management organizations through their continued work as a gender and leadership consultant (Prac8, Prac16).

To what extent were the findings sufficiently relevant to achieve the stated objectives?

The stated objective of the GLWFP was to "gain an understanding of the experiences of gender and leadership within the British Columbia Wildfire Service" (Doc8). This objective was realized by the GLWFP. The project elicited learning from the experiences of female and male firefighters to gather organizational knowledge (including knowledge of the organizational culture) and develop tailored recommendations to support the organization in fostering gender-responsive leadership.

Indicated by the QAF assessment, the GLWFP addressed a socially relevant research problem by intending to support the BCWS in delivering its strategic goal of excellence in people. Prior to the GLWFP, there was little conversation and dialogue taking place on gender and leadership within the practitioner sphere. Impressions of the research findings' relevance are inferred from informant comments regarding how the findings resonate with their own personal experiences as well as conversations they have had with other female firefighters (Prac12). The findings and conclusions of the GLWFP were substantiated by evidence in the literature and primary data, and had internal validity (Res1). Informants found the findings to be relevant because of the PI's extensive insider knowledge of the context and referred to how the involvement and receptivity of practitioners increased the relevance of project design, implementation, and ultimately the findings. Although the BCWS and other Canadian wildland fire agencies have taken similar action in line with the GLWFP recommendations, this is not a direct result of the research (Prac3, Prac6, Prac12). However, these indirect connections infer the relevance of the recommendations. The PI's careful consideration of power dynamics and approach to ethical engagement enabled the PI to generate relevant findings and outputs. By involving multiple standpoints across the organization, the PI elicited a more diverse construction of the current organizational culture around gender and leadership (Doc4). By identifying academic and practical gaps, the GLWFP served as a bridge between academic knowledge and the practitioner sphere to support the relevance of the findings to achieve the stated objective. Informants also reflected on the relevance and value of the study particularly to the Canadian context (Res3). GLWFP recommendations are noted to be national in scope, revealing the findings' utility and practicality for other high-risk organizations in Canada (Prac6).

To what extent and how are target audiences aware of and using the project outputs?

The GLWFP contributed to knowledge outputs and social process outputs. Knowledge outputs of the GLWFP include the identified gap between academic knowledge of gender and leadership within the profession and low organizational awareness of the gendered experience; the awareness that men are negatively affected by gender within wildland fire; the culture of silence within wildland fire; and the trade-off between gender diversity and excellence. Social process outputs developed from the research process include the forum for discussion and to build capacity (conflict resolution strategies) and recommendations to improve organizational practice at the BCWS (e.g., acknowledge and resolve gender discrimination at BCWS, cultivate capacity for organizational learning at BCWS, build partnerships to address gender discrimination via organizational learning).

Out of the twenty-seven informants, all but two were aware of the project. However, five informants who were aware of the project did not have an in-depth understanding of the project outputs or results. This indicates a relatively high awareness of the project outputs among target audiences. Informants' responses focused on the awareness and utility of the GLWFP in terms of the conversation it started on the topic within the BCWS, the increased awareness and understanding that was derived from that process, and subsequent changes in the context that arose in part from the research process and recommendations. The GLWFP leveraged partnerships with senior leaders within the BCWS to increase awareness of the project and support the dissemination of outputs throughout the organization. Findings were also shared through the thesis, journal articles, blog posts, the PI's website, conference presentations, meetings with Ministry of Forest, Lands and Resource Operations and BCWS senior leadership, and workshops to ensure a wide reach across academic and practitioner target audiences. The recommendations were deemed relevant, concrete, and national in scope (Doc7, Prac12, Prac20). Recommendations were based on what firefighters had recommended within data collection in combination with lessons learned from other programs in risk-management occupations (Doc7, Prac11).

Use in Practice

A number of informants discussed the use of GLWFP outputs in the organizational practice of the BCWS. For example, the GLWFP facilitated conversations with the leadership team to ensure the topic is a focus of discussion within the BCWS (Doc12). The GLWFP put the topic on the agenda, was a catalyst for change, and provided scientific background to the problem which has supported staff in thinking more about these issues related to gender and leadership in their day-to-day work (Prac1, Prac4, Prac14). The project aimed to support the use of outputs by intentionally aligning the research with the BCWS 2021-2017 strategic goal of achieving excellence in leadership (Reimer, 2017a). As the PI shared the GLWFP findings and led workshops on the topic, discussions with both male and female leaders within the organization increased, and the PI began to work more closely with the BCWS to brainstorm solutions on the recommendations put forward by firefighters who participated in the GLWFP (Doc15). Following the presentation of GLWFP results, a debrief was completed with senior leaders to encourage increased conversation on the topic and to create change towards diversity (Gov1). The BCWS also worked collaboratively with the PI to develop training on the topic of gender and leadership following the GLWFP (Prac3). Although there has been improved focus and discussions at the BCWS as a result of GLWFP outputs, there remains to be action on the recommendations (Prac7). Owing to a number of external initiatives, including the organization itself recognizing the need to make changes to elements of their culture, some informants find it challenging to relate specificity to the GLWFP outputs (Prac4). Although the GLWFP was a catalyst for increased discussion on the topic, informants suggested that the GLWFP is not referenced in current conversations on gender and inclusivity in the BCWS (Prac4).

Findings were also intended to be accessible and support the furthering of practical knowledge application within the international firefighting community and other risk-management organizations (Survey1). The thesis was described as a useful resource for practitioners to reference to justify future work on the topic (Prac11). One practitioner indicated intentions to use GLWFP findings in future funding and/or sponsorship proposals (Prac11). Others have used similar methods to that of the GLWFP within their own work in other risk-management organizations (Prac13). Although some informants were unable to speak to specific benefits of the GLWFP, the

research and its scientific credibility are being used as a “*selling feature*” (Prac12) by informants to continue work on the topic. Informants also discussed use of ideas from the GLWFP findings that translate across the broader notion of inclusivity, which has assisted them in becoming more comfortable discussing the topic on an individual level (Prac4). As a form of organizational self-reflection, the GLWFP has contributed more broadly to the international conversation about gender and gender discrimination within the wildland fire community (Doc8). The PI’s publication of GLWFP findings and recommendations in journals lends more credibility to the topic because it comes from a peer-reviewed source (Prac12). These journal articles, as well as articles in practitioner publications, have also contributed to the practitioner dialogue on the topic (Prac13).

Use in Policy

There is minimal discussion of the use of GLWFP outputs in policy. When discussed by informants, uptake in policy focused mainly on organizational policy within the BCWS. The GLWFP contributed to the People First initiative by encouraging open discussion on the topic of gender and ensuring these discussions become an accepted part of the culture (Prac18). The GLWFP findings and recommendations also indirectly influenced the Respectful Workplace Policy that was released by the BCWS in the spring of 2017 as the PI was a part of initial discussions and advocated for a non-punitive approach which was not adopted by the organization (Res4).

Government informants also noted that Standards of Conduct were created for the wildfire service that address specific behaviors including bias and harassment; however, it is unclear whether this is a direct contribution of the GLWFP and its outputs but it is plausible to expect some contribution due to the strategic engagement of government actors in the GLWFP and the success in ensuring the issue is a focus of the BCWS (Gov1). For example, the PI briefed individuals within the Ministry of Forests, Lands and Resource Operations on the GLWFP findings and results in one-to-one conversations during the 2017 and 2018 fire seasons (Res4). However, there was no official engagement in terms of a strategy change at the government or level that could be explicitly linked to the GLWFP (Gov1, Gov2, Res4).

The PI’s research insights have been utilized by other high-risk organizations, along with a number of alternative sources (e.g., workers compensation board, industry relations, external consulting companies) to conduct training on the topic of gender and leadership and to support the creation of guidelines in organizational operation manuals (Prac2). Informants in other risk-management occupations suggested that there have been a number of discussions in terms of changing policy and in how member policy is taught as a result of the PI’s continued work on the topic (Prac8). Lastly, informants highlight that policy change is often the result of a number of factors and initiatives coming together at the right time, with policy change taking time to manifest; as a result, policy change may not yet have been realized as a result of the uptake of GLWFP outputs (Prac10).

Use in Academia

GLWFP outputs have been used in academia to lay a framework for other researcher to reference in the future (Prac21). Informants have shared the GLWFP thesis with other researchers interested in looking into the topic of gender in wildland fire, which has led to the GLWFP being cited in a number of works (Prac21; Walker, Reed and Fletcher, 2020; Dickson-Hoyle, Beilin, and Reid, 2020; Zabaniotou, Pritsa, and Kyriakou, 2021; Hsieh and Tai, 2020; Syaufina and Sitanggang, 2020; Sprague, 2019). The PI has also shared their definitions and thoughts of wildland fire culture through personal communications with other researchers exploring the topic (E-mail5). The PI’s article published in the International Journal of Wildland Fire (Doc4), which discusses the findings and recommendations of the GLWFP, has received seven of citations by academics and firefighters discussing the topic (Prac17). This implies that the findings are useful and lends scientific credibility to the topic needing increased focus (Prac17). Other researchers focusing on similar issues such as mental health within wildland firefighting have also cited the GLWFP within their own work (Res3).

How does Royal Roads support student success in research?

RRU and the MAL program played a key role in supporting the success of the GLWFP and the PI. The program balances professional diversity with sector-specific knowledge and problem-solving skills to support research that

contributes to change (RRU, 2019b). The program fosters effective research to encourage change and the “*betterment of people*” (Prac10). The MAL program attracts students with a broad range of experiences who are themselves endeavoring to influence change within the context of their own profession (Res1). The program encourages students to use an action-oriented approach to research and work in collaboration with a sponsoring or partnering organization to improve the usefulness of their research (Res1). Students are also encouraged to develop an inquiry team to surround themselves with a group of people both within their organization and outside to assist them with moving change forward and mobilizing the research (Res1). For example, the PI recruited academic leaders in the field of gender in wildland fire to be a part of the inquiry team to support and assess the research (Res1). This ensured that the GLWFP was assessed from an academic perspective as well as from the perspective of those who were expected to use it (Res2, Res4).

The MAL program also offers distanced learning which supported the PI to stay connected in the rural context of wildland firefighting and maintain a collaborative nature with some firefighters (e.g., bouncing ideas off of colleagues) during their studies (Doc12, Res4). This ensured the GLWFP remained relevant to the rural firefighting community and the rural masculinities prevalent within the culture by immersing the PI within the problem context (Res4). The MAL program also exposes students to non-traditional methods outside of interviews, focus groups, and surveys (Res1). For example, students are encouraged to use creative methods such as photo-voice and world cafés to think outside of the usual linear decision-making model; creative methods enable students to gain insights from a different perspective (Res1). RRU encourages students to explore what is the best method for their particular project and what they want to achieve (Res1). However, as previously noted, GLWFP used overly academic language which created a barrier to results for the wider practitioner community. Further research design programming at HEI’s to focus on using appropriate terminology for target audiences would support the use and uptake of research.

The program is noted to have positively influenced the GLWFP and enabled the PI to create a robust research methodology that produced data that could be triangulated to get to the core of issues surrounding the topic of gender and leadership in wildland fire (Res2). However, more focus on the development of thorough research objectives would aid the structure and purpose of research projects to support their academic credibility and position student researchers for further publishing opportunities and outcome realization within academic impact pathways. The academic rigour of the program built the PI’s confidence and trained the PI to engage with research participants using an approach that acknowledged the researcher as a leader in their own right (Res2). For example, the methodology courses prepared the PI to engage and manage challenging participants within focus groups, which the PI continues to use in their current doctoral work (Res2). Although the research capacity-building of the PI was high, minimal capacity-building occurred for participants and other system actors. Research design programming can support the uptake and use of future research by ensuring capacity-building of system actors is an integral element of research to support outcomes related to individual and organizational change.

By supporting research evaluations and exploring how student research has contributed or has the potential to contribute to change, RRU ensures that student research does not just sit on a shelf following completion. (Prac5, Prac12, Res2). Utilizing ToC as a tool within research design programming would further support planning, monitoring and evaluation for learning and improve effectiveness. Had the GLWFP used ToC more explicitly within the research process this would have encouraged critical thinking, integration, and collective visioning among team members and collaborators, and facilitated co-ownership of the research process, and transparency and accountability of results to support the uptake and use of findings within the BCWS and wider practitioner realm (Belcher, Claus, Davel, Jones, and Ramirez, 2019). Co-ownership of the research process through the use of a ToC throughout the GLWFP may have minimized the perceived bias of the ThoughtExchangeTM tool by facilitating greater ownership and supporting increased participation.

However, there are also challenges in completing research at the Master’s level, including the limited time frame students have to engage a large and diverse range of individuals to influence some measure of change (Res1). Students are encouraged to keep their research projects smaller in scope to make the research feasible (Res1). One informant also suggested that challenges exist when partnering with an organization, such as the time needed

from both parties to develop a robust research project and shared understanding (Prac8). Some students approach organizations with an unclear proposal, which proves a significant time and resource barrier to organizations requested to sponsor graduate projects (Prac8). Lastly, the depth of research expertise at the Master's level is noted to have been somewhat of a barrier in completing research that effectively contributes to change as student researchers have only limited time and resources (Res4). Involving external experts in the field helped to overcome this challenge faced by the GLWFP (Res4). The PI dived deeper into the analysis than expected by most Master's-level research, which added to the complexity of the project; RRU faculty members were supportive in pointing the PI to more complex action research methodologies to manage the intricacies of the project (Res4).

What lessons about effective research practice can be learned from this case study?

Interview informants discussed a variety of themes that support effective research practice, including: research that addresses a real-world problem; research that is collaborative and/or participatory; research that is unbiased; research that is academically rigorous; research that presents a strategy; and research which can be translated into use (Prac11, Prac17). Effective research is research that is directly relevant to important issues and adds value to areas that are under-explored (Prac11, Prac17). Effective research provides empirical information that can inform decision-making for a problem and is not based on assumptions (Prac17). There is an adaptive management aspect to effective research that ensures research is useful to implement change (Prac11). Collaborative and participatory research which consults system actors and allows system actors to have their voice heard was noted to be more effective by informants and is thought to be a concept often missed by most research projects (Prac14, Prac15). To be truly effective, the research should also speak to the population that it targets and address genuine concerns within the community of study (Prac16, Prac21). Informants also note that it is important to reduce bias as much possible within research to achieve the best results possible (Prac18, Res2). Effective research should not have an underlying agenda, and should be factual and honest and explore alternative explanations to provide specificity regarding limitations (Prac4, Prac18). Research should not be tainted by dominant voices and should contextualize the findings in both existing theories and knowledge to meet existing standards of academic rigor (Prac12, Res2). Ultimately, effective research is research that presents a strategy and/or can be translated into use and action (Prac15). Informants suggested that effective research turns findings into practical outputs in a non-academic and digestible formats (such as newsletters or workshops) that can be shared with its target audiences to challenge cultural or organization norms (Prac1, Prac9, Prac20, Res2). Rather than simply presenting results, effective research should provide a strategy to support change, for example through recommendations to move forward on the topic and support decision-making (Prac6, Prac15, Prac19).

Project Lessons

The GLWFP supported the realization of outcomes across multiple pathways by using mechanisms such as filling knowledge gaps, developing and refining methods, leveraging reputations, and strengthening and creating coalitions to support positive changes for the PI and participants involved in the research process. Outcomes were also realized in part owing to the PI's position as an insider, strategic engagement of relevant actors, and the interdisciplinary nature of the project which enabled elements of the GLWFP's process and outputs to be relevant, credible, legitimate, and well positioned for use. These qualities also helped bridge the gap between the academic and practitioner spheres. Although all relevant stakeholders were engaged in the research, had the GLWFP presented the findings in more accessible ways it is likely that the project would have had a greater uptake by practitioners. Other research projects could benefit from the lessons gained from the GLWFP on how to conduct research in the sensitive topic of gender and leadership, the benefits of strategically leveraging partnerships with a wide range of stakeholders, and the benefits of conducting interdisciplinary research.

- **Leveraging the PI's position within the organization and social capital were effective strategies to collect data and to ensure knowledge-into-practice through dissemination.** The PI's position as an insider to the organization allowed them to gain access to a hard-to-reach population and assisted with the data collection process. The PI's in-depth understanding of the organization and pre-established networks

played a crucial role in gaining support for the GLWFP and fostering change through the transfer of knowledge through the PI's colleagues at the BCWS. The PI's experience working in the organization positioned them well to influence change.

- **Aligning the research with current initiatives and organizational strategy means the research is better positioned for use.** The GLWFP identified entry points from literature, organizational cultural norms, and through personal experiences at the BCWS. Completing a thorough review of existing research on the topic and engaging in a range of scoping exercises was paramount to ensure that the project was situated within the appropriate problem context, filled a knowledge gap, and increased the likelihood that the recommendations would be useful and used. For example, the shift in worker dynamics in the wildland fire community illustrated by the literature indicated an opportunity for organizational change. The GLWFP is also intended to support the BCWS in delivering on its strategic goal of excellence in people.
- **Engaging all levels of system actors as participants in the development of recommendations fosters the relevance of outputs.** Genuine involvement of relevant actors in the research process ensures diverse perspectives are reflected to increase the relevance and utility of the research questions, findings, and recommendations. The GLWFP involved a range of system actors in the research (e.g., boots on the ground, managers, senior leadership, government actors, etc.) and enabled diverse perspectives to engage in the discussion. The GLWFP was also gender-inclusive and showed no gender preference during the activities and engagement. The research demonstrated sensitivity to the needs of participants (e.g., PI was aware of and responded to power dynamics) and the PI made efforts to establish positive relationships with participants to build trust, including involving interview participants in the decision-making process.
- **Strategically leveraging partnerships with organizational leaders and leading academics supports the acknowledgement of the research and fosters organizational change.** The PI received official support and sponsorship from the BCWS, and collaborated with senior leadership and the inquiry team throughout the research process to share findings and receive feedback. The inquiry team comprised members of the BCWS who were interested in organizational change. The PI also recruited academic leaders who were experts in the field of gender and leadership in wildland fire to be a part of the inquiry team. Organizational buy-in for the GLWFP was crucial to its success in gathering data from a hard-to-reach population and fostering support for recommendations. Building respectful and positive relationships with national and international practitioners and leading academics supported the dissemination of the research. Strategic partnerships can also ensure continued work on the topic by identifying the need for change, highlighting gaps, and presenting new perspectives and ways forward. Sponsoring organization relationships should be managed carefully to gain access, support, resources, and networks.
- **Utilizing an interdisciplinary approach supported the GLWFP in building a bridge between academic and practitioner spheres.** The interdisciplinary approach allowed the PI to engage with necessary system actors in the practitioner and academic realm to build networks and disseminate knowledge. The PI successfully integrated a range of appropriate disciplines to ensure academic rigour and trust in the research findings and recommendations. By being exposed to interdisciplinary perspectives, participants became aware of their own place within the organizational culture which opened up new perspectives to contribute to academic and organizational knowledge.
- **Effective communication, particularly regarding methods and the expectation for change after the presentation of results, is key to sustain and develop action from the research.** Misunderstanding between the BCWS and PI regarding the AR methodology is noted to have led to confusion and disagreement. The organization is suggested to have not fully understood some of the drivers behind the continuation of work by the PI following the GLWFP, which led to challenges in moving the research forward. Perception of a research agenda and researcher positionality can lead to skepticism of research findings and diminish the likelihood for application of outputs and/or create tension. An in-depth discussion on processes following the release of GLWFP findings could have prevented some of the challenges that subsequently arose in an effort to continue the conversation in a constructive manner to support disclosure

of perspective, genuine and explicit inclusion, and effective communication within research design and implementation.

Contextual Lessons

The GLWFP was well-situated within the problem context, as the entry points were drawn from literature and personal experiences of female firefighters as well as the PI's previous experience as a wildland firefighter. This factor played a key role in the accomplishments of the project and limited the effects of contextual barriers for research conducted on a sensitive topic.

- The PI had first-hand familiarity with the cultural dynamics of the BCWS. This insider knowledge also allowed the PI to gain access to a hard-to-reach participant base. Despite their insider positioning, there were difficulties in influencing entrenched cultural norms, particularly around sensitive topics such as gender and leadership. The PI successfully initiated the first steps for change by creating a conversation on the topic across all levels of the organization to ensure the likelihood that the topic will be placed on the organizational agenda (Black & Fawcett, 2008). By providing meaningful data grounded within the organizational priorities and Canadian contexts, the project was more likely to raise attention to an issue and encourage action.
- Gender and leadership in wildland fire are complex issues, and exploration into the topic can lead to tensions if collaborative relationships are not managed throughout the research process. For example, the PI's insider perspective was perceived to create bias. Owing to the PI's gender, it was suggested that there was a predetermined direction to the GLWFP which led to some distrust in results. The implications of bias on the GLWFP's conclusions is not discussed in great detail; full transparency on positionality would have improved the trust and use of findings and recommendations. When doing further research within this context, it is suggested that a wider lens of inclusivity should be used to minimize perceptions of bias.
- Traditionally, wildland fire comes from a perspective of natural science which resulted in the PI having to complete share and educate some members of wildland fire on social science which was challenging and resulted in some speculation around GLWFP findings and methods. Future research in this context should include further social science literacy and expose audiences to different research disciplines and types of research perspectives to address the perception of subjectivity. There is value of social sciences and leadership studies to support risk management organizations to function effectively.
- For research to be both useful and used by target audiences, it must be presented in accessible formats. Although the PI shared findings throughout the research process, communications could have been more accessible as the project was critiqued for its use of overly academic language. More appropriate terminology or presentation in layman's terms would have improved the accessibility of results throughout the organization. Tailoring dissemination to target audiences would also have supported the sharing of findings to practitioners outside of the academic community to ensure greater use of the GLWFP results.

Evaluation Limitations

The following evaluation lessons and limitations should be considered with regards to the Outcome Evaluation approach, data, and results.

Limitations of the analytical framework: Having the PI identify informants to test the outcomes can also increase the risk of introducing bias into data collection as informants may be selected for their likelihood to reflect positively on the project's results and outcomes. To address this limitation, snowballing for additional perspectives and sources of information was undertaken and a variety of documents were reviewed.

Limitations of the data and results: Assessments using the Outcome Evaluation approach rely on informant perspectives. Interviews were conducted a few years after the project concluded, making recall of project details and processes difficult for some informants. There was also some confusion in separating outcomes related to the GLWFP from other initiatives on gender also underway within the organization. This led to several outcomes being realized or partially realized with unclear project contribution. However, informants with a continued

working relationship with the PI could recall more positive details of the project and its contributions. As there have been few discussions on the topic of gender and leadership in wildland fire within the media, outcomes relating to public perception had insufficient evidence to make an assessment.

Recommendations

The GLWFP demonstrated some characteristics of an effective transdisciplinary project by focusing on a socially relevant research problem, effectively engaging with the problem context, ensuring adequate competencies were reflected in the research team, using appropriate methods, adhering to ethical standards of research conduct, and contributing to a significant outcome. These elements of project design and implementation contributed to positive outcomes across multiple pathways in the project's ToC. The project also leveraged diverse mechanisms to support outcome realization. These results align with Belcher et al.'s (2019) findings. There were also elements of the project that could be strengthened. The evaluation concludes with the following recommendations for future research, which can apply to other RRU graduate student research projects or research more broadly.

1. **Use a ToC to plan and monitor progress.** This includes developing explicit, realistic, and logical assumptions and theories about how and why a research project is expected to contribute to a change process. Developing a ToC and its underlying theories and assumptions at project inception can help to target project activities, as well as leverage opportunities that arise throughout the research process. Although the GLWFP had an implicit ToC, deliberate planning for outcomes would have supported the GLWFP to support critical thinking, integration, and collective visioning among stakeholders to facilitate transparency and accountability of results. Utilizing a ToC from project inception would also help to identify and engage key actors at project boundaries and improve the understanding of diverse roles in a change process.
2. **Develop research objectives that clarify the structure and purpose of the research project.** Objectives should be specific in terms of what knowledge is needed and how the project will produce that knowledge, and should not be presented as a statement of interest. A set of clearly defined objectives provide a clear direction and scope of the research, and can support target audiences in clearly understanding the purpose of the research project.
3. **Discuss alternative explanations and limitations (including bias) in relation to effect on results to support rigour and transparency.** An in-depth discussion of the PI's positionality and how this affected the interpretation of findings would have increased transparency and trustworthiness of results.
4. **Tailor communications for target audiences.** Using appropriate language and tailoring communications to suit the needs of target audiences are necessary to ensure the uptake and use of findings and can influence the effectiveness of a message. For research to strengthen policies and practices within organizations, a range of audiences across the organization need to engage with its findings. Such engagement requires effective research communication through multiple avenues.
5. **Align research with the organization's strategic direction to support implementation and uptake.** By working with senior leaders to develop a research project that aligns with the organization's strategic direction, the PI ensured that the GLWFP was both relevant and filled a gap. In addition to alignment with the organizations strategic direction, values must be shared and appropriate buy-in by boundary partners must be gained to support the uptake and use of findings to influence organizational policy and change. This was an element initially done well by the GLWFP but was lost with the change in leadership.
6. **Leverage strategic partnerships to foster organizational change.** By strategically partnering with senior leaders, members of the organization interested in organizational change, and academic experts in the field, the GLWFP successfully positioned the research for use. Leveraging social networks and strategic partnerships are effective ways to access data and contribute to organizational change through dissemination and outreach.

Appendix 1. Evidence Sources

Code	Class	Author(s)	Reference	Date
Blog1	Blog	Reimer	Reimer, R. (2017). Learning at Work – Safe spaces required? The wisdom and irony of ‘Don’t F it up’ Part 1. Retrieved from https://wildfirelessons.blog/2017/03/08/learning-at-work-safe-spaces-required-the-wisdom-and-irony-of-dont-f-it-up-part-1/	2017
Blog2	Blog	Reimer	Reimer, R. (2017). Learning at Work – Safe spaces required? The wisdom and irony of ‘Don’t F it up’ Part 2. Retrieved from https://wildfirelessons.blog/2017/03/09/learning-at-work-safe-spaces-required-the-wisdom-and-irony-of-dont-f-it-up-part-2/	2017
Blog3	Blog	Reimer	Reimer, R. (2017). Learning at Work – Safe spaces required? The wisdom and irony of ‘Don’t F it up’ Part 3. Retrieved from https://wildfirelessons.blog/2017/03/07/learning-at-work-safe-spaces-required-the-wisdom-and-irony-of-dont-f-it-up-part-3/	2017
Doc1	Event overview	Reimer	Reimer, R. (2018). Conference event overview: The Wildfire Within, Firefighter perspectives on gender and leadership in wildland fire. SWFSC.	2018
Doc2	Position paper	Association for Fire Ecology	Association for Fire Ecology. (2016). Sexual Harassment and Gender Discrimination. Retrieved from https://fireecology.org/sexual-harassment-position-paper	2016
Doc3	Survey infographic	Association for Fire Ecology	Association for Fire Ecology. (2016). Sexual Harassment and Gender Discrimination in Wildland Fire Management, Infographic. Retrieved from https://fireecology.org/sexual-harassment-position-paper	2016
Doc4	Peer-reviewed journal article	Reimer and Eriksen	Reimer, R., & Eriksen, C. (2018). The wildfire within: Gender, leadership and wildland fire culture. International Journal of Wildland Fire, 27(11): 715. https://doi.org/10.1071/WF17150	2018
Doc5	Journal article	Reimer	Reimer, R. (2017). Leadership, Excellence and Gender in Professional Culture: Dialogue-based Research from Wildland Fire - With Implications for the Avalanche Industry?. The Avalanche Journal, 116. Retrieved from https://issuu.com/theavalanchejournal/docs/vol116	2017
Doc6	Organizational policy	BCWS	Ministry of Forests, Lands, Natural Resource Operations and Rural Development. (2018, January 21). BC Wildfire Service Respectful Workplace Policy.	2018
Doc7	Radio interview transcript	CBC Radio Kamloops	CBC Radio Kamloops. (n.d.) Shelley Joyce interviews Rachel Reimer. Retrieved from https://www.racheldreimer.com/publications-and-presentations	n.d.
Doc8	Master’s thesis	Reimer	Reimer, R. (2017). The wildfire within: Firefighter perspectives on gender and leadership in wildland fire. (Master's thesis, Royal Roads University, Victoria, Canada). Retrieved from http://hdl.handle.net/10170/1054	2017
Doc9	Testimony	Martin	Testimony of Kelly Martin before Committee on Oversight and Government Reform. U.S. House of Representatives on examining Misconduct and Mismanagement at the National Park Service, Unpublished.	2016
Doc10	RRU news article	Blythe	Blythe, A. (2019, January 23). Leading on the fire line of gender. Retrieved from https://www.royalroads.ca/news/leading-fireline-gender	2019

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Doc11	RRU news article	MacGregor	MacGregor, J. (2017, June 12). Wildland firefighting ignites graduate research. Retrieved from https://www.royalroads.ca/news/wildland-firefighting-ignites-graduate-research	2017
Doc12	Learning review	United States Department of Agriculture	United States Department of Agriculture. (2016). Sierra Tree Strike Incident, Learning Review. Retrieved from https://www.wildfirelessons.net/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=96be87cd-80e1-3abc-f63a-cdc70d3cbce8&forceDialog=0	2016
Doc13	Twitter post	Leduc	Caleb Leduc. (2016, October 26). Great to see #research at #WFC2016 discussing #gender and #leadership in wildland firefighting, work by Rachel Reimer, MA Cand. @RoyalRoads [Tweet]. Retrieved from https://twitter.com/caleb_leduc/status/790981299062177792?s=20	2016
Doc14	News article	Wildland Fire Lessons Learned Centre	Wildland Fire Lessons Learned Centre (2016). Two More Chains, 6(2). Retrieved from https://www.wildfirelessons.net/viewdocument/two-more-chains-summ	2016
Doc15	Action plan	Government of Western Australia	Government of Western Australia, Department of Biodiversity, Conservation and Attractions (2019). Women in Fire Management Action Plan 2019–22. Retrieved from https://www.dpaw.wa.gov.au/images/documents/conservation-management/fire/Women%20in%20Fire%20Management%20Action%20Plan%202019-22.pdf	2019
E-mail1	E-mail communication	Anonymous	Subject: Re: Great Webinar!, Unpublished	2018
E-mail2	E-mail communication	Anonymous	Invitation to submit to Special Issue, Unpublished	n.d.
E-mail3	E-mail communication	Anonymous	Fwd: Research on Gender, Leadership and Well-being in the Avalanche and Guiding Industry, Unpublished	2019
E-mail4	E-mail communication	Anonymous	Fwd: Thank You, Unpublished	2018
E-mail5	E-mail communication	Anonymous	Re: Wildland Fire Culture, Unpublished	2019
E-mail6	E-mail communication	Anonymous	Re: WTREX 2019 - Tall Timbers Research Station in Florida! Applications now open!, Unpublished	2018
E-mail7	E-mail communication	Anonymous	Re: Follow-Up - Invitation to Participate in a Royal Roads Research Project, Unpublished	2019
E-mail8	E-mail communication	Anonymous	Re: Respectful workplace Policy, Unpublished	2019
E-mail9	E-mail communication	Anonymous	Re: Invitation to Participate in a Royal Roads Research, Unpublished	2019
E-mail10	Email communication	Anonymous	Re: Theory of Change workshop, Unpublished	2018
Gov1	Interview	Government informant	Unpublished case study interview transcript	2019

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Gov2	Interview	Government informant	Unpublished case study interview transcript	2019
Prac1	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac2	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac3	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac4	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac5	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac6	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac7	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac8	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac9	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac10	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac11	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac12	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac13	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac14	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac15	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac16	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac17	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac18	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac19	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac20	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Prac21	Interview	Practitioner informant	Unpublished case study interview transcript	2019
Res1	Interview	Researcher informant	Unpublished case study interview transcript	2019
Res2	Interview	Researcher informant	Unpublished case study interview transcript	2019
Res3	Interview	Researcher informant	Unpublished case study interview transcript	2019
Res4	Interview	Researcher informant	Unpublished case study interview transcript	2019
Survey1	Survey	PI	Unpublished survey response.	2018

Appendix 2. Semi-structured Interview Guide

A) General questions about the respondent, their expertise on the topic, & recent/significant changes in topic (purpose to build rapport & clarify the context)

Main Question	Probes	Intent: What we are trying to find out Do NOT ask these directly.
1. What is your role within [organization]?	<ul style="list-style-type: none"> How is your work related to gender and leadership in wildland fire? How long have you been doing this kind of work? 	Understanding the respondent's job/organization and the relevance of the topic to their work. Finding out the expertise of the respondent and their professional connection to the topic, as well as their influence on the topic of focus.
2. What role does [organization] play in gender and leadership in wildland fire?	<ul style="list-style-type: none"> How long has your organization been involved in work related to gender and leadership in wildland fire? 	
3. What are the main challenges related to the topic of gender and leadership in wildland fire?	<ul style="list-style-type: none"> What is the reasoning for these challenges? 	Personal expertise & perceptions on the topic of focus. Interviewee's knowledge level, understanding, and perceptions on the problems & issues relevant to the focus of the project – what do they think the problems are and how they frame the problems. QAF: Rel1, Rel2, Rel3, Rel5
4. What have been the most important developments related to gender and leadership in wildland fire in the last three years?	<ul style="list-style-type: none"> In the discussions, events, ideas, institutions, policy, and/or practice?² What are the implications of these developments? Why do you think these are important? 	Understanding people's perceptions of the situation and identifying possible changes in policy & practice. Getting an idea of the way in which the issues in question are perceived by interviewees, and get a range of various perspectives/understandings of the developments, causalities & people's values in relation to issues. QAF: Rel1, Rel2, Rel3
5. Who are the key players in the discussion, policy, or practice of gender and leadership in wildland fire?	<ul style="list-style-type: none"> What role do government/academic/NGO /international/private sector/communities play³? In what ways have they (each) been influential? 	Understanding people's perceptions of who is who in changing policy & practice. Getting an overview of who people consider as key actors in the process. This question will also provide insights about the power dynamics between the stakeholders (e.g. who's got power over whom). QAF: Rel1, Rel3
6. What information/knowledge has been the most influential in related to gender and leadership in wildland fire?	<ul style="list-style-type: none"> Who is promoting the information/knowledge or event in question? In your opinion, has the information [what they mentioned] influenced policy and practice? How? Probe for examples. 	Understanding what kind of knowledge is used in decision-making in general. Getting a better picture of what kind of knowledge & other factors are influencing gender and leadership in wildland fire, and from where the ideas are coming. More detailed information about possible changes in policy & practice because of new information/scientific knowledge. QAF: Rel1, Rel2, Rel3

² All terminology should be adjusted & verbally explained so it is appropriate to each interviewee (please record any adaptations in the post-interview notes).

³ It is not necessary to ask all questions to every informant – the list merely illustrates what kind of information we are trying to find out.

B) Understanding links between knowledge sharing & decision-making processes (purpose to assess important sources of influence on policy & practice)

Main Question	Probes	Intent: What we are trying to find out Do NOT ask these directly.
7. When doing work related to gender and leadership in wildland fire, where do you (or your organization) get the information you need to do your work?	<ul style="list-style-type: none"> What kinds of information? How does that information help guide decisions around what your organization does? 	Understanding what kind of knowledge is used in decision-making in general. Getting a better picture of what kind of information is seen as important and/or used in decision-making (scientific or non-scientific). QAF: Rel7, Eff2
8. Do you use scientific information in your work in relation to gender and leadership in wildland fire?	<ul style="list-style-type: none"> How has it influenced or contributed to your work? Where did you get that information? (Any specific events, publication, meetings, etc.) What are the main barriers to using scientific information? 	Understanding what the role of science is in decision-making. Getting a better picture of the ways in which scientific knowledge is used by organisations, how they get the science they use, and what prevents them from basing their decision-making on scientific research findings. QAF: Rel7, Eff2, Eff3
9. Which factors are influence your (personal and/or organization) decision-making around issues related to gender and leadership in wildland fire?	<div> <ul style="list-style-type: none"> Political factors Individual or organizational advocates Scientific information/ research </div> <div> <ul style="list-style-type: none"> Political factors Public opinion Precedent in other jurisdictions Global pressures/ influences </div> <p>Are there any additional factors?</p>	Understanding what other aspects influence decision-making. Understanding how people see decision-making situations, which aspects matter most in making changes in policy & practice, and how research findings matter in relation to other factors.

C) Determine respondent's awareness of and/or involvement in the principal investigator's project

Main Question	Probes	Intent: What we are trying to find out Do NOT ask these directly.
10. Have you heard about [the principal investigator]'s research on gender and leadership in wildland fire? *if they do not recognize the PI's name, prompt with details about the project	<div>[to non-partners]</div> <ul style="list-style-type: none"> What do you know about the research project? How did you hear about it? How would you describe your interactions with the project or the principal investigator? (e.g., presentations, workshops, etc.) <div>[to partners]</div> <ul style="list-style-type: none"> How did you get involved in the project? What was your role in the project? What was your contribution to the project? (e.g., meetings, provide information, connect people, make recommendations, etc.) Do you think that your input was taken into account? 	Understanding awareness, role, & length of engagement with relevant actors and/or project partners. Finding out informant's awareness & opinions about the project. Finding out to what extent the degree & length of engagement in the project may be associated with changes in policy & practice. QAF: Rel3, Rel7, Cre7, Cre8, Leg1, Leg2, Leg3, Leg4, Eff2

[Ask 11 ONLY to participants & those who said they know the principal investigator and the project]

11. How would you describe your participation/collaboration experience in the project?	<ul style="list-style-type: none"> How would you characterize your opportunity to participate and engage in the research? (i.e., rigid/ restricted by student, open/facilitated by the PI/ participatory) Do you have any suggestions regarding how engagement/participation could have been made more meaningful for you? Do you think any key stakeholders were excluded from the research? Any examples of positive experiences/what was done well? Any promising practices? How could the participation/collaboration work even better in the future? 	Understanding personal experience and feedback. Further details of the influence of the project on the personal level, possible additional aspects (re: knowledge translation). Potential for improvement. QAF: Leg2, Leg3
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D) Perceptions on design and implementation elements and how the programming at Royal Roads University supports student success (ask only to members of the research advisory committee)

Main Question	Probes	Intent: What we are trying to find out Do NOT ask these directly.
12. How do you think the Master of Arts in Leadership program helps to support effective student research?	<ul style="list-style-type: none"> How is research taught in the program? How is the applied research focus reflected in the program? How do you think [the principal investigator]'s project was influenced by the program (positively, negatively)? 	Understanding program influence on effective research practice. QAF: Cre1, Cre5, Cre6, Cre8
13. How was [the principal investigator]'s project assessed?	<ul style="list-style-type: none"> What criteria were used? What would you say are some of the challenges of assessing research of this kind? 	Understanding how student research is assessed, and how advisory committee members conceptualizes research effectiveness.
14. How would you characterize the design and implementation of [the principal investigator]'s project?	<ul style="list-style-type: none"> Did [the principal investigator] demonstrate a comprehensive understanding of the context and elements relevant to the research problem? How would you describe the application of the methods? Was the execution suitable to the research objectives? Was the execution suitable to the context? Do you think resources were sufficiently and effectively allocated? Were there any issues with the design that you can recall? How were these addressed? Do you think any important stakeholders were excluded? 	Perspectives about project design and implementation. QAF: Rel3, Rel5, Rel6, Cre1, Cre4, Cre7, Cre8

E) Research outcomes assessment (ask only if they are aware of the project) (purpose to determine extent of outcome achievement and research influence on knowledge or social process contributions around gender and leadership in wildland fire)

Main Question	Probes	Intent: What we are trying to find out Do NOT ask these directly.
15. What contributions do you think [the principal investigator]'s project has made to address issues pertaining to gender and leadership in wildland fire?	<ul style="list-style-type: none"> • Changes in knowledge/understanding? • Changes in attitudes? • Changes in skills? • Changes in relationships? • Changes in behaviour? • At what level do these changes mostly occur? (i.e., organizational, individual, governmental, policy, practice) • When did these changes occur? (during, post-project) • What are the implications of these changes? • Were there any negative outcomes of this project? If yes, please describe. • Probe for specific outcomes the principal investigator thought the informant could speak to. • What do you think the principal investigator did well to achieve these results? • How accessible did you find the results and communication during the process? • Do you think the research can be transferred to other contexts? 	<p>Understanding the respondent's opinion about the contributions of the research.</p> <p>Finding out the respondent's opinion on the student's research contributions (without leading to specific outcomes). Can give an indication of the utility of the research.</p> <p>Finding out how the student's research is/was perceived and conceptualized by interviewees to get an overall characterization of the change process. This will help us construct narratives about alternative and/or supplementary theories of change.</p> <p>Finding out about the explicit outcomes/impacts of the project in question anywhere (in the world) of which the informant is aware, not just within their own work/organization.</p> <p>QAF: Rel6, Rel7, Cre7, Cre8, Cre10, Leg3, Eff1, Eff2, Eff3, Eff4</p>
16. Has the research contributed to or influenced your work on the topic?	<ul style="list-style-type: none"> • What were the most important things you learned? • Have there been any positive or negative impacts on knowledge, awareness, policy, capacity, or practice? • In what ways? [ask for examples] • [If respondent mentions knowledge, ask about what knowledge product it came from] 	<p>Understanding how the student's research has influenced their work (re: the topic of focus).</p> <p>Finding out about linkages between project and informant's work on the topic of focus*, and whether the research has contributed to changes in policy & practice, the debate, awareness in the topic, knowledge, capacity, or any other type of contributions. Getting a sense whether the change is perceived as positive or negative.</p> <p>QAF: Rel5, Eff1, Eff2, Eff3, Eff4</p>
17. If there was more time and resources available, what do you think [the principal investigator] could have done differently to produce more useful findings and/or change?	<ul style="list-style-type: none"> • Why do you think these would be useful? [ask for examples] • How do you think [the principal investigator] could have integrated these into their project? • Why do you think this [suggestion] was not done? • Do you think resources were efficiently and appropriately allocated? 	<p>Understanding alternative ToCs and perspectives of the research potential beyond what it did achieve/intended to, and other opportunities.</p> <p>Hold to the end of the interview – if the interviewee starts talking about it at the beginning, please lead them back to any of the questions above and ask to return to the question.</p> <p>This Q allows participants to give feedback to the project and helps identify gaps/challenges, but we know many of the problems</p>

		<p>already and do not want to let this dominate/ mislead the main focus of the interview.</p> <p>Use this opportunity to increase the depth of any previous answers by probing and relating this question to any other points informants raise – if/when appropriate.</p> <p>QAF: Rel3, Rel5, Rel5, Rel7, Cre1, Leg3</p>
18. What would have happened in the topic of gender and leadership in wildland fire in the BCWS and beyond if this research had not been conducted?	<ul style="list-style-type: none"> Probe to clarify if needed (the role of the project in improving collaboration, social networks, participation, engagement, etc.) 	<p>Testing “zero hypothesis”.</p> <p>Using a different angle to understand the true influence of the project by asking what would be different had the PI not done this work.</p> <p>QAF: Eff4</p>

F) Closing Questions

Main Question	Probes	Intent: What we are trying to find out Do NOT ask these directly.
19. What does effective research mean to you?	<ul style="list-style-type: none"> What does effective research look like? 	Understanding opinions on research effectiveness.
20. Do you have any additional remarks with regard to the role of [the principal investigator]’s project, or research in general, in change processes?	<ul style="list-style-type: none"> Is there anything else you would like to add that has not been discussed that will be useful for our evaluation? 	<p>Closing</p> <p>Last remarks, things they might want to add that were not addressed, and closure.</p>

Appendix 3. Codebooks

Outcomes Codebook

Code	Description	Comment
Alternative explanation(s)	Factors, actors, or processes external to the project that contributed to outcome achievement.	Aligned with questions from interview guide on other developments, factors, and challenges.
Application	Any reference to possible practical applications resulting from the research (or any other related research in the region/topic). Include comments of whether participants have used or applied knowledge from the project (or another project/training) in their work, and how it changed practices. Include any indication of future intentions to apply or use knowledge in academic, policy, or practice contexts.	• Evaluation Research Question 2d: To what extent and how are target audiences aware of and using the project outputs?
Barriers	Comments related to factors that obstructed the research process and its contributions.	• Evaluation Research Question 2f: What lessons about effective research practice can be learned from this case study?
Changes in attitude	Evidence of changes in attitudes.	• Evaluation Research Question 1a: To what extent and how were the intended outcomes realized?
Changes in behaviour	Evidence of changes in behaviour.	• Evaluation Research Question 1a: To what extent and how were the intended outcomes realized?
Changes in knowledge	Evidence of changes in knowledge.	• Evaluation Research Question 1a: To what extent and how were the intended outcomes realized?
Changes in relationships	Evidence of changes in relationships.	• Evaluation Research Question 1a: To what extent and how were the intended outcomes realized?
Changes in skills	Evidence of changes in skills.	• Evaluation Research Question 1a: To what extent and how were the intended outcomes realized?
Characteristics of project design & implementation	Comments relating to perceptions of the design and implementation of the project.	• Evaluation Research Question 2a: What elements of project design and implementation supported outcome realization, and how?
Characteristics of researcher	Comments relating to perceptions of the PI, how they conducted themselves, their personality, and their soft skills, etc.	
Decision-making	Any data pertaining to decision-making done during the project, or influences on stakeholder decision-making.	Aligns with questions in the interview guide pertaining to decision-making and knowledge.
Dissemination & knowledge sharing	Information on how, where, and with whom the research was shared (planned or unexpected opportunities).	Code aspects of ‘knowledge translation’ and ‘brokering’. • Evaluation Research Question 2a: What elements of project design and implementation supported outcome realization, and how? • Evaluation Research Question 2d: To what extent and how are target audiences aware of and using the project outputs?

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Facilitating factors	Comments related to factors that facilitated/supported the research process and its contributions.	• Evaluation Research Question 2f: What lessons about effective research practice can be learned from this case study?
Knowledge sources	Comments of where people get their knowledge and how they use it in their work. Comments of what type of knowledge/research people perceive to be credible or useful.	• Evaluation Research Question 2d: To what extent and how are target audiences aware of and using the project outputs?
Perceptions on research effectiveness	Informants' ideas on what constitutes effective research. Discussion of effective research qualities.	• Evaluation Research Question 2f: What lessons about effective research practice can be learned from this case study?
Power	Any aspects related with power and power dynamics.	
Relevant actors	Identification and information pertaining to actors relevant to the context, whether they be direct participants in the research, actors within the context, actors working on issues/topics within the context/system, or boundary partners.	• Evaluation Research Question 2b: To what extent and how did the project engage effectively with relevant stakeholders?
RRU-related information	Any comments related to RRU, its programs, pedagogy, decisions to attend, benefits gained, critiques, etc.	• Evaluation Research Question 2e: How does RRU support student success in research? • Evaluation Research Question 2f: What lessons about effective research practice can be learned from this case study?
Social networks	Any reference to networks and connections between people or organizations that go beyond knowing about the other's existence.	
Trust	Comments related to relationships and trust. Also trust of researcher, findings, organizations, or other actors in the system.	
Unexpected outcomes	Comments of other changes in knowledge, attitudes, skills, relationships, and/or behaviour resulting fully or in part from the research that were not identified by the PI.	• Evaluation Research Question 1b: Were there any positive or negative unexpected outcomes from this project?
Zero hypothesis	A different angle to understand the true influence of the research by asking what would be different had the student not done their research.	• Evaluation Research Question 1c: Could the outcomes have been realized in the absence of the project?
Case-specific Outcomes Outcomes were identified in the ToC workshop and are reflected in the ToC model.		
PI builds relationships with national and international practitioners	Intermediate outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
BCWS acknowledges the study	Intermediate outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
Participants' self-awareness about BCWS culture is uncovered	Intermediate outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
Members of BCWS create informal support network	Intermediate outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
Competencies developed through experiential learning for constructive dialogue around the topic	Intermediate outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?

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Professional networks are expanded	Intermediate outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
Other researchers become aware of the research	Intermediate outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
Gender and leadership is a focus of discussion for national and international practitioners	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
Victims of gender discrimination at BCWS have courage to speak up	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
BCWS discusses gender and leadership (multiple levels)	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
BCWS supports gender-responsive leadership	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
BCWS integrates recommendations into organizational practice	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
Culture shift at BCWS towards inclusivity and diversity	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
Provincial government aware of gender discrimination in BCWS and takes action based on recommendations	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
Public aware of gender discrimination in BCWS and demands action	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
Public organizations held accountable for transparency around gender discrimination	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
PI gains professional capacity and recognition as gender and leadership expert	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
PI becomes an advocate to keep gender as priority for wildland fire community	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?
BCWS recognizes gender discrimination as a valid subject for discussion	End-of-project outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 1e: Are the higher-level changes likely to be realized?
Broader wildland fire community aware of gender discrimination at BCWS	High-level outcome.	• Evaluation Research Question 1a: To what extent and how were outcomes realized?

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		<ul style="list-style-type: none"> • Evaluation Research Question 1e: Are the higher-level changes likely to be realized?
BCWS senior leadership introduces policy on gender and leadership	High-level outcome.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 1e: Are the higher-level changes likely to be realized?
BCWS's reputation as progressive organization increases	High-level outcome.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 1e: Are the higher-level changes likely to be realized?
Findings and recommendations on gender and leadership are transferred to other risk management organizations	High-level outcome.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 1e: Are the higher-level changes likely to be realized?
Other high-risk occupations discuss gender discrimination and take action based on recommendations	High-level outcome.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 1e: Are the higher-level changes likely to be realized?
PI continues work on gender and wildland fire as a consultant	High-level outcome.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 1e: Are the higher-level changes likely to be realized?
PI pursues PhD to continue work on gender and leadership in high-risk occupations	High-level outcome.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 1e: Are the higher-level changes likely to be realized?
Other researchers/students use research and take-up new questions on gender and leadership	High-level outcome.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 1e: Are the higher-level changes likely to be realized?
Accumulation of knowledge influences the practice of organizations	High-level outcome.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 1e: Are the higher-level changes likely to be realized?

QAF Codebook

Code	Description	Comment
Alternative explanations are explored	An indicator for the ‘Clearly presented argument’ criterion. Part of the Credibility Principle.	• Evaluation Research Question 1c: Could the outcomes have been realized in the absence of the project?
Analyses and interpretations are adequately explained (clearly described terminology and logic leading to conclusions)	An indicator for the ‘Clearly presented argument’ criterion. Part of the Credibility Principle.	
Any changes to research project as a result of reflection are described and justified	An indicator for the ‘Ongoing monitoring and reflexivity’ criterion. Part of the Credibility Principle.	
Approach is justified in reference to the context	An indicator for the ‘Research approach fits purpose’ criterion. Part of the Credibility Principle.	
Bias is identified (researchers’ positions, sources of support, financing, collaborations, partnerships, research mandate, assumptions, goals and bounds placed on commissioned research)	An indicator for the ‘Disclosure of perspective’ criterion. Part of the Legitimacy Principle.	
Biases and limitations are recognized	An indicator for the ‘Adequate competencies’ criterion. Part of the Credibility Principle.	
Collaboration process is discussed	An indicator for the ‘Effective collaboration’ criterion. Part of the Legitimacy Principle.	• Evaluation Research Question 2b: To what extent and how did the project engage effectively with relevant stakeholders?
Considering full range of stakeholders explicitly identifies ethical challenges and how they were resolved	An indicator for the ‘Research is ethical’ criterion. Part of the Legitimacy Principle.	
Context is analyzed sufficiently to identify research entry points	An indicator for the ‘Clearly defined socio-ecological context’ criterion. Part of the Relevance Principle.	
Context is defined and described	An indicator for the ‘Clearly defined socio-ecological context’ criterion. Part of the Relevance Principle.	
Demonstration that opportunities and process for collaboration are appropriate to the context and actors involved (e.g. clear and explicit roles and responsibilities agreed upon, transparent and appropriate decision-making structures)	An indicator for the ‘Effective collaboration’ criterion. Part of the Legitimacy Principle.	• Evaluation Research Question 2b: To what extent and how did the project engage effectively with relevant stakeholders?
Ethical review process followed is described	An indicator for the ‘Research is ethical’ criterion. Part of the Legitimacy Principle.	
Evidence is provided that necessary skills, knowledge and expertise are represented in the research team in the right measure to address the problem	An indicator for the ‘Adequate competencies’ criterion. Part of the Credibility Principle.	
Evidence of changes in behavior among participants or stakeholders	An indicator for the ‘Research builds social capacity’ criterion. Part of the Positioning for Use Principle.	• Evaluation Research Question 1a: To what extent and how were outcomes achieved?

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Evidence of changes in knowledge and understanding among participants (stakeholders)	An indicator for the 'Research builds social capacity' criterion. Part of the Positioning for Use Principle.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 2d: To what extent and how are target audiences aware of and using the project outputs?
Evidence of changes of perspectives among participants or stakeholders	An indicator for the 'Research builds social capacity' criterion. Part of the Positioning for Use Principle.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 2d: To what extent and how are target audiences aware of and using the project outputs?
Evidence that innovations developed through the research or the research process have been (or will be applied) in the real world	An indicator for the 'Practical application' criterion. Part of the Positioning for Use Principle.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 2d: To what extent and how are target audiences aware of and using the project outputs?
Evidence that knowledge generated by the research has contributed understanding of the research topic and related issues among target audiences	An indicator for the 'Contribution to knowledge' criterion. Part of the Positioning for Use Principle.	<ul style="list-style-type: none"> • Evaluation Research Question 1a: To what extent and how were outcomes realized? • Evaluation Research Question 2d: To what extent and how are target audiences aware of and using the project outputs?
Evidence that the research has contributed to positive change in the problem context or innovations that have positive social or environmental impacts	An indicator for the 'Significant outcome' criterion. Part of the Positioning for Use Principle.	• Evaluation Research Question 1e: Are the higher-level outcomes likely to be realized?
Explains roles and contributions of all participants in the research process	An indicator for the 'Genuine and explicit inclusion' criterion. Part of the Legitimacy Principle.	• Evaluation Research Question 2b: To what extent and how did the project engage effectively with relevant stakeholders?
Integration of an appropriate breadth and depth of literature and theory from across disciplines relevant to the context and the context itself	An indicator for the 'Broad preparation' criterion. Part of the Credibility Principle.	
Knowledge skills and expertise needed to carry out research are identified	An indicator for the 'Adequate competencies' criterion. Part of the Credibility Principle.	
Limitations are accounted for on an ongoing basis	An indicator for the 'Limitations stated' criterion. Part of the Credibility Principle.	
Limitations are stated	An indicator for the 'Limitations stated' criterion. Part of the Credibility Principle.	
Methods are clearly described	An indicator for the 'Appropriate methods' criterion. Part of the Credibility Principle.	
Methods are fit to purpose	An indicator for the 'Appropriate methods' criterion. Part of the Credibility Principle.	• Evaluation Research Question 2a: What elements of the research design and implementation supported outcome realization, and how?

Methods are systematic yet adaptable	An indicator for the 'Appropriate methods' criterion. Part of the Credibility Principle.	• Evaluation Research Question 2a: What elements of the research design and implementation supported outcome realization, and how?
Methods are transparent	An indicator for the 'Appropriate methods' criterion. Part of the Credibility Principle.	
Novel methods or adaptations are justified and explained (including why they were used and how they maintain scientific rigour)	An indicator for the 'Appropriate methods' criterion. Part of the Credibility Principle.	• Evaluation Research Question 2a: What elements of the research design and implementation supported outcome realization, and how?
Objectives are achieved	An indicator for the 'Objectives stated and met' criterion. Part of the Credibility Principle.	• Evaluation Research Question 2c: To what extent were the research findings sufficiently relevant to achieve the stated objectives?
Objectives clearly stated	An indicator for the 'Objectives stated and met' criterion. Part of the Credibility Principle.	
Objectives logically and appropriately related to the context	An indicator for the 'Objectives stated and met' criterion. Part of the Credibility Principle.	
Problem defined to show relevance to the context	An indicator for the 'Socially relevant research problem' criterion. Part of the Relevance Principle.	
Process of integration (including how paradoxes and conflicts were managed) is discussed	An indicator for the 'Research approach fits purpose' criterion. Part of the Credibility Principle.	
Processes of reflection (individually and as a research team) are clearly documented throughout the process	An indicator for the 'Ongoing monitoring and reflexivity' criterion. Part of the Credibility Principle.	
Rationale for inclusion and integration of different epistemologies, disciplines, methodologies is explicitly stated	An indicator for the 'Research approach fits purpose' criterion. Part of the Credibility Principle.	
Research articulates what the achievement of the outcomes implies for higher level impacts	An indicator for the 'Explicit Theory of Change' criterion. Part of the Relevance Principle.	• Evaluation Research Question 1e: Are the higher-level changes likely to be realized?
Research design and resources are appropriate and sufficient to meet the objectives	An indicator for the 'Feasible research project' criterion. Part of the Credibility Principle.	
Research design and resources are sufficiently resilient to adapt to unexpected opportunities and challenges throughout the research process	An indicator for the 'Feasible research project' criterion. Part of the Credibility Principle.	
Research execution is suitable to objectives	An indicator for the 'Appropriate project implementation' criterion. Part of the Relevance Principle.	• Evaluation Research Question 2a: What elements of the research design and implementation supported outcome realization, and how?
Research execution is suitable to the problem context	An indicator for the 'Appropriate project implementation' criterion. Part of the Relevance Principle.	• Evaluation Research Question 2a: What elements of the research design and implementation supported outcome realization, and how?
Research explicitly identifies how the outcomes are intended and expected to be realized	An indicator for the 'Explicit Theory of Change' criterion. Part of the Relevance Principle.	

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Research explicitly identifies its main intended outcomes	An indicator for the 'Explicit Theory of Change' criterion. Part of the Relevance Principle.	
Research identified necessary actors	An indicator for the 'Effective Communication' criterion. Part of the Relevance Principle.	
Research problem is clearly stated and defined	An indicator for the 'Clear research problem definition' criterion. Part of the Credibility Principle.	
Research problem is grounded in the academic literature and problem context	An indicator for the 'Clear research problem definition' criterion. Part of the Credibility Principle.	
Research problem is researchable	An indicator for the 'Clear research problem definition' criterion. Part of the Credibility Principle.	
Research project communicated with all necessary actors	An indicator for the 'Effective Communication' criterion. Part of the Relevance Principle.	• Evaluation Research Question 2b: To what extent and how did the project engage effectively with relevant stakeholders?
Research project planned appropriate communications	An indicator for the 'Effective Communication' criterion. Part of the Relevance Principle.	
Research question is clearly stated and defined	An indicator for the 'Clear research question' criterion. Part of the Credibility Principle.	
Research question is grounded in the academic literature and problem context	An indicator for the 'Clear research question' criterion. Part of the Credibility Principle.	
Research question is justified	An indicator for the 'Clear research question' criterion. Part of the Credibility Principle.	
Researcher interacted sufficiently with problem context	An indicator for the 'Engagement with the problem context' criterion. Part of the Relevance Principle.	• Evaluation Research Question 2a: What elements of the research design and implementation supported outcome realization, and how?
Researcher(s) interacted appropriately with problem context	An indicator for the 'Engagement with the problem context' criterion. Part of the Relevance Principle.	• Evaluation Research Question 2a: What elements of the research design and implementation supported outcome realization, and how?
Researcher(s) is well positioned to influence change process	An indicator for the 'Engagement with the problem context' criterion. Part of the Relevance Principle.	
Results are clearly presented	An indicator for the 'Clearly presented argument' criterion. Part of the Credibility Principle.	
Stakeholders are engaged appropriately throughout the process	An indicator for the 'Appropriate project implementation' criterion. Part of the Relevance Principle.	• Evaluation Research Question 2b: To what extent and how did the project engage effectively with relevant stakeholders?
Statement about the practical application of research activities	An indicator for the 'Socially relevant research problem' criterion. Part of the Relevance Principle.	
Statement about the practical application of research outcomes	An indicator for the 'Socially relevant research problem' criterion. Part of the Relevance Principle.	

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Steps taken to ensure respectful inclusion of diverse actors and views are explicit	An indicator for the ‘Genuine and explicit inclusion’ criterion. Part of the Legitimacy Principle.	• Evaluation Research Question 2b: To what extent and how did the project engage effectively with relevant stakeholders?
The documentation explains the range of participants (cultural backgrounds and perspectives)	An indicator for the ‘Genuine and explicit inclusion’ criterion. Part of the Legitimacy Principle.	• Evaluation Research Question 2b: To what extent and how did the project engage effectively with relevant stakeholders?
The research achieved appropriate communications	An indicator for the ‘Effective Communication’ criterion. Part of the Relevance Principle.	• Evaluation Research Question 2b: To what extent and how did the project engage effectively with relevant stakeholders?
The research design considers stakeholder needs and values	An indicator for the ‘Relevant research objectives and design’ criterion. Part of the Relevance Principle.	• Evaluation Research Question 2b: To what extent and how did the project engage effectively with relevant stakeholders?
The research design is appropriate to the problem context	An indicator for the ‘Relevant research objectives and design’ criterion. Part of the Relevance Principle.	• Evaluation Research Question 2a: What elements of the research design and implementation supported outcome realization, and how?
The research design is relevant	An indicator for the ‘Relevant research objectives and design’ criterion. Part of the Relevance Principle.	• Evaluation Research Question 2a: What elements of the research design and implementation supported outcome realization, and how?
The research design is timely	An indicator for the ‘Relevant research objectives and design’ criterion. Part of the Relevance Principle.	• Evaluation Research Question 2a: What elements of the research design and implementation supported outcome realization, and how?
The research objectives are appropriate to the problem context	An indicator for the ‘Relevant research objectives and design’ criterion. Part of the Relevance Principle.	
The research objectives are relevant	An indicator for the ‘Relevant research objectives and design’ criterion. Part of the Relevance Principle.	
The research objectives consider stakeholder needs and values	An indicator for the ‘Relevant research objectives and design’ criterion. Part of the Relevance Principle.	
Transferability of research findings is explained	An indicator for the ‘Transferability and generalizability of research findings’ criterion. Part of the Credibility Principle.	• Evaluation Research Question 2d: To what extent and how are target audiences aware of and using the project outputs?
Transferability of research process is explained	An indicator for the ‘Transferability and generalizability of research findings’ criterion. Part of the Credibility Principle.	• Evaluation Research Question 2d: To what extent and how are target audiences aware of and using the project outputs? How are they using them?
Understanding an appropriate breadth and depth of literature and theory from across disciplines of the context	An indicator for the ‘Broad preparation’ criterion. Part of the Credibility Principle.	
Understanding an appropriate breadth and depth of literature and theory from across disciplines relevant to the context	An indicator for the ‘Broad preparation’ criterion. Part of the Credibility Principle.	

Appendix 4. Transdisciplinary Research Quality Assessment Framework (adapted from Belcher et al., 2016)

Relevance: The importance, significance, and usefulness of the research problem(s), objectives, processes, and findings to the problem context.

Criteria	Definition	Guidance
Clearly defined problem context ⁴	The context is well defined, described, and analyzed sufficiently to identify a research problem and corresponding entry points.	<ul style="list-style-type: none"> ✓ The researcher(s) demonstrates holistic understanding of the problem context in which the research is situated (description of the system, including actors situated in the context) ✓ Connection is made between the problem context and the research problem ✓ Research entry points are determined by the problem context
Socially relevant research problem ⁵	The research problem is well defined and described, and considers the application to the problem context and current academic discourse.	<ul style="list-style-type: none"> ✓ The research problem is a timely issue in society or aligns with current actions (e.g., international commitments, governmental mandate, policy development, etc.) ✓ There is a demand from system actors⁶ for the research problem to be addressed
Engagement with problem context	Researchers demonstrate appropriate ⁷ breadth and depth of understanding of and sufficient interaction with the problem context.	<ul style="list-style-type: none"> ✓ Understanding drawn from the literature ✓ System actor perspectives are understood ✓ Where possible, researchers incorporate insights from prior research or professional experiences relevant to the problem context
Explicit theory of change	The research explicitly identifies its main intended outcomes ⁸ , how they are expected to be realized, and how they are expected to contribute to longer term outcomes and impacts.	<ul style="list-style-type: none"> ✓ The logic of the research contributions to a process of change is well described and sound ✓ Key actors, processes, and assumptions are identified ✓ End-of-project outcomes are reasonable to expect with the resources available
Relevant research objectives and design	The research objectives are appropriate to the research problem, and the research design is aligned with the objectives.	<ul style="list-style-type: none"> ✓ Objectives identify what the research project aims to do or produce ✓ Objectives can be justified in how they address the research problem (e.g., fill a knowledge gap) ✓ The research design logically plans how the project will meet the objectives (i.e., identify what methods, activities, and engagement are needed)

⁴ **Problem context** refers to the social and environmental setting(s) that gives rise to the research problem, including aspects of: location; culture; scale in time and space; social, political, economic, and ecological/environmental conditions; resources and societal capacity available; uncertainty, complexity, and novelty associated with the societal problem; and the system actors and processes are discussed (Carew & Wickson, 2010).

⁵ A **research problem** is the particular topic, area of concern, question to be addressed, challenge, opportunity, or focus of the research activity. Research problems highlight a gap in understanding or knowledge that contributes to the social problem.

⁶ **System actors** include policy actors, NGOs, and intended beneficiaries

⁷ Words such as ‘**appropriate**’, ‘**suitable**’, and ‘**adequate**’ are used deliberately to allow for quality criteria to be flexible and specific enough to the needs of individual research projects (Oberg, 2008).

⁸ Outcomes are defined as “changes in knowledge, attitudes, skills, and relationships manifested as changes in behavior” (Belcher, Davel, & Claus, 2020, p.9).

Relevant communication ⁹	Communication during and after the research process ¹⁰ is appropriate to the context and accessible to stakeholders, users, and other intended audiences.	<ul style="list-style-type: none"> ✓ Communications with system actors help focus the research, source information, and co-generate and share learning ✓ Communications are timely and responsive to other system processes ✓ Communications are tailored to the target audience
Credibility: The research findings are robust and the sources of knowledge are dependable. This includes clear demonstration of the adequacy of the data and the methods used to procure the data, including clearly presented and logical interpretation of findings.		
Criteria	Definition	Guidance
Broad preparation	The research is based on a strong integrated theoretical and empirical foundation.	<ul style="list-style-type: none"> ✓ Breadth and depth of literature and theory from relevant disciplines are reviewed and integrated ✓ Empirical demonstration of gaps is based on previous research or interventions, or identified by system actors (e.g., joint problem formulation)
Clear research problem definition	The research problem is clearly stated and defined, researchable, and grounded in the academic literature and problem context.	<ul style="list-style-type: none"> ✓ A research/knowledge gap is identified ✓ The importance of and need for the research is demonstrated ✓ The research problem can be answered empirically
Clear research question	The research question(s) is clearly stated and defined, researchable, and justified as an appropriate way to address the research problem.	<ul style="list-style-type: none"> ✓ The research question(s) is logically derived from the research problem ✓ The research question(s) can be answered empirically (i.e., is researchable) ✓ Justification is given on how answering the research question will address the research problem
Objectives stated and met	Research objectives ¹¹ are clearly stated and sufficient to answer the research question(s).	<ul style="list-style-type: none"> ✓ Objectives are clear, coherent, and feasible ✓ Objectives indicate what knowledge is needed, and how that knowledge will be acquired ✓ Collectively, satisfying all objectives will answer the research question(s)
Feasible research project	The research design and resources are appropriate and sufficient to meet the objectives as stated, and adequately resilient to adapt to unexpected opportunities and challenges throughout the research process.	<ul style="list-style-type: none"> ✓ Research design is logically derived from the objectives ✓ The project can be completed with the resources available (i.e., budget, time, hardware, software, human capital, and social capital) ✓ Research design is flexible to accommodate unexpected changes

⁹ **Communication** refers to both written communication (e.g., proposal, documents, presentation of findings, etc.) as well as engagement communications (e.g., scoping, data collection activities, meetings, workshops, etc.).

¹⁰ **Research process** refers to the series of decisions made and actions taken throughout the entire duration of the research project and encompasses all aspects of the research project.

¹¹ **Objectives** explain what the research will do (i.e., generate specific knowledge, create or facilitate specific processes) and what steps will be undertaken in order to answer the research question(s).

Adequate competencies	The skills and competencies of the researcher(s), team, or collaboration (including academic and societal actors) are sufficient and in appropriate balance (without unnecessary complexity) to succeed.	<ul style="list-style-type: none"> ✓ The knowledge, skills, and expertise needed to carry out the research are identified ✓ The necessary knowledge, skills, and expertise are represented in the research team
Appropriate research framework	Disciplines, perspectives, epistemologies, approaches, and theories are combined and/or integrated to meet stated objectives and answer the research question(s).	<ul style="list-style-type: none"> ✓ Explanation of the theoretical framework is given ✓ Explanation is provided for why and how disciplines, epistemologies, and theories are used ✓ The process of integration of disciplines, epistemologies, and theories is explained, including how paradoxes and conflicts between integrated components are addressed ✓ Justification is given for the framework selected in relation to the problem context
Appropriate methods	Methods are fit to purpose and well suited to achieving the objectives and answering the research question(s).	<ul style="list-style-type: none"> ✓ Clear descriptions of methods and how they were applied are given ✓ Selection of methods are justified and logically connected to the objectives ✓ Novel (unproven) methods or adaptations are explained and justified, including why they were used and how they maintain rigour
Sound argument	The logic from analysis through interpretation to conclusions is clearly described. Sufficient evidence is provided to clearly demonstrate the relationship between evidence and conclusions.	<ul style="list-style-type: none"> ✓ The argument is logical and defensible ✓ Analyses and interpretations are adequately explained and supported by evidence ✓ If applicable, alternative explanations of results are explored
Transferability and/or generalizability of research findings	The degree to which the research findings are applicable in other contexts is assessed and discussed. In cases that are too context-specific to be generalizable, aspects of the research process or findings that may be transferable to other contexts and/or used as learning cases are discussed.	<ul style="list-style-type: none"> ✓ Researcher(s) discusses the ability to transfer results and/or methods to other contexts ✓ Justification of transferability/generalizability of results is logical
Limitations stated	An explanation of how the characteristics of the research design or method may have influence on the results or conclusions is given.	<ul style="list-style-type: none"> ✓ The influence of internal (e.g., sampling) and/or external factors (e.g., responsiveness of interviewees) on the results is acknowledged and discussed ✓ Researcher(s) assess the extent to which the limitations influence the results
Ongoing monitoring and reflexivity ¹²	Researchers engage in ongoing reflection and adaptation of the research process, making changes as new obstacles, opportunities, circumstances, and/or knowledge surface.	<ul style="list-style-type: none"> ✓ There is an indication that the researcher(s) considers the need to reflect on and adapt during the research process ✓ Efforts to monitor progress and identify, consider, and respond to changes in context or understanding are discussed

¹² **Reflexivity** refers to an iterative process of formative, critical reflection on the important interactions and relationships between a research project's process, context, and product(s).

✓ Processes of reflection (whether formal or informal), and the resulting action(s) taken, are explained

Legitimacy: The research process is perceived as fair and ethical. This encompasses the ethical and fair representation of all involved and the appropriate and genuine inclusion and consideration of diverse participants, values, interests, and perspectives.

Criteria	Definition	Guidance
Disclosure of perspective	Actual, perceived, and potential bias is clearly stated and accounted for.	<ul style="list-style-type: none"> ✓ Potential for actual or perceived bias (e.g., positionality, sources of funding, partnerships, mandate, etc.) is identified and acknowledged ✓ Implications of potential bias on the conclusions are discussed
Effective collaboration ¹³	Individuals ¹⁴ involved in the research process pool their knowledge, experience, and skills together in a constructive atmosphere and in appropriate measure to produce new knowledge and/or social processes that contribute to a common goal.	<ul style="list-style-type: none"> ✓ A shared understanding of goals and expectations is established ✓ Roles and responsibilities are clear and explicitly agreed upon ✓ Decision-making structures are transparent and fair ✓ A synergistic process capitalizes on the strengths of collaborators (across disciplinary, professional, organizational, and cultural boundaries)
Genuine and explicit inclusion ¹⁵	The research offers authentic opportunities to involve relevant actors to share their perspectives, knowledge, and values, and/or participate in the research process.	<ul style="list-style-type: none"> ✓ Participants' roles and contributions, perspectives, and cultural backgrounds are described ✓ Steps taken to ensure the respectful inclusion of diverse actors and views are explained
Research is ethical	The research adheres to standards of ethical conduct.	<ul style="list-style-type: none"> ✓ Ethical practice is followed: research does no harm; participants have informed consent; anonymity and confidentiality are maintained ✓ Procedural ethics (e.g., ethical review process) are pursued and documented

Positioning for Use: The research process is designed and managed to enhance sharing, uptake, and use of research outputs and stimulates actions that address the problem and contribute to solutions.

Criteria	Definition	Guidance
Strategic engagement	Research process stimulates and/or engages with change opportunities.	<ul style="list-style-type: none"> ✓ Engagements are timely and responsive to other system processes ✓ Researcher(s) is well positioned to have influence within the problem context ✓ Opportunities to influence change processes are identified and/or generated, and acted upon ✓ Resources are mobilized to influence/act on change processes

¹³ Collaboration encompasses both internal dynamics within the core research team and external processes with participants, collaborators, partners, and allies. Collaboration comes in many forms in research, ranging from general advice-giving to co-generated knowledge production.

¹⁴ Within and external to the core research team.

¹⁵ Some system actors may not want to participate in the research process, but still want their views to be represented in the findings. It is the task of the researcher(s) to ensure that their perspectives are accurately represented.

New knowledge contribution	Research generates new knowledge and understanding in academic and social realms in a timely, relevant, and significant way.	<ul style="list-style-type: none"> ✓ An academic knowledge gap is filled ✓ System actors' knowledge gaps are filled ✓ System actors gain a better understanding of the problem context
Influencing attitudes	Research process and/or findings stimulates and supports system actors to reflect on and/or change their attitudes or perspectives on the problem and solutions to address it.	<ul style="list-style-type: none"> ✓ Awareness-building of the research problem, the research findings, or a solution/innovation is a first step in changing attitudes ✓ System actors gain a different perspective on the targeted problem as a result of the research process and/or findings
Capabilities	System actors develop skills relevant to the problem context and/or for solving the social problem through the research process and/or findings.	<ul style="list-style-type: none"> ✓ Research capacities of the researcher(s) and/or partners are developed (e.g., gain research experience, training, testing of new methods/approaches) ✓ Participants and partners gain new or build on existing skills as a result of the research process and/or findings ✓ Skills developed are transferable to other aspects of system actors' professional or personal lives
Relationship-building	The research process supports new or fortifies existing relationships, networks, and ways of working for solution-building in the problem context.	<ul style="list-style-type: none"> ✓ Trust between system actors is fostered by the research process ✓ Mutual interests between system actors are recognized ✓ A forum, platform, or network is created or strengthened as a result of the research process ✓ System actors work together in new ways as a result of the research process ✓ The research contributes to shifting the power dynamics toward solution-building ✓ Open communication, equality and equity, co-identification/co-development across the research process, feedback processes, and conflict management and resolution are important components of effective relationships
Practical application	The findings, process, and/or products of research have high potential for use by system actors.	<ul style="list-style-type: none"> ✓ The potential utility of the research outputs for system actors are discussed ✓ System actors convey intentions to use or apply the research ✓ System actors pilot, adopt, or adapt a method, tool, approach, or innovation from the research ✓ System actors use or refer to the research findings to inform their work
Significant results	Research contributes to the solution of the targeted problem or provides unexpected solutions to other problems.	<ul style="list-style-type: none"> ✓ The research process and/or findings contribute to behaviour change in the problem context ✓ Expected changes are realized or have potential to be realized in the future

Appendix 5. QAF Scores and Justifications

Table 7. Individual evaluator and average scores for all QAF criteria, with justifications for the score allocated

Principle	Criteria	E1	E2	E3	E4	Avg.	Justification/Comments
Relevance	Clearly defined problem context	2	2	2	2	2	Thesis provides a holistic socio-cultural description of the wildland firefighting problem context; thesis outlines the negative implications of the lack of a conversation about gender and leadership in wildland fire contexts; BCWS organizational context and discrepancy in perspectives are explained in detail; research entry points are drawn from the literature, BCWS' documented cultural norms, and personal experience at BCWS.
	Socially relevant research problem	2	2	2	2	2	Previous research identified gender discrimination is a relevant problem within male-dominated professions; academic and practical gaps are identified and discussed (e.g., first applied research project on gender undertaken within wildland fire profession, lack of and resistance to a conversation on gender and leadership within BCWS); timeliness of discussion of experiences of female wildland firefighters, gender, gender discrimination, and sexual harassment within the international wildland fire community; research problem is aligned with BCWS' strategic goals and organizational outcomes; informants reflected on relevance and value of study; practical application of the findings for BCWS are considered and discussed.
	Engagement with problem context	2	2	2	2	2	PI interacted sufficiently with the problem context to gain a breadth and depth of understanding (via personal experience as a BCWS firefighter and crew leader); literature review and interviews indicate various system actor perspectives are understood (e.g., female firefighters, male firefighters, leadership); engagement with relevant wildland fire conferences and networks were well integrated into the project.
	Explicit theory of change	1	1	1	1	1	Not explicit or documented, but strong implicit ToC in statements of hoped or intended changes and leveraging opportunities; thesis indicates opportunities to influence change via BCWS (e.g., form of organizational self-reflection) and contribute to related academic debates on wildland fire communities or other male-dominated professions (e.g., stimulate wider community conversation).
	Relevant research objectives and design	1	1	2	2	1.5	Research objectives are not provided; singular stated objective is weak and reads more as a statement of interest; research design is relevant and appropriate to the problem context and justifies how the methods and engagement activities will address the research problem; thesis accounts for and accommodates participants' needs/values in the design of the approach on sensitive topic.
	Relevant communication	1	1	1	2	1.25	Thesis explains how communications during the research process (via Thoughtexchange™ tool, progress updates for BCWS leaders) were planned and accommodated participants' needs; some informants commented that they did not fully understand the purpose or the approach of the research, indicating that communication could have been clearer and better managed expectations; multiple dissemination strategies were planned and aligned with external processes (e.g., presentation at BCWS, international conferences); informants noted outputs could have been better tailored to enhance general audiences' understanding (i.e., highly academic language); there were unexpected organizational barriers that prevented wider dissemination of the results.
Credibility	Broad preparation	2	2	1	2	1.75	Thesis clearly presents a broad scope of theory and literature used to frame the study; understanding from multiple disciplines (e.g., gender studies, feminist and masculinity theory, leadership studies, organizational culture) are well integrated.

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	Clear research problem definition	2	1	1	2	1.5	Research gaps are clearly identified (e.g., dearth of research on wildland fire culture, research-practitioner divide); the research problem is implied; a stronger problem statement could have helped in frame the study; the importance of the research is clearly articulated
	Clear research question(s)	1	1	1	0	0.75	The overarching and sub-research questions are stated in the thesis, though the appropriateness of the research questions was questioned as they cannot be answered empirically; framing of the research questions could have been stated in a more definitive way; no justification given to how answering the research questions will address the research problem.
	Comprehensive objectives	1	0	0	1	0.5	Proper research objectives are not articulated; the objective is not logically or appropriately related to the problem context; better formulation of objectives would have aided the structure and purpose of the project as well as supported communications to BCWS leadership and participants.
	Feasible research project	2	2	2	2	2	The design and resources were appropriate to carry out the research; thesis includes discussion of how limiting the scope would make the project manageable; PI received support and sponsorship from BCWS leadership; PI was supported by four inquiry team members; PI drew on existing networks through BCWS and their personal social capital to support participation in the project.
	Adequate competencies	2	2	2	2	2	The PI had extensive prior field experience and knowledge of the BCWS context to carry out the research in an appropriate way; the PI appears to have had the necessary knowledge and research skills to carry out the research to completion; informants commented on the PI's passion for the work.
	Appropriate research framework	1	1	1	2	1.25	Explanation is given for the inclusion and framing of disciplines for the research; selection of applied research methodology is justified in the approach for the specific problem context; brief discussion of paradoxes or conflicts in the data is given, but could have been elaborated.
	Appropriate methods	2	2	2	2	2	Thesis clearly describes the methods and approach; rationale is given for use of the Thoughtexchange™ tool to collect data from participants and enable participant engagement with the previous rounds of data; transparency is given in how the methods were applied and how results were derived; informants' critiques of sample size are not applicable as the project did not use the data to derive statistical analyses.
	Sound argument	1	1	1	1	1	Thorough presentation of research process, findings, conclusions, recommendations, and organizational implications; however, the dissonance in data and expected findings was not fully interrogated and some interpretations are questionable; alternative explanations are not explored.
	Transferability and generalizability of the findings	1	2	1	1	1.25	Findings are specific to BCWS' context; informants thought the research was transferable, but this is not discussed in the thesis apart from a discussion on validity; methods, findings, and recommendations have been transferred to other male-dominated professions (e.g., ACMG context).
	Limitations stated	1	1	1	1	1	Limitations are not meaningfully discussed in terms of the implications on results; brief mentions of disproportionate representation of female perspectives compared to their respective population in the organization, access to permanent versus temporary staff and subsequent representation of perspectives, and PI's embedded positionality, but these could have been elaborated; mostly shortcomings are discussed.
	Ongoing reflexivity and monitoring	2	1	2	2	1.75	Thesis is highly reflexive, and reflection was intentional in the design (e.g., guided by feminist approaches to enhance reflexivity); thesis offers discussion of the challenges and self-awareness needed as a member of the group being studied; processes of reflection are described (e.g., use of a reflective journal); reflection and review of preliminary data led the PI to re-engage in literature review; dissonance in results would have

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							required more reflection on PI's bias (i.e., why do the results say what they say, rather than why do they not say what I expect); thesis details the integration of monitoring processes (e.g., progress updates and open dialogue with senior leadership/BCWS sponsors).
Legitimacy	Disclosure of perspective	1	1	1	1	1	Thesis acknowledges the PI's positionality (e.g., insider to BCWS, position of privilege as a researcher, PI's gender within a male-dominated culture), but the context in which the project operated required full transparency of how personal bias affected the interpretation of results; more intensive discussion of positionality and bias would have supported the argumentation; partnership with BCWS is transparently presented; some informants identified areas of bias within the research.
	Effective collaboration	1	2	2	1	1.5	PI received official support and sponsorship from BCWS to carry out the research with a shared understanding of goals and expectations (despite later changes in leadership direction); the PI collaborated with senior leadership and the inquiry team; members of the advisory committee reflected positively on their relationships with the PI; thesis indicates PI's efforts to foster trust and open communication with partners and participants; some informants commented that the collaborative research process was not as open as the PI perceived it to be.
	Genuine and explicit inclusion	2	1	1	2	1.5	A range of system actors were involved in the research, and efforts were made to enable diverse perspectives to engage in the discussion (e.g., diverse gender representation, range of power positions within BCWS, inclusion of opponents); steps were taken to engage participants in an appropriate way (i.e., being sensitive to their needs), but not clear if done for all system actors; indications that the PI made efforts to establish a positive relationship with participants to build trust.
	Research is ethical	2	2	2	2	2	Project received ethical approval by RRU Research Ethics Board; participants had informed consent; anonymity and confidentiality were maintained; a section of the thesis is dedicated to ethical issues around power dynamics and gender within the context of the research, respect for people, concerns for welfare, and fairness of the research process.
Positioning for Use	Strategic engagement	2	2	2	2	2	PI was well positioned to influence the context (e.g., access to wildland fire networks, working at BCWS, support from BCWS leadership, engagement in relevant conferences); thesis discusses strategic value of partnership with BCWS to inform decision-making; PI received support from BCWS' senior leadership to conduct the research; thesis identifies BCWS' strategic positioning to lead discussions on gender and leadership in wildland fire within their networks, though subsequent changes in the direction of leadership have since created barriers.
	New knowledge contribution	1	2	2	2	1.75	Unique and novel knowledge produced (e.g., systematic survey and documentation of perspectives and experiences of gender and leadership in a wildland fire context); project filled an academic knowledge gap (e.g., first applied research in context); contribution to PI's own knowledge; unclear if system actors' knowledge gaps were filled based on evidence from informants; indications of potential for changes in others' understanding of the problem context.
	Influencing attitudes	2	2	2	2	2	Research provided an opportunity to build awareness within an organization around gendered perspectives and experiences of the wildland fire profession; indications of participants' newfound awareness of organizational and culture-driven power dynamics; research process was validating for some participants.
	Capabilities	1	1	1	1	1	Research capacity-building of the PI was high, and equipped the PI for their doctoral research; some participants developed abilities to engage in a conversation about gender and related topics; unclear if

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							capacity-building occurred for participants or other system actors; would expect to see indications of capacity-building in an action research project.
	Relationship-building	1	2	2	2	1.75	Indications of trust were built with research participants; mutual interests between the PI and BCWS were recognized, though these later devolved with a change in leadership and organizational direction; the project provided an informal support network for participants who struggled in the organization; PI expanded their professional relationships through participation in international conferences; unclear evidence of whether system actors work together in new ways, but these could be very micro-changes in everyday engagements; potential that the research supported a shift in power dynamics within BCWS by facilitating a conversation.
	Practical application	1	2	2	2	1.75	Thesis reflects on significance of inquiry and discusses the potential and intended benefits for BCWS; recommendations were intended for uptake, but unclear to what extent this happened (in light of emergence of organizational barriers outside PI's sphere of control); evidence that the research made participants think about gender in a different way; methods have inspired others to do similar inquiries in the US; subsequent application of findings and research insights in the avalanche industry.
	Significant results	2	2	2	2	2	The GLWFP clearly contributed to the partial or full realization of eleven of the nineteen intermediate and end-of-project outcomes; indications that the research resulted in positive outcomes for individuals and was a catalyst for more open discussions on gender at the BCWS, but extent of organizational changes remain unclear; despite presence of tensions and conflict during the research process, such discomfort may be a necessary part of the intended change process; potential for more outcomes in the future (too early to assess social benefits and the shift in culture), but likely these will result from other processes and interventions in the context.

Appendix 6. Evidence of Outcome Realization

Legend: Outcome Realization





	Green = realized		Orange = not realized
	Light green = partially realized		Grey = insufficient evidence

Table 8. Extent of outcome realization, supporting evidence, degree of project contribution, and evidence rating

Expected Outcome	Summary of Results Realized	Evidence Supporting Results' Realization	Evidence Rating: Low (L), Medium (M), High (H) Justification
Discourse Guiding Organizational Practice Pathway			
PI builds relationships with national and international practitioners [intermediate outcome]	<p>The PI's professional relationships with practitioners were a key component to raising awareness of the GLWFP and its results. Completing the MAL program at RRU allowed the PI to build relationships with other research-practitioners outside of wildland firefighting. For example, the PI built a working relationship with a member of the Canadian Armed Forces who was in the PI's cohort. This relationship provided the PI with professional perspectives from another risk management organization who had also been exploring issues on the topic of gender and leadership within their profession. Building relationships with members of the PI's cohort supported the PI with how to deal with the personal challenges of completing research on a sensitive topic. The PI built a number of professional relationships with national and international practitioners and researchers through presenting GLWFP findings at conferences (Prac9, Prac11). Relationships were built with individuals at the Canadian Interagency Forest Centre who suggested that the PI is now the individual they turn to when looking for an expert on gender and leadership. Academically, the GLWFP provided the PI with the opportunity to build relationships with other researchers exploring similar topics, resulting in collaborations on journal articles and publications.</p> <p>At the international level, the PI gave presentations at WTREX and built networks with practitioners internationally, including those in the US. Those who attended the WTREX presentation by the PI noted the PI's professional presentation style and ability to create a safe, comfortable, and inclusive environment to discuss the topic of gender and leadership. The PI built further</p>	<p><i>"I [contributed] some perspectives of my personal experiences and my professional experiences [...] I don't know if mentoring or mentor is too big of a word, but I guess some coaching, I did put [the PI] in contact, too, actually, with a couple of people [...] who had done some research on, especially on the gender piece who had more of diverse background"</i> (Prac10)</p> <p><i>"[the PI] has definitely contributed not only to our team and to the work that we do, but again to also building this library of work that we can point to justify our efforts when we look for funding, or when we look for sponsorships or gain new partnerships"</i> (Prac11)</p> <p><i>"I had initially heard about the work [the PI] was doing when I was at the conference in 2016, and then as we were talking about different options for panelists, then actually CFFC sent me the paper that came out, The Wildfire Within that came out just last year, and they sent it to a couple of managers from each of the provinces [...] as we work looking for panelists when we need someone to speak about gender and leadership, [the PI] seems to be our Canadian know-how person on that"</i> (Prac12)</p> <p><i>"I met [the PI] at a conference. We stayed in touch because I was working for the US Forest Service in the Office of Innovation and Organizational Learning, and we were working on investigating line of duty deaths. [The PI's] research was very interesting, because it opened some windows of inquiry that I had no expertise in and had no way of trying to understand them. We had a fatality in the Forest Service in 2013 – and we utilized [the PI] and the research [they were] doing, and in particular [the PI's] appreciative inquiry approach, just [the PI's] approach to</i></p>	<p>H</p> <p>Realized, clear project contribution</p> <p>Comments from national and international wildland firefighters show a large network of practitioners who know the PI and the GLWFP. Relationships also expand outside of wildland firefighting to individuals in other risk-management organizations.</p>

	<p>international relationships through WTREX by supporting the hosting of the workshop. Relationships were built with members of the US Forest Service, particularly with members of the Office of Innovation and Organizational Learning who were investigating line of duty deaths at the time of collaborating with the PI. The US Forest Service utilized the PI's expertise to explore a fatality in the organization in 2013 to investigate whether gender and leadership played a role in interactions leading up to the fatality. This has resulted in further collaborations between the US Forest Service and the PI.</p> <p>Outside of wildland firefighting, the PI also built relationships with the Association of Canadian Mountain Guides. The PI went on to collaborate with the organization to explore the effect of gender diversity and mental health on members of the ACMG.</p>	<p><i>identifying how gender and leadership play a role in interactions"</i> (Prac13)</p> <p><i>"In fact, we're trying to work with [the PI] to do a very similar thing here in the US"</i> (Prac13)</p> <p><i>"[the PI] brought [the research on gender diversity and mental health] to us, to both myself and the ED of the Canadian Avalanche Association and it was extremely timely"</i> (Prac16)</p> <p><i>"[the PI] and another colleague and I worked together to publish an article on gender and leadership, so we have a co-publication [...] so I was able to learn just from reading the literature that [they] included, [they] brought in some pieces that I hadn't read before so [the PI's] literature review in that sense helped to expand my reading list"</i> (Res1)</p> <p><i>"I think [the PI's] methodology and [their] commitment to the research has been both inspirational; and insightful for me. The particular methodology that [the PI] used with the Thoughtexchange™ surveys and I think that as an insider to [the PI's] research community, [the PI] has been able to demonstrate particular elements and issues that I, as an academic and an outsider to the wildland fire community, have not necessarily been able to get at in the same depth"</i> (Res2)</p>	
<p>BCWS acknowledges the study</p> <p>[intermediate outcome]</p>	<p>The PI faced a number of challenges at the start of the GLWFP in terms of obtaining the support for the project from BCWS leadership with some leaders suggesting that there should be a focus on all types of diversity rather than solely focusing on gender (Gov1, Gov2, Prac14). However, as the BCWS started to acknowledge the GLWFP, more individuals realized that gender discrimination was an issue (Gov1, Prac14). By allowing the PI to explore the issue on an organizational level sent a message to the BCWS that leaders acknowledge the topic as being important. The working relationship and connections the PI had with the highest members of BCWS leadership prompted leadership to acknowledge the GLWFP and the issue of gender and leadership within the organization. As well as acknowledging the study, the BCWS saw the GLWFP as valuable and showed a keen interest in continuing to follow-up the work in line with broader issues around worker health and safety and well-being. The BCWS' Executive Director at the time of the GLWFP stated that the project contributed to the conversation and thinking about what gender and leadership look like within the organization and has facilitated conversations on the topic with the leadership team. Communications about the GLWFP were shared by BCWS leadership to all members of staff with discussions taking place</p>	<p>"I think there is definitely really keen interest and this is seen as super valuable within the BCWS and there is an interest in continuing and following up with this work in line with broader issues around worker safety and health and wellbeing [...] obviously I can't speak on behalf of the BCWS, but they are really passionate about working on the respectful workplace and creating an environment where people can really be their full selves where there is a mutual respectful environment. This research is seen as part of that broader strategy" (Doc15)</p> <p><i>"Inside BC, I think there were managers who just couldn't believe [gender discrimination] could be happening [...] I think there was this disbelief that it couldn't be them. And when [the BCWS] started talking about it in [the PI's] study, I think more and more people started to realize that it was going on"</i> (Gov1)</p> <p><i>"Allowing [the PI] to come into the organization and do the kind of research that [they were] doing, that sent a message to the organization that [the government] support research – not that we think there's a problem – but we think this work is important. We think your contributions to this work are important. We would like you to hear what [the PI] found out"</i> (Gov1)</p> <p><i>"I remember when [the PI] started [the] research during [the] Master's program, and the lanes [the PI] wanted to go down, [the</i></p>	<p>H</p> <p>Realized, clear project contribution</p> <p>Comments from members of the BCWS and government informants show that although there were barriers faced by the PI at the beginning of the project, by including leadership within conversations throughout the project the</p>

	<p>in regard to financing further action on the topic. Practitioners suggested that the PI had been successful in raising awareness of prevailing attitudes and beliefs on the topic within the organization, with individual members of the organization acknowledging the GLWFP.</p> <p>Informants discussed how the conversation on gender and leadership was ‘pushed’ and supported by government actors which lead to the BCWS as an organization acknowledging the GLWFP. Female leadership at the highest levels of the organization at the time of the GLWFP supported the BCWS in acknowledging the project.</p>	<p>PI] was getting a lot of resistance from some leadership [...] But [the PI] was able to get enough people that had enough influence to agree with [them]” (Prac10)</p> <p>“[the PI] worked with the employer at the highest levels, so it certainly prompted the leadership to wrestle with this issue at least for a time” (Prac14)</p> <p>“[the BCWS has acknowledged and reflected on the GLWFP] because there were emails out to all staff from the director level that presented the research” (Prac18)</p> <p>“[The GLWFP] has made me more aware of some of the prevailing attitudes and opinions that unfortunately still exist within all levels of the organization” (Prac3)</p> <p>“It was also interesting to see that BC as an agency do support [the PI] and my big thing as a question is I don’t know where they are taking it from there. I think it has definitely brought it to the forefront and made it a topic that people are forced to talk about” (Prac7)</p>	<p>BCWS acknowledged the study.</p>
<p>Participants’ self-awareness about BCWS culture is uncovered</p> <p>[intermediate outcome]</p>	<p>The topic of gender and leadership was a topic that the wildland fire community struggled with historically and was an issue across the sector as a whole, not just within the BCWS. Bringing the issue to practitioners’ attentions through the GLWFP was an important first step as previously some BCWS staff were less likely to believe that gender discrimination was occurring at the organization (Prac19, Gov1). The GLWFP increased participants’ awareness and focused people’s attention on an issue that had not previously been explored in detail by the BCWS (Gov1). Participants gained awareness of their hidden assumptions about masculinity and femininity in leadership, and wildland firefighters appreciated the opportunity to participate in conversations about their daily experiences (Doc11). As the BCWS started to discuss and acknowledge the GLWFP, members of the organization began to understand the organizational culture in more detail and became aware of gender discrimination (Gov1). The GLWFP supported participants in becoming more aware of discrepancies between the male and female experience of organizational culture and how both genders experience male-dominated groups (Prac1, Prac21, Prac3). Although there was some awareness of these elements of the organizational culture prior to the GLWFP, the research enhanced this awareness for practitioners (Prac1). As well as an increased self-awareness about the organizational culture, some informants stated that their perspectives on the topic of gender discrimination were permanently changed by the GLWFP</p>	<p>“[The PI] said that throughout [their] research, the firefighters appreciated the opportunity to participate in conversations about their daily experiences of gender and leadership, what their ideal future was, and what actions they wanted to see. It also helped them gain awareness about their hidden assumptions about masculinity and femininity in leadership” (Doc11)</p> <p>“Inside BC, I think there were managers who just couldn’t believe it could be happening, and didn’t believe that their colleagues, coworkers, friends...and I think there was this disbelief that it couldn’t be them. And when we started talking about it in [the PI’s] study, I think more and more people started to realize that it was going on” (Gov1)</p> <p>“because I think [the GLWFP] changed people’s awareness, and as soon as people’s awareness is changed and maybe become more receptive, you’re able to do something” (Gov1)</p> <p>“I think [the GLWFP] has just made me more aware, it has made me aware of the discrepancy [...] I would like to say that I was aware prior to it and I think I was, but just not to this extent” (Prac1)</p> <p>“I think [the GLWFP] brought the topic forward which was important. I know it’s one that the wildland fire community as a whole has struggled with historically, it’s not just something unique to British Columbia, it is across the sector as a whole. So I think bringing it forward for awareness was important” (Prac19)</p> <p>“[it has made more people aware of underlying issues] and just the experiences of others... it has just made me more aware of some of</p>	<p>H</p> <p>Realized, clear project contribution</p> <p>Comments from participants of the GLWFP reveal that taking part in the project enabled them to become more aware of the BCWS culture and have a deeper understanding of the topic within the organization.</p>

	(Prac21, Res2). Participants also gained a better understanding and validation of their own experience and increased awareness to help them navigate interactions in the workplace (Prac7). Without the GLWFP, it is likely that the awareness of gender discrimination and the BCWS culture would not be as high as it is now (Prac7). However, some informants stated that although the GLWFP resulted in increased dialogue on the topic, it is difficult to say whether participants' perspectives or understandings were changed (Prac19).	<i>the prevailing attitudes and opinions that unfortunately still exist within all levels of the organization" (Prac3)</i> <i>"but I think in BC, I don't think the awareness would be as high as it is hopefully now" (Prac7)</i> <i>"I'm sure that there would have been awareness changing moments in the course of the research when people participated. Just in the sheer act of completing the survey that was part of the study, some people would have been prompted to think about the issue in a way that they haven't before. So, even though it might not have created that change that ultimately, we would have liked to see, hopefully the thought process would have initiated some sort of awareness raising consciousness" (Res2)</i>	
Members of BCWS create informal support network [intermediate outcome]	The GLWFP succeeded in starting a conversation on the topic and normalized the discussion of gender and leadership within the organization (Prac3). The project encouraged members of the BCWS to discuss their experiences of gender and leadership more openly and feel more comfortable doing so due to the organizational wide conversation on the topic (Prac3). On an individual level, the GLWFP motivated some female leaders within the organization to be a positive role model for women starting their careers within the BCWS, so that aspiring female leaders could see that it was possible to be successful within the organization (Prac3). The PI themselves became an informal support network for members of the BCWS who were experiencing issues related to gender and leadership. For example, some managers and supervisors were putting members of their team who had personal experiences of gender discrimination in contact with the PI to share their experiences and receive support (Prac1). Managers and supervisors themselves have also turned to the PI for support in situations where members of their team are experiencing issues like those discussed in the GLWFP (Prac1). At the organizational level, it was suggested that the GLWFP was a catalyst for the creation of the safe-reporting line established by Wildfire Services to provide support to staff who had experienced issues related to gender discrimination (Gov1). The safe-reporting line is noted to be an asset to the BCWS and its employees, not only for issues around gender discrimination, but other topics as well such as mental health.	<i>"I think one of the things that was really special that happened out of it is that Wildfire Services actually created a helpline where you could call and get support if something had happened [...] we actually had a sexual assault case we had to deal with, and we were able to share that back – not the details – but with your managers and say, 'This is going on and you people need to be looking for it'" (Gov1)</i> <i>"knowing the research that [the PI] has done has provided me with support when I am talking to the women that I am supervising because I know that there's a source of support there for them and there is also a source of support for myself because I am supervising these people and I want to be helpful and I want to make sure that they succeed with whatever they are doing. A prime example is last year where I had one of my employees come to me [...] extremely upset with things that were going on at base [...] I put [them] in contact with [the PI] and [the PI] was able to reach out and there was another element of support [...]. [the PI] has done the job and knows what [they are] talking about and can empathize and sympathize" (Prac1)</i> <i>"I guess [the GLWFP] keeps me more motivated to keep doing the work I do and to keep trying to be a positive female role model so the minority percentage of women who are starting out in the organization can see that it's possible to stay with the organization and be successful" (Prac3)</i> <i>"One of [the GLWFPs] biggest successes is that it created conversation and it got people talking, it opened the door to people being allowed to talk about [gender and leadership in wildland fire] or feel more comfortable talking about it because somebody else was" (Prac3)</i>	M Realized, clear project contribution Comments from practitioners and government informants highlight both informal and formal support networks that were created as a result of the GLWFP.
Gender and leadership is a focus	The GLWFP supported gender and leadership becoming a focus of discussion for national and international practitioners (Prac10,	<i>"I think at a national level, all the wildland firefighting organizations, all the provinces and territories, have a bit of a</i>	H,

<p>of discussion for national and international practitioners</p> <p>[end-of-project outcome]</p>	<p>Prac11, Prac12). The PI faced a number of challenges at the beginning of the project, as well as resistance from some leadership in terms of only focusing on gender rather than diversity more generally (Prac10). However, the PI influenced leaders to acknowledge the GLWFP and explore the topic further (Prac10).</p> <p>In 2016, the PI presented the GLWFP at the Wildland Fire Canada Conference. Since then, informants have witnessed increased discussion of the topic at different conferences, including the introduction of the panel pledge which stated that there must be both males and females on conference panels and submitting questions (Prac12). At the most recent Wildland Fire Conference in 2019 there was a full-hour conversation exploring diverse, healthy, and stable workforces in Canada (Prac12, Prac21). This is noted to have been the first time since the GLWFP that the topic has been discussed at a national conference (Prac12). Some practitioners have also had staff approach them on a one-to-one basis to discuss issues related to gender discrimination with the topic now having become a comfortable talking point (Prac12). At a national level, the topic became a focus of discussion with most individuals (particularly women) having heard of the PI and the GLWFP. In some cases, discussion was turned into action (Prac4, Prac9, Gov1). Wildland Fire agencies across the provinces and territories recently met for a to discuss gender, sexual assault, and sexual harassment (Gov1). As a result, a statement of intent was created to show that gender discrimination will not be tolerated within the profession on a national scale (Gov1). It is unclear from evidence to what extent this is a result of the GLWFP. In Alberta and Ontario, there was an increased acknowledgement of gender issues within wildland firefighting agencies and the topic is a focus of discussion; again, the relation to the GLWFP is unclear from evidence (Prac7).</p> <p>The GLWFP also contributed to the international discussion, most notably in the US, on the topic of gender and leadership (Prac17, Prac21, Prac4). US-based practitioners stated that they used the GLWFP to acknowledge that there was a wider cultural problem within wildland fire and that it should be a focus for discussion (Prac13). The success of the PI in beginning discussion with the BCWS showed US organizations that enabling a dialogue within their own organizations is possible (Prac13).</p> <p>There are a number of alternative explanations that have also contributed to gender and leadership being a focus of discussion</p>	<p><i>structure together. And they actually got together and had a day-long meeting talking about gender and sexual assault, sexual harassment, and created a statement that said we're not going to tolerate that as provinces and territories in wildland firefighting, and that was huge [...] So really an awakening, a real eye-opening for people, I would say, nationally"</i> (Gov1)</p> <p><i>"I do think that just having people focus on [the topic of gender and leadership in wildland fire] helps to bring [the topic] to light and helps [the topic] become more of a norm that this is something worthwhile to look at and think about, but I think [attitude change] take time"</i> (Prac11)</p> <p><i>"So, in 2017 it was identified that there needed to be a gender forum and that was led by CIFFC and there was a series of recommendations that came out of that it was important that part of [the CIFFC] portfolio, the diversity and inclusion piece, and so [CIFFC] took those recommendations and started implementing them, one being beginning a national survey that can [be] provide[d] to each of the agencies and [exploring] what approaches [CIFFC] can take nationally on increasing the awareness of the issues [of gender and leadership]"</i> (Prac12)</p> <p><i>"In 2016, [the PI] presented a 20-minute presentation and there was no other discussion [on the topic]. Since 2016, I [have] see[n] there is a lot more discussion at different conferences, there's panels [...] and the awareness of a panel pledge, having both representation of males and females on panels, and people who are asking those questions. The conversation has begun"</i> (Prac12)</p> <p><i>"I think individuals are talking more about [gender discrimination] [...] the national conference that happened last month, and since then I've had people approach me on a one-to-one basis, and so there is this feeling that maybe this is a safe thing to talk about or maybe something that they haven't reflected on before, but we see task teams in some of the provinces, we see them discussing it at a provincial level, at [the] organization[al level] [...] at the national level, and certainly people feel more comfortable, I feel personally speaking one to one"</i> (Prac12)</p> <p><i>"I think it's fair to say there is a renewed focus now because of a wider cultural understanding, the #MeToo movement, there's a lot of cultural understanding of gender and leadership [...] within the land management agencies, there's been enough high-profile instances recently that there is definitely a focus on sexual harassment, sexual discrimination, sexual assault"</i> (Prac13)</p> <p><i>"So, we were able to kind of piggyback off [the GLWFP] in the US, because it's not a Canadian problem, it's not a US problem, it's a</i></p>	<p>Realized, unclear project contribution</p> <p>Corroborated by both national and international practitioners that the topic is now a focus of discussion. The GLWFP had a leading role in ensuring the topic was a focus of discussion within the BCWS and supported discussions on the national level. However, more widely, a number of alternative explanations are included that have contributed to the realization of this outcome.</p>
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	<p>for national and international practitioners. For example, in 2017, it was identified that CIFFC would create and lead a gender forum which was in part spurred by the GLWFP. A series of recommendations were built out of the gender forum which were implemented by staff at CIFFC focusing on gender and inclusion. These recommendations include looking into approaches that can be taken nationally to increase the awareness of issues around gender discrimination. A renewed focus on the topic of gender in the workplace is also a result of wider cultural understanding, for example the #MeToo movement (Prac13). US practitioners note that there have been a number of high-profile cases within Land Management agencies that have increased the focus on sexual harassment, sexual discrimination, and sexual assault (Prac13, Prac9, Res3).</p>	<p><i>larger cultural problem. So, we were able to use [the PI's] confidence in [the] research to say that, 'Hey, it's likely that we've got some of the same issues. Let's find a way to talk about it.' And [the PI] was also able in [the] research to place it in a context that enabled dialogue and didn't stifle dialogue"</i> (Prac13)</p> <p><i>"I was asked to speak at a conference and they were going to do some traditional fire safety thing, but the organizer contacted me back and said hey, it turns out we can't have you come in the capacity that we thought because our manager has told us that we have to focus our entire conference on gender and leadership issues, and I thought fantastic! I can't say for certain whether that is because they got hold of [the PI's] paper, but those are the kinds of things I think academic research is able to influence"</i> (Prac21)</p> <p><i>"I know this is being discussed nationally [...] I am proud that [the BCWS] have actually turned the discussion into action [...] So I think yes, I do think this is national and I don't want to say international, but certainly North American in nature"</i> (Prac4)</p> <p><i>"in Alberta they have really taken some steps to, I wouldn't say as much as Ontario, but they are trying to take more steps in terms of acknowledging gender issues and trying to bring it to the forefront and making it a priority [...] I am not entirely sure how much the Alberta folks know about her research because as I said it hasn't been, as far as I can tell, super widely shared within the community"</i> (Prac7)</p> <p><i>"There are similar kinds of priorities and objectives happening in the US and Australia. That Association for Fire Ecology paper had people from Mexico, Australia, Canada and the US, so I think there are cross-overs [...] I think there is obviously, even from a social context outside of wildland fire, more of a movement for this type of research and awareness"</i> (Prac7)</p> <p><i>"some of [the PI's] work has been in the [wildland fire] lessons learnt publications and that's a very widely read well respected source of current information and just stuff going on within wildland fire in the US and that's pretty significant. Others have also brought up topics related to gender relative to the recent sexual harassment concerns that have popped up, particularly the forest service and the parks service, so it is definitely a topic that has become much more visible and I would say in the last 5 years"</i> (Res3)</p>	
Victims of gender discrimination at	<p>Due to the GLWFP, informants suggested that more individuals have spoken up about discrimination; the GLWFP was successful at starting a conversation and encouraging some victims to discuss their experiences and feel more comfortable doing so</p>	<p><i>"[people affected by gender discrimination at the BCWS] do [have the courage to speak up] [...] I think the avenue is there for them to say it, but there is still ostracization that occurs because of it. Even now if a woman is being bullied, I have had women come to</i></p>	<p>H Partially realized, clear</p>

<p>BCWS have courage to speak up</p> <p>[end-of-project outcome]</p>	<p>(Prac3). The PI's work inspired some individuals to continue to self-reflect on their experiences through taking part in the PI's diversity workshops (E-mail4). The methodology used by the GLWFP, in particular the ThoughtExchange™ process, was successful at supporting individuals to share their stories while protecting their anonymity (Prac3). This method also supported practitioners to identify with other people's experiences (Prac3). The GLWFP provides knowledge and support for supervisors when speaking to members of their team who may have experienced issues of gender discrimination in the workplace (Prac1). Supervisors and managers provided examples of staff turning to them and having the courage to speak to them one-to-one about issues they have experienced within the workplace (Prac1). A number of firefighters have also turned to the PI to share issues and stories, which gave some victims of gender discrimination the courage to continue their work and make sense of their own experiences (Res4). Victims of gender discrimination have been more willing to share their stories which has been one of the most important developments in ensuring the topic is a priority for the organization (Prac4). One practitioner described how less employees are leaving the BCWS without discussing their experiences of the organizational culture which was hugely beneficial to the organization (Prac4). However, the GLWFP was part of a wider organizational catalyst for change to open the conversation on culture and gender within the BCWS (Prac4).</p> <p>Other alternative explanations included an individual letter that was sent from a female firefighter to upper management which discussed the daily rhetoric of what it was like to be a female firefighter within the organization (Prac4). This was extremely powerful for leaders and a catalyst for change within the organization (Prac4). The BCWS also created a safe reporting line where staff can share their experiences within the workplace (Prac4, Prac6). This created a safe space for individuals to discuss their experiences. The safe reporting line highlighted themes within the organization that the BCWS needed to focus on and address, and diversity was recognized as one of these themes (Prac6).</p> <p>Although there are now avenues for victims of gender discrimination to speak up, some informants believed that there is still ostracization that occurs (Prac18).</p>	<p><i>me and say 'This is what has happened to me on a fire, or has happened to me in the workplace', and I'm like 'Okay, well you are going to bring that up right?' And they are like 'Well, if I will, then what is going to happen? Then I become that woman, that person' [...] I think officially there is an avenue there for them to talk about discrimination, but there is still a box there that keeps them from getting there [...] they will be ostracized [...] there is the formal means to do it, but there are still barriers to be able to openly about it" (Prac18)</i></p> <p><i>"I know there has been more people speaking up about discrimination which is a great thing, so I think [the GLWFP] helped to start a conversation" (Prac3)</i></p> <p><i>"I believe that the Thoughtexchange™ questionnaire worked, it help people to be able to tell their story and share their stories a bit while remaining anonymous, and then for people to be able to go through those and be able to identify with other people's experiences" (Prac3)</i></p> <p><i>"one of [the GLWFP's] biggest successes is that [the project] created conversation and it got people talking, [the GLWFP] opened the door to people being allowed to talk about [gender discrimination] or feel more comfortable talking about [gender discrimination] because somebody else was" (Prac3)</i></p> <p><i>"I think one of the most important developments is that people are more willing to start sharing their stories. So this is more about how [discrimination] has become an elevated priority is that people are not just leaving without telling their story and really highlighting the impact of what it has been like to work in wildland fire, now not just in BC but across the world as a female or as someone from a different ethnicity, or as someone who does not fit the norm of what it used to mean to be a wildland fire fighter" (Prac4)</i></p> <p><i>"[the letter] was the most powerful thing, because it wasn't overt bullying, harassment and hazing behaviour, it was just sort of daily rhetoric and the way that one work unit operated without being conscious of knowing that they were having a negative impact on a female individual. The way [it was] articulated that in the letter [...] was just so powerful in terms of a catalyst for change, that letter was hugely powerful for our organization, it went all the way to the top" (Prac4)</i></p> <p><i>"yes, I do believe that [victims of gender discrimination have courage to speak up] [...] I guess I would say that the people who were a part of [the PI's] research for sure [have the courage]. I think the people who were not [are part of the research] are not</i></p>	<p>project contribution</p> <p>Comments from informants suggest that some victims of gender discrimination at the BCWS do have the courage to speak up, but a number of alternative explanations have supported the realization of this outcome and it is suggested that ostracization still occurs.</p>
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<p>BCWS recognizes gender discrimination as a valid subject for discussion</p> <p>[end-of-project outcome]</p>	<p>The BCWS recognizes gender discrimination as a valid subject for discussion (Prac1, Prac18). Informants suggested that members of the BCWS are aware of discrimination happening in the workplace which led to the organization becoming focused on the topic (Prac1, Prac18). With increased discussions, more BCWS managers realized that gender discrimination is a valid subject for discussion, and more staff were open to a conversation on the topic (Gov1, Prac3). Conversations on gender discrimination are being comfortably had at all levels of the organization (Prac6). Senior managers at the organization were no longer in denial that there are issues of gender discrimination occurring at the organization and believed that resources should be allocated to the issue (Doc10, Prac6, Prac7). This resulted in initiatives such as the safe reporting line for staff to discuss their experiences of gender discrimination in the workplace (Gov1). Evidence that the PI was hired following the GLWFP to complete consulting work and training on gender discrimination in the workplace reveals that the organization viewed the area as a valid topic for discussion (Prac3). The PI created a series of workshops in collaboration with the BCWS to address leadership issues within the organization showing support for continued work on gender discrimination (Res2).</p>	<p><i>"I believe that [BCWS] upper level managers are no longer in denial that we may have a [gender discrimination] problem and that [the organization] should allocate resources to it" (Doc10)</i></p> <p><i>"the current acting Executive Director has, after some reflection, acknowledged that [the GLWFP] was what he described as a 'catalyst' for change within the fire service" (Doc13)</i></p> <p><i>"When we started talking about [gender discrimination] in [the PI's] study, I think more and more people started to realize that [gender discrimination] was going on" (Gov1)</i></p> <p><i>"[the PI] raising [the topic] with [female leadership] and the fact of being two females at the helm, of the organization as well as the chair [...] the topic of [gender discrimination] came on the agenda for the first time in [the time of female leadership] which I would like also to the work that [the PI] did, not fully because of the work that [the PI] did, but [...] finding a whole bunch of pieces coming together at the same time" (Gov2)</i></p> <p><i>"Yes [BCWS now recognizes gender discrimination as a valid topic for discussion], among other things, there is a big culture shift happening and that is a big element of it, so yes it has definitely shifted and become more focused" (Prac1)</i></p> <p><i>"I believe so for sure [BCWS recognizes gender discrimination as a valid subject for discussion], and maybe it is not openly said, but I think it is known. I think it is definitely something that is realized</i></p>	<p>H</p> <p>Realized, clear project contribution</p> <p>Comments from informants suggest that the GLWFP supporting the BCWS in recognizing gender discrimination as a valid subject for discussion.</p>

	<p>However, senior leadership suggested that the BCWS should be a leader in all types of diversity within the wildland fire industry and should not have a sole focus on gender (Prac6). Being diverse should be part of the organizational culture and not just the next government initiative (Prac6). Two GBA+ projects were underway in the organization, and partnerships were established with the gender equity group in the Ministry of Finance (Prac6). It is unclear from evidence to what extent these initiatives were related to the GLWFP. Alternative explanations that supported the BCWS recognizing gender discrimination as a valid subject for discussion included external factors such as the #MeToo movement and other societal events which raised the importance of the topic and encouraged momentum within organizations to make change (Prac6). The increased number of personal experience stories being told by staff members were also strong catalysts for change (Prac6). Having two female leaders in senior positions at the time of the GLWFP supported the organization in recognizing gender discrimination as a valid subject for discussion and put the subject on the organizational agenda (Gov2).</p>	<p>[...] everyone realizes that whether they admit it or not that there is inequality in there, it is discrimination in the workplace” (Prac18)</p> <p>“I think [the GLWFP] helped to kick-start conversations [...] fortunately I think [the PI’s] research created the conversations to get this out and address [gender discrimination] and in a less ad-hoc way, and for me now those are not awkward conversations at all [...] So, you have [the PI’s] research and then you have the whole broader MeToo movement, there is a whole bunch of things going on in society that are being highlighted that really start to pick-up momentum” (Prac6)</p> <p>“I think [the BCWS have] come out and said that [they] recognize [gender discrimination] as an issue and [the organization] need to take steps to address it [...] but I guess [the PI’s] research brought it, it was part of the bringing [the topic] to the forefront” (Prac6)</p> <p>“I think [the GLWFP] has definitely brought [gender discrimination] to the forefront and made it a topic that people are forced to talk about” (Prac7)</p> <p>“[the PI] has been very proactive in trying to create change so [the PI] has worked with the organization used as a case study to try and create a program of workshops that fit to address leadership issues within the [BCWS]” (Res2)</p>	
<p>BCWS discusses gender and leadership (multiple levels)</p> <p>[end of project outcome]</p>	<p>As the GLWFP evolved through the research process, conversations between the PI and key organizational leaders increased (Doc8). Increased conversations and increased engagement by the BCWS on the topic allowed the GLWFP findings to be successfully transferred from the PI to organizational leaders (Doc8). By successfully facilitating conversations on the topic with the leadership team, the GLWFP supported the topic becoming more openly discussed at the senior leadership level within the BCWS (Doc12, Res4, Survey1). By working closely with senior leadership, the PI prompted leaders to discuss the topic (Prac14). Informants suggested that gender and leadership is a topic of discussion at senior leadership meetings and is discussed throughout the organization (Prac1, Prac4, Prac6). All fire centers across BC have also had team discussions on gender and leadership, gender discrimination, and other issues of equality within the BCWS (Prac6). Both full-time and seasonal staff are noted to feel more comfortable discussing the topic of gender discrimination (Doc10). Informants discussed their own personal experiences with other members of staff coming forward to share stories and perspectives on gender and leadership within the organization (Gov1). Some senior leaders</p>	<p>“As the [GLWFP] has evolved, conversations with key organizational leaders have increased. This heightened level of engagement facilitated a transition of the learning that was part of this inquiry project from the hands of the lead researcher into the hands of organizational leaders” (Doc8)</p> <p>“I feel like more people (in general- full time and seasonal staff) seem to feel more comfortable talking about these things out loud” (Doc10)</p> <p>“Gender is a more openly discussed topic at the senior leadership level within the organization” (Survey1)</p> <p>“the conversations that [I] had with [the PI] gave me a framing for how to even dialogue about it nationally, and how to add a lens myself to look at it and describe it to others” (Gov2)</p> <p>“An uncomfortable one, usually, but [the GLWFP] started a conversation [on gender and leadership]” (Prac10)</p> <p>“I think [the PI] worked with the [BCWS] at the highest levels with the director, so [the GLWFP] certainly prompted the leadership to wrestle with this issue at least for a time” (Prac14)</p> <p>“I don’t know for sure, I can only hope that the dialogue [on the topic] is continuing” (Prac16)</p>	<p>H</p> <p>Realized, clear project contribution</p> <p>Corroboration between document evidence and interviews that the BCWS now discusses gender and leadership at multiple levels of the organization.</p>

	<p>discussed how conversations with the PI provided them with knowledge and framing for how to have a dialogue on the topic (Gov2). The PI successfully created a space for open dialogue on the topic and created a conversation on gender and leadership (Gov2, Prac10, Res1). However, informants suggested that some members of the BCWS were having discussions on gender and leadership prior to the GLWFP. Other informants noted that the topic may not be something that is formally discussed overtly throughout the organization (Prac18).</p>	<p><i>“There was some discussions and conversations about [the GLWFP], but it didn’t really, it’s not something that is formally talked about [...] but I think it is grafted into People First [...] it is a catch-all basically for all manner of topics for equality [...] I think that [the PI’s] work did kind of help with that, there were conversations being had in the background for a long, long time about this kind of stuff, but they were quiet, and they weren’t really happening openly right. I think definitely it started conversations right, at different levels” (Prac18)</i></p> <p><i>“So now every time that we get the senior leadership together which has been three times since we sort of launched into this world, [gender and leadership] is a main topic of conversation” (Prac4)</i></p> <p><i>“all the fire centers have had sessions where [the BCWS] bring staff in and talk about [gender discrimination and equality] more and more openly [...] these conversations would have never happened [previously] and now [the BCWS] are having them” (Prac6)</i></p> <p><i>“I think [the PI] has done just some tremendous work here, not only theoretically, but also in terms of what [the PI] was able to achieve in opening up dialogue within [the] organization as well” (Res1)</i></p>	
<p>BCWS supports gender-responsive leadership</p> <p>[end of project outcome]</p>	<p>There has been more support for gender responsive leadership, as well as increased encouragement for women to apply for leadership positions within the BCWS (Prac1). However, it is unclear from evidence to what extent these changes are directly linked to the GLWFP (Prac1). There has also been a recent shift in the way that the BCWS is hiring leaders (Prac4). The organization is focusing on hiring leaders and opposed to hiring ‘good’ firefighters. Individuals are being recruited into leadership positions if they have leadership skills, or if they want to develop as a leader so that they can successfully lead a diverse team irrespective of gender (Prac4). Informants also suggested that the BCWS are supporting members of the organization to progress to positions where they can have the most influence, with the organization hiring members of staff for leadership positions away from the stereotypical norm (Gov1). GBA+ has also been partially used by the BCWS, but larger delivery of GBA+ training is yet to be invested in by the organization (Prac4). Again, it is unclear from evidence whether this is an outcome of the GLWFP. However, some informants suggested that although there are now more women at director level and within management positions, this initiative does not appear to be formalized (Prac18). There also remain certain positions, such as</p>	<p><i>“Oh for sure, there has been more support [for gender responsive leadership] and I think also too, it’s probably encouraging people [...] it is encouraging more women to try maybe, and apply for these jobs [...] this is the first time in 10 years since we had a female crew leader in Penticton, and since [the GLWFP] has come out there has been more [applicants]” (Prac1)</i></p> <p><i>“I think [the BCWS is now supporting gender responsive leadership], again, I don’t believe it is formalized [...] we are seeing women at director level and management positions [...] there is still the specific positions like the incident commander, the operations chief and the zone manager jobs where things still need to be boxed on the ears and say okay, let’s shake it up here a bit and let’s hire the best people for the job” (Prac18)</i></p> <p><i>“If [the BCWS are] only hiring around 25-30% women, and then only retain so many of those people in a period of 5 to 10 years, it is really hard to have women move into leadership positions just based on the numbers and the time it takes” (Prac3)</i></p> <p><i>“we are starting to see a shift in the way that [the BCWS] are hiring leaders [...] I would say that [the BCWS] are putting more focus on actually hiring leaders versus hiring good firefighters, or hiring people who can hold people accountable as supervisors. [The BCWS] are actually looking to hire who have leadership</i></p>	<p>M</p> <p>Partially realized, unclear project contribution</p> <p>There has been increased support for gender responsive leadership at the BCWS, but it is unclear to what extent this is related to the GLWFP. Barriers remain regarding retention rates and time needed to reveal the</p>

	<p>operations chief and zone management roles that remain male dominated (Prac18). Hiring is noted to not yet be based solely on merit, with some hiring of women in certain positions a notion of “ticking a box” (Prac3). Evidence suggested that the BCWS hires approximately 20-30% women (Prac3). However, a smaller number of female hires are retained within the organization for a period of five to ten years, long enough to progress to leadership positions (Prac3). Subsequently, with a relatively small initial hiring pool and a low retainment rate, fewer women will progress to leadership positions. Meaningful change to the culture is also noted to have been slow. For change in hiring practices to have an effect, more time will need to pass (Prac7).</p>	<p><i>skills or want to take more training and development in leadership skills, so that regardless of what your staff is comprised of, male, female, homosexual, heterosexual, transgender, etc., that you have the skills and the competency to be a good leader to all of those people which may mean that you have to be a different leader to each one of them. To me, that is what true leadership looks like. So, I think that has been part of the shift” (Prac4)</i></p> <p><i>“I haven’t seen a lot of change in terms of meaningful change, to change the culture in a real long-lasting way, I think that’s a [long] way out. I don’t also know how slowly things will change in terms of the make-up of leaders in wildland fire, it is pretty slow. I look at incident management teams, and out of 5 incident management teams, [there is] only [one] female incident commander. [The BCWS] have one planning section chief, no off-section chiefs, yeah, it is not changing very quickly” (Prac7)</i></p>	<p>change from hiring practices.</p>
<p>BCWS integrates recommendations into organizational practice</p> <p>[end of project outcome]</p>	<p>Following the GLWFP, the PI worked in partnership with the BCWS to implement some of the suggestions made by research participants. The BCWS were interested in continuing work on the topic and saw it as valuable and in line with issues of worker safety, health, and well-being (Doc15). It is suggested that the PI has been proactive in attempting to create change by partnering with the BCWS to develop a program of workshops to address leadership issues within the organization (Res2). However, a number of obstacles arose in supporting long-term change within the organization due to resistance within the BCWS (Res2). The GLWFP was viewed as a small case study, not applicable to the wider organization (Res2). Some informants suggested that the BCWS have not implemented any of the recommendations put forward to their knowledge (Prac1, Prac3). Others stated that there are indirect connections between recent initiatives by the BCWS and the GLWFP recommendations (Prac6). For example, the PI held sessions with the BCWS which initiated training and discussion on the topic of gender and leadership which have since evolved into a new stream of BCWS’ work focused on supporting staff leadership development (Prac4). It is suggested that the GLWFP results were not widely shared throughout the BCWS which is a reflection on the leadership at the time and the tentativeness to address the research findings (Prac3).</p> <p>Initially, it was challenging for the PI to see that the BCWS did not implement the GLWFP in the way the PI had hoped (Res2). Uncertainty regarding the impact of the GLWFP on the BCWS resulted in the PI feeling ‘disheartened’. However, recent change occurred and the BCWS have acknowledged the PI’s work as</p>	<p><i>“[the PI is] working with [the BCWS] currently to partner and implement some of the things that fire fighters suggested [...] [the BCWS] are still really at the drawing board with that, but there is definitely really keen interest and this is seen as super valuable within the BCWS and there is an interest in continuing and following up with this work in line with broader issues around worker safety and health and wellbeing. I can’t speak on behalf of the BCWS, but they are really passionate about working on the respectful workplace and creating an environment where people can really be their full selves where there is a mutual respectful environment. [The GLWFP] is seen as part of that broader strategy and [the BCWS and PI] are certainly working together to make movements and follow up on this” (Doc15)</i></p> <p><i>“so, in terms of the finding that gender makes a difference in how fire fighters are treated at work, all the different findings here they resonate with me and through conversations with other women. But in terms of incorporating the recommendations specifically because of her research, I am not sure if inherently the provinces knew that they were doing that. I do see Alberta, Ontario and BC having done surveys and this was suggested within the recommendations [...] particularly because the recommendations are national in scope” (Prac12)</i></p> <p><i>“But as far as gender in wildfire, there hasn’t really been anything that is directly linked to [the GLWFP] which has been implemented” (Prac3)</i></p> <p><i>“the sharing of [GLWFP] data and the results with the whole organization was done poorly, and I don’t think that is a reflection on [the PI]. I think it’s more of the leadership within [the]</i></p>	<p>M</p> <p>Partially realized, unclear project contribution</p> <p>A number of barriers prevented the GLWFP recommendations from being integrated directly. However, the recommendations are national in scope and should be shared widely to support change.</p>

	<p>having had a major impact within the organization (Res1). On a national level, practitioners noted that the GLWFP resonated with them (Prac12). Provinces across Canada also started to implement change that align with the GLWFP recommendations, but this is not a direct result of the project. The recommendations are noted to have been national in scope, and it is important that they are shared more widely to encourage provinces to be more transparent (Prac12).</p>	<p><i>organization at the time and their tentativeness to address what came out of the research, but it was really not well presented and shared throughout the organization which is unfortunate” (Prac3)</i> <i>“I don’t think that there’s any [policy or government changes] that came directly from the research” (Prac3)</i> <i>“I don’t know off the top of my head [if any GLWFP recommendations have been integrated into the BCWS]. But, if not directly, then definitely indirectly you can make connections to things that [the BCWS] are now doing through [the PI’s] recommendations” (Prac6)</i> <i>“[The PI] has been very proactive in trying to create change, so [the PI] has worked with the [BCWS] to try and create a program of workshops that fit to address leadership issues within the organization. There has been a variety of obstacles in actually making that happen in the longer term because of the resistance within the system to change [...] And I think that has been hard for [the PI] to come to terms with and not seeing the implementation of [the] results as much as [the PI] had hoped for” (Res2)</i> <i>“certainly people’s rejection of wanting to know the results, so the brushing off of the results of being a feminist rant or it’s a small case study and that’s not applicable to everyone else, or whether it is a shutting down of the workshops that [the PI] initiated with the BCWS because of a leadership change that no longer supported more inclusive approaches. So, it hasn’t all been rosey and positive in terms of how people have accepted the results from this study” (Res2)</i></p>	
<p>Culture shift at BCWS towards inclusivity and diversity</p> <p>[end of project outcome]</p>	<p>The GLWFP is noted by some practitioners to have contributed to an overall shift in the culture and was seen as a justification to continue future work on the topic (Prac11, Prac18). Some suggested that the GLWFP was a catalyst for the People First initiative which is a ‘catch-all’ program for issues on equality (Prac18). The GLWFP was a catalyst for change on the gender aspect of workplace culture, but culture also includes mental health, stress and a multitude of other lenses (Prac4).</p> <p>Wildland fire is currently going through a large cultural transformation (Prac4). There has been a shift for cultural improvement across the BCWS which is focusing on all aspects of equality; it is broader than gender (Prac1). This includes focusing on how individuals interact and communicate with each other inside and outside of the workplace to create a more supportive environment for females in leadership roles (Prac1). This cultural shift has also supported the BCWS in recognizing gender discrimination as a valid subject for discussion (Prac1).</p>	<p><i>“At this fire center that I am working in, there is a big push for cultural improvement, improvement of the culture within wildland fire within our fire center. But that is a bit broader then just gender” (Prac1)</i> <i>“[the BCWS] are starting to see more and more females in leadership roles and I think it is slow, but it is starting to happen. And I think especially with [the BCWS] focusing on the culture and [the organization] becoming a more supportive environment” (Prac1)</i> <i>“Among other things, there is a big culture shift happening and that is a big element of it, so yes it has definitely shifted and become more focused” (Prac1)</i> <i>“I think [the GLWFP] is contributing to an overall shift in the culture and justification of [future] work [on the topic]” (Prac11)</i> <i>“I think [the GLWFP] is grafted into People First, at least that’s the best that I can see, and I think that that is something, it is a catch-all basically for all manner of topics for equality [...] now it</i></p>	<p>M</p> <p>Partially realized, unclear project contribution</p> <p>Culture shifts take time. Although the GLWFP was a catalyst for change for the gender element of culture, a number of alternative explanations</p>

	<p>Some informants believed that the BCWS have taken steps to create more diverse opportunities for all employees which has led to positive growth (Prac19). There has been a shift in the way the BCWS is hiring leaders to focus on creating leaders that can successfully manage a diverse team (Prac4). This cultural shift is noted to be a slow and gradual change, but the BCWS have invested time, resources, and energy into creating more inclusive and diverse workplaces (Prac4). There is the realization that the BCWS needs to create a culture of inclusion rather than a culture of conformity which includes all elements of diversity including gender, sexual orientation, ethnicity, religious background, etc. There is no evidence to suggest that this cultural transformation is a result of the GLWFP.</p> <p>There are a number of alternative explanations that support the realization of this outcome. For example, the People First initiative contributed to the shift in organizational culture with leaders recognizing that gender discrimination can happen within their workplaces (Prac18). This initiative focused on creating a more inclusive and safer workplace (Prac18). At a similar time as the PI released the GLWFP findings, the BCWS partnered with the Roy Group to invest in stronger leadership development (Prac4). The GLWFP is also noted to have come at a time where the BCWS as an organization was internally recognizing the need to correct some elements of workplace culture (Prac4). However, it is suggested that there has not been long-lasting meaningful change to the organizational culture (Prac7). It will take time for the results of initiatives to be recognized (Prac7, Prac18).</p>	<p><i>is becoming more and more part of the acceptable culture right, or at least it is starting to at this point in time” (Prac18)</i></p> <p><i>“Of course [the BCWS] promotes equality and it promotes gender neutrality and the best person for the job. But still, as a culture, we put people in different places and we still don’t allow certain advancement unless you conform to the norm” (Prac18)</i></p> <p><i>“I think what wildfire is going through right now in British Columbia is a pretty huge cultural transformation, and it’s slow, it is not happening overnight like I would like it to, but [the BCWS] have invested time, resources and a bunch of energy into it to say [the organization] need to make [their] workplaces better” (Prac4)</i></p> <p><i>“[the BCWS] need to be better, [the BCWS] need to create a culture of inclusion rather than a culture of conformity and that includes obviously gender, but it also includes LGBTQ+, it also includes First Nations and other races, religious backgrounds. Really it includes everyone getting to be themselves when they show up to work which hasn’t necessarily been the way it has always operated. And not intentionally, just because that was the way it was” (Prac4)</i></p> <p><i>“roughly around the time that [the PI] was releasing [their] research and working with [the BCWS], [the BCWS] were also working with another consultant on Vancouver Island, the Roy Group, trying to invest in stronger leadership development [...] It was almost like a light switch went off where [the BCWS] said [inclusivity and diversity is] going to be a focus for BCWS and people will be the priority. It’s not just about the culture [...] There’s mental health, there’s fatigue, stress, anxiety, depression, we were seeing a pretty big range of challenges that [BCWS] staff were dealing with [...] culture is sort of an all-encompassing term” (Prac4)</i></p> <p><i>“I think [the GLWFP] was coming in at a similar time as when [the BCWS] as an organization were recognizing that [the organization] needed to correct some piece in [the] culture. [The PI’s] work was a catalyst on the gender side of that [...] I don’t want to discredit gender, but I want to say that it was [organizational] culture as a whole [...] [the BCWS] just said that [they] need to look at this from a lot of lenses” (Prac4)</i></p> <p><i>“I haven’t seen a lot of change in terms of meaningful change, to change the culture in a real long-lasting way, I think that’s a way out” (Prac7)</i></p>	<p>also supported the realization of this outcome.</p>
Provincial government aware of gender discrimination	<p>There is minimal evidence to suggest that the provincial government has taken actions based in the GLWFP recommendations. However, two government informants were</p>	<p><i>“[the PI] raising it with [female leaders] and the fact of being two females at the helm, of the organization as well as the chair [...] And I believe that the topic of [gender and leadership] came on the</i></p>	<p>L</p>

<p>in BCWS and takes action based on recommendations</p> <p>[end of project outcome]</p>	<p>aware of the PI and the GLWFP (Gov1, Gov2). Members of the BCWS stated that the organization made the provincial government aware that they recognized gender discrimination as an issue and needed to take action to address the topic (Prac6). However, some informants suggested that there has not been any policy or government changes that are a direct result of the GLWFP (Prac3, Prac6). Alternative explanations include having two female leaders at senior positions in the BCWS and government. The topic of gender and leadership came onto the BCWS agenda for the first time while there were two female leaders in senior positions (Gov2). As a result, conversations began at the national level amongst key parties (Gov2).</p>	<p><i>agenda for the first time [during female leadership in key positions], which I would like also to the work that [the PI] did, but not fully because of the work that [the PI] did, but [...] finding a whole bunch of pieces coming together at the same time [...] the dialogues hadn't happened at the national level amongst the key parties"</i> (Gov2)</p> <p><i>"I don't think that there's [any policy or government changes] that came directly from the [GLWFP]"</i> (Prac3)</p> <p><i>"Policy actions [from the provincial government]. Not that I am aware of. I think [provincial government] have turned to [the BCWS] and I think [the BCWS have] come out and said that [they] recognize this as an issue and [the organization] need[s] to take steps to address [gender discrimination] [...] I think [the BCWS] are on the right path [...] but I think [the BCWS are] addressing it on multiple fronts"</i> (Prac6)</p>	<p>Partially realized, unclear project contribution</p> <p>Government informants were aware of gender discrimination in the BCWS. However, there is minimal evidence to suggest that action has been taken based on recommendations.</p>
<p>Public aware of gender discrimination in BCWS and demands action</p> <p>[end of project outcome]</p>	<p>Regarding the public perception of the firefighting role, some informants stated that the media generally portray and interview the stereotypical masculine, male firefighter (Prac3). This makes it difficult to change the stereotype of the types of individuals who succeed in the firefighting role (Prac3). This public stereotype also makes it difficult for women or more feminine individuals to believe that they can also succeed in the profession as they cannot see individuals like themselves already in the role (Prac3). The PI completed an interview with CBC Radio Kamloops in which the interviewer asked about the PI's own personal experiences. The PI made the intentional choice to speak from an objective perspective of a researcher and did not want to draw sensationalized attention to the topic by sharing personal experiences (personal communication). It is suggested that this likely affected the lower levels of public awareness; sensationalizing the issue as a whistleblower would have likely garnered more public attention.</p> <p>Some informants suggested that other than the PI's radio interview, there have been no discussions on the topic within media that they are aware of (Prac9). Others believed that the public are not aware of gender discrimination within the BCWS and do not demand action on the topic (Prac5). It is suggested that the public do not usually consider wildfire services unless there is a direct threat of fire to themselves. Therefore, it is unlikely that the public would be aware of or concerned about gender</p>	<p><i>"a lot of the times when the media are wanting to interview somebody during a busy fire season, they want that stock character like super tall, bearded dude. So, if that is how firefighters are continually portrayed, you are not going to change that public perception of who does the job, you are not going to change that stereotype, and then you're not going to have a smaller female or more feminine individual think that they can do the job if they don't see anyone like them doing it"</i> (Prac3)</p> <p><i>"I suspect [the public are not aware of gender discrimination within the BCWS] [...] most people don't follow what's going on in [civil services and] other than when it affects them directly. So, if there is a wildfire happening a kilometer from your house, you would care about who is out there, how many resources are attending to it, and trying to save your property. But 99% of the time outside of that incident, people aren't really going to care whether or not we have adequate firefighting resources, [or] what the politics are internal to the organizations"</i> (Prac5)</p> <p><i>"One would hope that when [the GLWFP] report and subsequent reports that dig deeper into [the topic] bring light into what is going on, then that gives the Ministry and organizations an opportunity to potentially correct the path and the direction of what they are doing. It is important work to do, but would society as a whole care about it? I would be a little cynical to think that they would take up that kind of a[n] [influence]"</i> (Prac5)</p>	<p>Insufficient evidence</p> <p>Some informants predict that the public would not be aware of a micro issue such as gender discrimination within the BCWS. Overall, there is insufficient evidence for this outcome.</p>

	discrimination within the BCWS (Prac5). With most members of the public unlikely to think about the issue of women in leadership on a regular basis, it is difficult to shape and influence policy or organizational change (Prac5). Informants suggested that researchers should not rely on public sentiment to influence change on the topic (Prac5). Micro issues such as gender discrimination within the BCWS are challenging to make macro issues within society, so it is unlikely that the public are aware of the topic or demand action (Prac5).	<p><i>“Most people don’t think of [the topic] on a regular basis, you have to realize that some of the research that you are doing is not going to [shape policy or organizational change], or should not rely on public sentiment to push the direction forward [...] you are trying to take an issue that is micro and make it a macro” (Prac5)</i></p> <p><i>“No [there have not been discussions within media on the topic], not that I am aware of” (Prac9)</i></p>	
Public organizations held accountable for transparency around gender discrimination [end of project outcome]	There is uncertainty as to whether public organizations are held accountable for transparency around gender discrimination. Accountability mechanisms are different between high-risk agencies, for example, there is less structural oversight and accountability in firefighting then there is in the police force (Prac15). The more individualized response between fire centers are suggested to make it easier to focus on operationalization issues (e.g. response time, equipment and safety issues), rather than focusing on ‘hard to tackle’ issues such as gender discrimination (Prac15). Therefore, anecdotally, some informants suggested that fire services are not being held broadly to a high enough standard (Prac15). The GLWFP did not provide unions with the opportunity to hold the BCWS accountable to make changes to address issues of gender discrimination (Prac5). However, the PI did have a meeting with a union colleague to share findings, but only one option was presented to the PI to influence change which was not appropriate for the PI’s personal position within the organization at that time and would have not utilized the research as general input to the union to improve employment standards or address gender issues (personal communication). Some practitioners also suggested that through being directly applicable to wildland fire agencies in both Canada and the US, the GLWFP encouraged agencies to be accountable and take action on the topic through finding system levers (Prac13).	<p><i>“without having done the same research over here [in the US], [the PI’s] research is directly applicable, and it calls BC Fire out and it calls [US agencies] out to act, to take action. And not action to rid ourselves of those bad actors and be done with it, but [to] find those system levers to try and manipulate action” (Prac13)</i></p> <p><i>“[whether public organizations are being held accountable for transparency around gender discrimination], it depends on what side you are looking at it I suppose. I would say that the accountability mechanisms are very different for police and fire. Police has way more structural oversight, and so in policing there was a huge amount of accountability to it, in fire I don’t see that level [...] So, I would say anecdotally that [wildland fire services] are not being held broadly to a high enough standard. They just don’t have the oversight, it is individual municipality’s that would either view that as a potential risk or a concern, or an area that was a priority for them; that’s a very individual thing from community to community. What ends up happening is it is so much easier to focus on the operational things such as response time, equipment, safety issues, that sort of thing. It’s much easier to focus on those things than this thing that is very difficult to talk about and understand and a tough nut to crack” (Prac15)</i></p> <p><i>“If [the GLWFP] was the report I saw a couple of years ago, it didn’t create for the union the opportunity to now hold the [BCWS] accountable to make changes. But it may have contributed to why the [BCWS] put out that standards of deportment document 2 years ago” (Prac5)</i></p>	<p>Insufficient evidence</p> <p>Evidence suggests there is overall uncertainty as to whether public organizations are held accountable for transparency around gender discrimination. There is insufficient evidence to assess the realization of this outcome</p>
Broader wildland fire community aware of gender discrimination at BCWS [high-level outcome]	Of the nine informants working in wildland firefighting outside of the BCWS, all were aware of the GLWFP and its findings. Practitioners from wildland fire agencies in the US noted how the GLWFP was directly applicable to their work; subsequently, the GLWFP also reflected issues of gender discrimination within wildland fire agencies (Prac13). Researchers suggested that there would not be a growing movement within the BCWS and other Canadian fire agencies to address gender and leadership within	<p><i>“the work that [the PI] has done, because it’s directly to applicable to what we do in wildland fire fighting in the United States, I can see myself in [the PI’s] research, I can see myself and I can see where the same conditions exist. So even without having done the same research over here, [the PI’s] research is directly applicable, and it calls BC Fire out and it calls us out to act, to take action. And not action to rid ourselves of those bad actors and be done</i></p>	<p>Insufficient evidence</p> <p>All informants outside of the BCWS were aware of the GLWFP and its</p>

	<p>wildland fire without the PI and the GLWFP (Res1). This reveals that there is both an awareness of the issue and a desire to create action on the topic as a result of the GLWFP. Other informants agreed that the broader wildland fire community beyond BC are aware of gender discrimination within the wildland fire community, including agencies in Alberta (Prac9). However, factors outside of the GLWFP contributed to this increased awareness. For example, one informant suggested that it was the Association for Fire Ecology Sexual Harassment Position paper (2016) and their survey on gender inclusion that increased the awareness of gender discrimination within the profession (Prac9).</p>	<p><i>with it, but find those system levers to try and manipulate action” (Prac13)</i> <i>“[the PI] was confident in saying the things that [the PI] did, in how gender influenced and whether BC Fire “had a problem” with harassment or discrimination” (Prac13)</i> <i>“Yeah, I think [the broader wildland fire community beyond the BCWS and Alberta] are aware of [gender discrimination] and that Association for Fire Ecology paper was the real start to all of this, they were the ones that really opened the can of worms and their international survey that they did related to gender and inclusion, I think they are the ones for me that started it all” (Prac9)</i> <i>“I think we wouldn’t have a growing movement within BC and Canada to address gender and leadership within wildland fire [without the GLWFP]. I think [the PI] has been a true leader in that regard, and [the PI’s] impact has been profound” (Res1)</i></p>	<p>findings. However, there is minimal evidence from interviews to support the realization of this outcome.</p>
<p>BCWS senior leadership introduces policy on gender and leadership</p> <p>[high-level outcome]</p>	<p>A number of informants suggested that BCWS senior leadership have begun to introduce policy on gender and leadership. For example, all wildland fire agencies at the national level came together to discuss gender and gender discrimination in a day-long meeting (Gov1). This led to a statement of intent being created that focused on the fact that gender discrimination will not be tolerated in wildland firefighting across the provinces (Gov1). Standards of Conduct were also created which are specific around bias and harassment (Gov1). However, there is insufficient evidence to suggest that this is a direct contribution of the GLWFP. Another internal policy introduced by the BCWS is the People First initiative (Prac18). This initiative focused on the culture of the organization and creating a more diverse, healthy, people-focused workplace which retains its staff (Prac18). This initiative generated excitement and made strides towards a healthier, more respectful, and more equal workplace (Prac18). However, People First is focused on all aspects of equality, broader than gender (Prac18). In Spring 2017, the BCWS released the Respectful Workplace Policy which was influenced by the GLWFP through conversations with the PI. The PI also played a small role in the initial stages of creating the BCWS Diversity Strategy; however, this collaboration subsided (Res4). It is suggested that the GLWFP may also have supported the BCWS in releasing the Standards of Department document, but the full role of the GLWFP in this initiative is unclear from evidence (Prac5). Although elements of the GLWFP are also noted to have filtered into the People First initiative, some suggested that there have been no policies introduced on gender</p>	<p><i>“At a national level, all the wildland firefighting organizations, all the provinces and territories [...] created a statement that said that [gender discrimination] is not on, [they’re] not going to tolerate that as provinces and territories in wildland firefighting, and that was huge” (Gov1)</i> <i>“[Wildland fire] actually created [its] own standards of conduct [...] And it was very specific around specific behaviours [...] being very, very clear on bias, harassment. Just really spelling it out that these things were not on” (Gov1)</i> <i>“[People first] is relatively new. It is something that was rolled out within the last year [...] especially with wildfire, a big course of [the] culture is safety and safety first and [the organization is] going to continue that. But now there [are] more discussions about bringing the concepts of People First into the actual workplace and it becomes a corner stone of the culture of the BCWS. So, it is definitely a new initiative, but it has generated excitement” (Prac18)</i> <i>“with People First, [the BCWS] are actually saying that [they] are going to do something too, and [the organization is] showing that [they] are actually making strides towards a healthier, respectful, more equal workplace. That is something that is at least tangible action that I have seen” (Prac18)</i> <i>“Now there is definitely parts and pieces of [the GLWFP] coming into People First and I am not sure if that has been systematically done, but I can see it from knowing what [the PI] was talking to [BCWS staff] about for many, many years” (Prac18)</i> <i>“But as far as gender in wildfire, there hasn’t really been anything that is directly linked to [the GLWFP] which has been</i></p>	<p>M</p> <p>Partially realized, unclear project contribution</p> <p>A number of recent initiatives have been implemented by the BCWS that aims to address the wider aspect of organizational culture and diversity. It is unclear to what extent these are an outcome of the GLWFP.</p>

	<p>and leadership that directly relate to the GLWFP (Prac18, Res4). The BCWS turned discussion into action in terms of addressing gender discrimination (Prac4). There has also been financial and resource backing of the enhanced focus on inclusivity and diversity in the BCWS (Prac4). Although it is suggested that tangible action and policies have been implemented by the BCWS, there is still a long way to go to achieve equality within the organization. The challenging fire seasons of 2017 and 2018 resulted in the organization running at maximum capacity in terms of operation and left little time for other factors such as gender and leadership (Prac5). Some items not directly related to operational policy did not receive the attention they should have due to these extreme fire seasons.</p>	<p><i>implemented [...] I don't think that there's any [policy or government changes] that came directly from the research"</i> (Prac3)</p> <p><i>"[the BCWS] have actually turned the discussion into action and in some cases [...] There is financial backing of this and there is resourcing backing of this new business line and this focus, this really enhanced focus of inclusivity and diversity within BCWS. [The BCWS] have reviewed and looked at hiring practices both at new recruit level as well as through the officer levels, and there's been some shifts there [...] I think that [the BCWS] are actually turning it into action"</i> (Prac4)</p> <p><i>"you had two back-to-back extreme fire seasons [...] and basically the organization running flat out for 2 years in a row. It is really hard to recover from, and maybe some of these nice to do things don't get the attention they should"</i> (Prac5)</p> <p><i>"[The GLWFP] may have contributed to why the [BCWS] put out that Standards of Department document 2 years ago"</i> (Prac5)</p> <p><i>"There's nothing that the leaders of the BCWS would explicitly link to [the GLWFP]. In the spring of 2017, [the BCWS] came forward with the Respectful Workplace policy and not directly linked to [the GLWFP], but certainly influenced by [the GLWFP]. And then [the BCWS] are currently working on a Diversity Strategy which [the PI has] been a small part of in the early stages"</i> (Res4)</p>	
<p>BCWS's reputation as progressive organization increases</p> <p>[high-level outcome]</p>	<p>Some informants suggested that the BCWS is on the way to being viewed as a progressive organization (Prac6). There have been slow and gradual changes within the organization, with momentum and an increased awareness behind action steps to become a more progressive organization (Prac6). For example, new hiring practices have been implemented, along with the People First initiative which resulted in a slight culture shift (Prac18, Prac6). However, there is the impression that the BCWS have taken a reactionary standpoint to issues regarding gender discrimination (Prac5). Some past incidents of gender discrimination have not been elevated to senior levels highlighting missed opportunities to ensure that equality is a core element of organization culture and gender discrimination is not accepted within the BCWS (Prac5).</p>	<p><i>"with the better education that people have and better tolerance, tolerance isn't the word, just a more mature attitude about gender and different minorities, different sexual orientations – [the BCWS are] growing up as a different organization [...] and it is definitely showing through some of the policies that [the organization] are doing through People First"</i> (Prac18)</p> <p><i>"I think [the organization] are crawling [towards the BCWS being viewed as a progressive organization], you've got to crawl before you walk [...] the mindset is that as [the BCWS] start to build momentum, and as [the BCWS] start to look internally and look at things and different areas, the recruitment and the GBA+ lens that [the BCWS] are recruiting through [...] there are things that [the BCWS] can do right away, and then there are bigger things that [the BCWS] just have to start doing it"</i> (Prac6)</p> <p><i>"I would describe it [as somewhat reactionary] from my vantage point [...] my feeling is that the [BCWS] leadership should have been leading with taking opportunities to demonstrate and model what that is and it should be part of the core culture of the organization [...] I would take the point of view that [the BCWS] should be setting what the walk should look like and then</i></p>	<p>Insufficient evidence</p> <p>There is insufficient evidence to assess the realization of this outcome</p>

		<i>modelling it out and promoting that, rather than coming along later and saying ‘oh by the way, we noticed that all of these things were wrong, but at no point in time did we tell you that every time we got an incident that we didn’t think was acceptable, we didn’t elevate it and say hey, we heard this was going on and we want to let everyone know that this is not part of who we are’” (Prac5)</i>	
Findings and recommendations on gender and leadership are transferred to other risk management organizations [high-level outcome]	<p>By sharing the GLWFP findings at conferences, the PI exposed their work as highly relevant to other risk management organizations and increased the wider interest on the topic (Prac8). This resulted in risk management organizations considering partnership efforts with the PI to explore the topic further (Prac8). Risk management organizations outside of wildland fire noted how the findings are transferable to their professions and organizations due to the nature of the work and the similar male-dominate dynamics of the workforce (Prac8). With the findings from the GLWFP focused on wildland fire proving troubling, other risk management organizations questioned whether there were similar occurrences of gender discrimination within their organizations (Prac8). The GLWFP gave practitioners within other risk management organizations new perspectives on which to view the topic and solidified their own thoughts on gender and leadership (Prac10). Some suggested that this new perspective allowed them to see the benefit in risk management organizations to take their own action steps to address the topic (Prac10). The parallel issues between gender and leadership in wildland fire and within other risk management organizations led to other organizations and professions working collaboratively with the PI to explore the topic further (Prac8). As a result of this work with the PI, other risk management organizations have implemented changes including having increased discussions on modifying member policy and the code of ethics to reflect findings (Prac8). Although action steps have been taken at other risk management organizations, there is still a long way to go towards gender equality (Prac8). However, informants from some risk management organizations suggested that the GLWFP did not directly contribute to the work at their own organizations, but the project may have led to indirect contributions via discussions on the topic with the PI (Prac10).</p> <p>At the national level, the GLWFP findings and recommendations resonated with wildland firefighters across Canada (Prac12). The recommendations are national in scope and the GLWFP communicates the need for transparency and acknowledgement</p>	<p><i>“[the GLWFP] gave me a different perspective, but also solidified the thoughts that I had [...] I would have liked to see more partnership happen with Fire Services, RCMP, provincial police services, because everybody seems to be dealing with the same issues [...] [because of the GLWFP] I was able to see things in a different way” (Prac10)</i></p> <p><i>“It would be indirectly through discussions [with the PI] [...] when [the PI and I would] have discussions, I’d be like ‘Oh, that’s a neat idea. Let’s bring that into my discussions within other organizations]’” (Prac10)</i></p> <p><i>“I remember feeling that [the PI’s] work was a very accurate and fair portrayal of the things that we see here in the US [...] I know [the PI] feels that the work we are doing with WTREX is in line with the kinds of things that need to be happening” (Prac11)</i></p> <p><i>“It is really important that [the PI] is doing this work and [the PI] is publishing on it and that we can point to that when we have these hard conversations, and when we try to justify our program. A program like ours that’s focused on women, some people are really uncomfortable with it and think it’s reverse discrimination, we don’t have events that are focused on men in fire. So, it is so important to have this academic literature where we can point to it and say, ‘hey this is an important issue that has been documented in research and it is an important thing’” (Prac11)</i></p> <p><i>“All the findings [in the GLWFP] resonate with me and through conversations with other women, but in terms of incorporating the recommendations specifically because of [the PI’s] research I am not sure if inherently the provinces knew that they were doing that. But I do see Alberta, Ontario and BC having done these surveys and it was suggested this within the [GLWFP] recommendations [...] the [GLWFP] recommendations are national in scope” (Prac12)</i></p> <p><i>“I was using [the PI’s] research was when I was looking at line of duty deaths [for the US Forest Service] [...] [the PI’s] research was very interesting, because it opened some windows of inquiry that I had no expertise in [...] we had a fatality in the Forest Service in 2013 and we utilized [the PI] and the research [...] [the PI’s] approach to identifying how gender and leadership play a</i></p>	<p>H</p> <p>Realized, clear project contribution</p> <p>Findings and recommendations have been transferred to other risk management organizations outside of wildland fire, and have also been transferred to fire agencies within the US.</p>

	<p>of the issue (Prac12). However, it is uncertain whether other provinces outside of BC have incorporated the GLWFP recommendations directly as the research is not widely known across the country (Prac12). Researchers also suggested that the GLWFP findings are transferable to contexts outside of the wildland fire community due to the patriarchal hierarchy being embedded in many aspects of everyday life (Res2).</p> <p>Wildland firefighters on the international level suggested that the themes and findings from the GLWFP resonate with their own experiences of gender and leadership within the profession and the project is an accurate and fair portrayal of the culture internationally (Prac11, Prac13). Agencies were able to use the GLWFP findings to identify their own challenges on the topic with international wildland fire organizations also beginning their own work in line with the GLWFP recommendations (Prac11, Prac13). The GLWFP is one of the first most notable pieces of research to discuss the topic of gender and leadership in a meaningful way (Prac13). The GLWFP opened new windows of inquiry into the topic that were not held by practitioners prior to the project (Prac13). Some stated how they see potential in using a similar approach and methodology as the GLWFP within their own organizations to contribute to change (Prac13). Practitioners in the US have also used the GLWFP findings when investigating line of duty deaths within the US Forest Service (Prac13). The US Forest Service also utilized the PI to assist them with understanding this incident; gender and leadership arose as one aspect that influenced decisions taken at the time of the line of duty death revealing the transferability of GLWFP to the international scale (Prac13). Other informants in international wildland fire agencies stated how the GLWFP is useful to refer to in order to show the value and justify their own work on the topic (Prac11). The GLWFP contributes to the credibility of the topic due to the scientific nature of the work (Prac12). Overall, it is suggested that the GLWFP has not as yet had the time to contribute to substantial change internationally, particularly within the US (Prac13).</p> <p>However, some informants were unaware of whether the GLWFP findings and recommendations had been transferred to other risk management organizations (Prac10).</p>	<p><i>role in interactions. We used [the PI] and [the GLWFP] to help us understand this particular incident” (Prac13)</i></p> <p><i>“We were able to use almost [the PI’s] confidence in [the] research to say that; ‘Hey, it’s likely that we’ve got some of the same issues [in the US]. Let’s find a way to talk about it” (Prac13)</i></p> <p><i>“[The PI’s] methods for collecting data have opened a door and an avenue for inquiry for us in the US [...] not something we have taken advantage of yet, but something we’re hoping to utilize eventually. So, utilizing a similar methodology for trying to understand this issue [...] I see a great deal of potential in us using that similar approach and viewpoint or perspective to approach potential solutions” (Prac13)</i></p> <p><i>“[the PI’s] work was highly relevant to ours and [the PI] presented [at the annual Spring conference]. At that presentation it seemed to captivate all the members present and it didn’t take long after that for us to consider further discussions about what might happen in terms of some work directly for us” (Prac8)</i></p> <p><i>“Absolutely [I think elements of the PI’s research are transferable to other contexts], the case study that was used in [the PI’s] study is repetitive across not just the wildland fire community but most of society in the way that the patriarchal hierarchy is embedded into everyday norms and practices, the way that gender is invisible, the way that women have to prove themselves to be acknowledged for their competencies. All of these elements that were highlighted in [the PI’s] case study are replicable across many if not most parts of society” (Res2)</i></p> <p><i>“what [the PI] does is ground-breaking for the wildland fire community, and we could use a lot more of it. We could use a lot more of it in the US [...] we’re just at the beginning of seeing a shift or starting to initiate a shift in how we view gender among other aspects of identity and how that affects how we interact, and then that affects how we work and our safety [...] and [the GLWFP] was one of the first and most prominent pieces of research that started talking about this in a meaningful way” (Prac13)</i></p>	
Other high-risk occupations discuss gender discrimination	At the time of the evaluation, the PI was engaged in work with other high-risk occupations to cultivate broader awareness of the topic of gender diversity and mental health, and identify what	<p><i>“[the PI] did a study that was quite similar to the one with wildland fire and [the PI] looked at gender diversity and mental health issues within the avalanche professional community” (Prac16)</i></p>	M

and take action based on recommendations [high-level outcome]	<p>action steps may be needed to address the topic (Res4). Collaborations with the PI provided numbers, statistics and evidence from within the organizations themselves which encouraged action (Prac2). The PI also provided other high-risk occupations with new ideas and focused organizations on future goals (Prac2). Practitioners suggested that there is the desire to see changes related to the topic and the organizations view themselves as leaders within the sector on these issues (Prac16). Although there is noted to have been resistance in the past, there have now been financial commitments to explore work on gender diversity and mental health and take action to contribute to long-term change in organizational culture (Prac16). Action points included reflecting gender and diversity within operational guidelines, procedures and policies amongst staff (Prac2). Collective visions statements were also created among four organizations which outlines goals of culture change around gender discrimination (Prac2). Although gender was discussed prior to collaborations with the PI, the PI encouraged change to be implemented more quickly and was a source of organizational motivation (Prac2).</p> <p>Overall, some high-risk occupations who have collaborated with the PI have begun to discuss gender discrimination and have taken action based on recommendations; however, informants were skeptical that these discussions are happening at a broader scale (Prac16, Prac15).</p>	<p><i>“I only know within our [sector] and yes [high-risk occupations have begun to discuss gender discrimination and have started to take action based on these discussions], it is definitely top of the pile for a lot of folks now, but I don’t know if that is happening elsewhere”</i> (Prac16)</p> <p><i>“I have been looking at [the topic of gender discrimination] more closely in the last 5 years, and then when [the PI] approached us a few years ago with the idea of doing a survey which brought more light on the topic. So, we have worked harder, we have been working at it prior to [the PI’s] project, but with the results of [the GLWFP] it gave us more concrete information, and since that time we have been working at it much more intensely in the last 2 years and particularly in the last few months”</i> (Prac2)</p> <p><i>“I think [change] is coming forwards through workplace incidents, through a change in culture, and of course the work that [the PI] did brought us visible numbers [...] here are some statistics from your very own association [...] And I think that helped galvanise our action – we have been working on this a lot longer than [the PI’s] research has been around [...] But, what [the PI] did was give us some really good hard look at our industry and that motivated the four organizations to get together to make sure that this culture change happens”</i> (Prac2)</p> <p><i>“[the PI is] engaged in other work now with other industries on the same issue and that’s been a real takeaway for [the PI], just really cultivating an awareness of action as being implicit in this process”</i> (Res4)</p>	<p>Realized, clear project contribution</p> <p>Evidence reveals that the PI collaborated with other high-risk occupations to explore gender discrimination. At these organizations, the topic has become a focus for discussion and action has been taken on recommendations.</p>
Personal/Professional Pathway			
Competencies developed through experiential learning for constructive dialogue around the topic [intermediate outcome]	<p>The RRU MAL program encouraged the PI to engage with participants in a way that developed their competencies to lead as a researcher and create a constructive dialogue on the topic (Res2). For example, the research experience enabled the PI to learn how to deal with challenging situations such as managing power dynamics within focus groups to ensure a constructive conversation (Res2). The PI continues to use these skills within their current work to lead and manage constructive dialogues (Res2). Evidence suggested that the BCWS were interested in following up the research and saw it as valuable and in line with worker health, safety, and wellbeing to create a respectful workplace (Doc15). The PI also enhanced their competencies and presentation skills to disseminate the research findings both through in-person presentations and written outlets, including peer-reviewed publications and academic journals (Res2). The PI also published an article in the Wildland Fire Lessons Learnt</p>	<p><i>“[the PI is] working with currently [the BCWS] to partner and implement some of the things that fire fighters suggested [...] there is an interest in continuing and following up with this work in line with broader issues around worker safety and health and wellbeing”</i> (Doc15)</p> <p><i>“[the PI] wrote a piece in [a] trade publication, Two More Chains. It’s from the Wildland Fire Lessons Learned Center. I wrote a response to that, and so we had this public dialogue going, trying to bring a lot of this stuff up to the surface so that the community, the greater community can have this discussion as well. And then we brought [the PI] back again to help us out with the sense-making portion of that investigation as well”</i> (Prac13)</p> <p><i>“the way that the [RRU] Leadership program encouraged and trained [the PI] to engage with research participants, from an approach that acknowledged that researchers are also leaders in their own right. For example, the training that [the PI] got to deal</i></p>	<p>M</p> <p>Realized, clear project contribution</p> <p>The MA in Leadership provided the PI with the opportunity to develop their competencies to implement and continue a constructive</p>

	<p>publication ‘Two More Chains’ to create a practitioner dialogue on the topic and stimulate conversation within the wildland fire community (Doc14, Prac13). The PI was invited to contribute to the sense-making element of the article revealing the development of the PI’s competencies for constructive dialogue (Prac13). The PI was also eager to continue to enhance their competencies through implementing the lessons learnt to create change at the BCWS (Res2).</p>	<p><i>with difficult participants in focus groups enabled [the PI] to better handle challenging situations during [the] research. And there’s also practices that I am continuing to see [the PI] use in [their] ongoing work is skills that [the PI] obtained during [their] Leadership program training at Royal Roads” (Res2)</i></p> <p><i>“[the PI] is a very good presenter and [the PI] has made a real effort to disseminate the findings both in person through presentation, but also through different written outlets. [The PI] has initiated writing up the results as peer-reviewed publications and academic journals [...] and I think that is very much to [the PI’s] credit that [they are] endeavoring to continue [their] own personal development, but also the continual distribution of results through journal articles” (Res2)</i></p>	<p>dialogue on the topic.</p>
<p>Professional networks are expanded</p> <p>[intermediate outcome]</p>	<p>The MAL program provided the PI with the opportunity to expand their professional networks with other students in the course (Prac10). This included building networks with other students working in high-risk occupations who were aware of and worked on the topic of gender within their own organizations (Prac10). These networks allowed the PI to discuss their own experiences with like-minded individuals and initiated a mentor-like relationship which supported the PI throughout the GLWFP (Prac10). Professional networks with other students in the PI’s cohort provided the PI with insights and perspectives into how other risk-management organizations had addressed the topic of gender and leadership (Prac10). Out of the 27 interview informants, 25 were aware of the GLWFP revealing a high awareness of the research among target audiences. By sharing their research at conferences throughout the research process, the PI successfully built professional connections and networks with practitioners throughout the sector (Prac9). A number of informants had initially met the PI at one of these conferences which is where they first became aware of the GLWFP (Prac9). The PI was successful at ensuring their name was heard across the sector by attending conferences and sharing papers, including articles for the Wildland Fire Lessons Learned Centre to increase the awareness of the GLWFP among practitioners (Prac9, Prac11, Prac13, Res2). The PI also shared the research with other professionals outside of the BCWS including those working in other risk-management organizations and relevant unions (Prac8, Prac14, Prac16).</p>	<p><i>“[The PI and I] started chatting and having discussions once [the PI] found out what I did. There was some link there [...] the same issues we were dealing with [in our organization], and still dealing with, was the cultural perspective of, a very male-dominated [...] the PI and I have] had long chats about [the topic], and for [the PI], some of it was personal situations [the PI] had been dealing with [...] or mentorship and coaching” (Prac10)</i></p> <p><i>“I would say [my contributions to the GLWFP were] more some perspectives of my personal experiences and my professional experiences [...] dealing with issues that [the PI] was trying to bring forward and study within the Wildfire Services. So, I was able to give [the PI] some ideas” (Prac10)</i></p> <p><i>“And I did put [the PI] in contact with a couple of people who had done some research on [the topic], especially on the gender piece who had more kind of diverse background or from an academic perspective and research perspective on the issue [...] And a few other people that [the PI] got to connect with, that I made the connections with to [the PI]” (Prac10)</i></p> <p><i>“[the PI] has definitely contributed not only to our team and to the work that we do to organize and host the WTREX” (Prac11)</i></p> <p><i>“I think getting [the PI’s] name and [the PI’s] voice heard has been really well done between attending conferences, or putting out papers, it just seems that everyone knows who [the PI] is and what [the PI] was looking at” (Prac9)</i></p> <p><i>“[The PI] is a very good presenter and has made a real effort to disseminate the findings both in person through presentation, but also through different written outlets. So, [the PI] has initiated writing up the results as peer-reviewed publications and academic journals” (Res2)</i></p>	<p>H</p> <p>Realized, clear project contribution</p> <p>The research experience provided the PI with the opportunity to expand their networks nationally and internationally within the sector and other high-risk occupations.</p>

<p>PI gains professional capacity and recognition as gender and leadership expert</p> <p>[end of project outcome]</p>	<p>The PI has gained professional capacity and recognition as a gender and leadership expert and informants expected that this would continue to grow (Prac16). The PI is noted to be a leader in the topic and the first person that many think of in relation to gender and leadership in wildland fire in Canada (Prac21, Prac12). If there are others who are looking for information on the topic of gender, informants noted that the PI is often the person they refer to (Prac17). Following the GLWFP, the PI was hired by the BCWS as a gender and leadership consultant (Prac3). The PI has been recognized as a source of support for women within wildland fire and supervisor addressing the topic within the BCWS (Prac1). The PI has the knowledge and experience on the topic and can empathize with staff who may be facing challenges related to gender and leadership (Prac1).</p> <p>Evidence showed that other researchers interested in exploring gender and leadership in wildland fire have reached out to the PI for their insight and perspective on the topic (E-mail5). The PI also received a number of awards and recognitions for completing the GLWFP including the RRU Chancellor's Award for the highest academic achievement in the graduating cohort of the Master of Leadership program (Doc12). Other awards include the Wildland Fire (WLF) Canada Student Ignition award for the top student presentation at the 2016 WLF Canada Conference (Doc12). The GLWFP was also nominated for the Social Sciences and Humanities Research Council of Canada Graduate Scholarship to Honor Nelson Mandela in 2016 (Doc12). Evidence revealed the recognition of the GLWFP as a quality research project and acknowledges the PI's skills in the topic. Informants highlighted the credentialization that comes with completing a Master's degree; the PI graduated with a distinction which provided them with the confidence and motivation to continue work on the topic (Prac3). The PI has also been invited to present at conferences suggesting that they are recognize as a gender and leadership expert (Prac11). The PI is now viewed as a top academic in the discussion of gender and leadership in wildland fire (Prac9, Prac11). Other students within the RRU MAL program are also aware of the GLWFP due to program leaders using the project as an example for future students (Res1). The PI's work has grown from wildfire to the avalanche and mountain guide industries to explore gender and leadership as a consultant (Doc11, Prac16). This has included completing research, presenting the results at meetings, leading professional</p>	<p>"[the PI is] on the organizing committee and this is [the PI's] third year on the IMT that manages the event" (E-mail6)</p> <p>"[The PI's] scope of work has grown organically from wildfire to the avalanche and mountain guiding field. [The PI] has also been working as a gender and leadership consultant with the Association of Canadian Mountain Guides, the Canadian Avalanche Association and the Canadian Ski Guides Association" (Doc11)</p> <p>"In addition to the university's Chancellor's Award for the highest academic achievement in the graduating cohort of the Master of Arts in Leadership program, [the PI] received the Wildland Fire (WLF) Canada Student Ignition Award for the top student presentation at the 2016 WLF Canada conference. [The PI's] thesis was nominated for the Social Sciences and Humanities Research Council of Canada Graduate Scholarship to Honour Nelson Mandela in 2016" (Doc12)</p> <p><i>"There are only a handful of people who have published on this topic and [the PI] is one of them. So, I think [the PI] is definitely recognized as an expert within this topic"</i> (Prac11)</p> <p><i>"As we work looking for panelists when we need someone to speak about gender and leadership, [the PI] seems to be our Canadian know-how person on that"</i> (Prac12)</p> <p><i>"I think it has helped [the PI] to get recognition in the very narrow world of people that think about this topic"</i> (Prac17)</p> <p><i>"Absolutely [the GLWFP helped the PI to gain recognition as a gender and leadership expert], that's why we hired [the PI]. It was based on that research and what [the PI] had done during [their] master's which was the whole reason why we brought [the PI] on"</i> (Prac2)</p> <p><i>"When you think about having impact, one of the things that allows you to have impact are the credentialization that comes with obtaining a master's degree and the kind of research that comes with master's level research, and I think that [the PI] was effective in terms of that credentialization and gaining attention and impact through that process"</i> (Prac20)</p> <p><i>"[The PI] is definitely a leader and the first person that I think of when I think of this topic"</i> (Prac21)</p> <p><i>"[The PI] was able to graduate with a distinction and it gave [the PI] the confidence and the drive to continue on with this type of research"</i> (Prac3)</p> <p><i>"We look to [the PI] as a subject matter expert [...] what [the PI] brought to the table was the gender pieces where [the PI's] background was quite strong"</i> (Prac8)</p>	<p>H</p> <p>Realized, clear project contribution</p> <p>The PI gained professional capacity and recognition as a gender and leadership expert and has continued to work on the topic as a consultant. Th PI is recognized within the practitioner community and the academic community.</p>
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	<p>development workshops, and attending strategic planning sessions (Prac16). The GLWFP supported the PI in being recognized as a gender and leadership expert by developing the PI's skills and credibility, which is why the PI was hired to complete work on the topic for other high-risk occupations (Prac2, Prac8). Although the PI is not the only source of information on the topic of gender and leadership for these organizations, they are viewed as having strong skills, experience, and insights to support the organization with its goals (Prac8). This expanded work into other risk-management organizations and through sharing the findings widely through conferences and articles, supported the increased recognition of the PI as a gender and leadership expert (Res1).</p> <p>Other international informants are more cautious and stated that it is difficult to discern whether the PI is now recognized as a gender and leadership expert as much of the PI's work has focused on the Canadian context (Prac17).</p>	<p><i>"People in other fields, maybe not wildland firefighting, but municipal firefighting, or police services, or [the PI] also works in the avalanche system, and so [the PI's] reputation is getting around. Other students in [the RRU Master's] program know about [the PI] [...] so people are becoming aware of [the PI's] work simply through [the RRU] program alone and then [the PI's] reputation in the field is spreading through the presentations that [the PI] is doing because [the PI] is actually achieving change that others are witnessing"</i> (Res1)</p>	
<p>PI becomes an advocate to keep gender as priority for wildland fire community</p> <p>[end of project outcome]</p>	<p>Graduating the MAL program with a distinction is provided the PI with the confidence and motivation to continue work on the topic (Prac3). The GLWFP also supported the PI in critically analyzing the topic and discovering alternative ways to address issues related to gender and leadership in wildland fire (Prac17). This empowered the PI to continue work to implement positive change (Prac17). To individual members of the BCWS, the PI is noted to be a source of information by sharing relevant articles on harassment and women in leadership to expand staff knowledge on the topic and ensure gender remains a priority (Prac18). Some researchers suggested that the PI is a leader in the movement within BC and wider Canada to address gender and leadership within wildland fire (Res1). After completing the Master's, the PI continued to advocate for the work within the BCWS by working as a gender and leadership consultant (Res1). However, barriers and constraints within the organization influenced the extent of change the GLWFP ultimately had on the BCWS (Res1). The PI has also continued to work with the Wildland Fire Lessons Learned Center to increase discussions and awareness around the topic (Res3).</p> <p>In other risk-management organizations, the PI has been successful at keeping the issues on the table during busy seasons which has supported the gender remaining a priority to the organization (Prac8).</p>	<p><i>"[The GLWFP] definitely helped [the PI] to think through what was happening, and alternative ways to think about it and deal with it. I think just being given tools to think about things differently gives you power, or empowers you to try to make a difference [...] [the GLWFP] helped [the PI to] understand [their] situation and what might be done, and helped [the PI] to feel like [they were] making a positive change"</i> (Prac17)</p> <p><i>"[The PI] was really able to expand my knowledge base at least more scientifically in terms of studies than what I had before about these topics"</i> (Prac18)</p> <p><i>"[The PI] was able to graduate with a distinction and it gave [the PI] the confidence and the drive to continue on with this type of research"</i> (Prac3)</p> <p><i>"I think [the PI] is very good at keeping these issues on the table, I think we owe [the PI] a lot for that"</i> (Prac8)</p> <p><i>"The constraints [the PI] faced were really with the upper-level management, or the higher leadership teams, the people that had some influence over change within the organization [...] even after graduating [the PI] continued to work as an advocate in [the] organization"</i> (Res1)</p> <p><i>"[Without the GLWFP] I think we wouldn't have a growing movement within BC and Canada to address gender and leadership within wildland fire. I think [the PI] has been a true leader in that regard, and [the PI's] impact has been profound"</i> (Res1)</p>	<p>M</p> <p>Realized, clear project contribution</p> <p>The PI became an advocate to keep gender as a priority for the wildland fire community by continuing work as a gender and leadership consultant within the BCWS and publishing articles to increase discussion and awareness among the community.</p>

		<i>“In addition to that, [the PI] has done a lot of work like with the [Wildland Fire] Lessons Learned Center just increasing discussion and awareness around the topics” (Res3)</i>	
PI continues work on gender and wildland fire as a consultant [high-level outcome]	<p>After the GLWFP, the PI was hired as a consultant at the BCWS to create and implement leadership workshops that addressed gendered cultural norms (Prac3, Survey1). The PI worked collaboratively with the BCWS to present and discuss the GLWFP findings and identify elements where the organization could improve (Prac1, Prac11). Pilot leadership workshops were delivered, and the majority of pilot participants recommended that the workshop should be delivered to all staff (Survey1). Informants noted how the PI was proactive in attempting to create change by continuing their work with the BCWS (Res2). However, the PI no longer directly supports the BCWS on their gender and leadership work (Doc13). Nevertheless, senior leadership of the BCWS have requested that the PI remains in contact with the organization to share findings of future work on the topic and to continue a positive and supportive relationship. The BCWS have continued work on the topic of gender and leadership but have “taken it down another path” (Prac10).</p> <p>Outside of the BCWS, the PI continued to publish on the topic in academic journals and within Wildland Fire Lessons Learned publications which continued the discussion on the topic within the wildland fire community (Prac13). Other informants from the international wildland fire community noted that they are currently trying to work with the PI to complete similar work to the GLWFP within the US (Prac13). The PI also continues to work as a gender and leadership consultant at other risk-management organizations (Prac16). With the PI’s support, these risk-management organizations have dedicated more time and focused on the topic more closely (Prac2). Within their consulting role, the PI is timely, with clear communications and is responsive to feedback which has resulted in positive working experiences with risk-management organizations (Prac8). Researchers noted that they are continuing to see the PI use skills that they developed in the GLWFP in the PI’s ongoing work on the topic (Res2).</p> <p>Informants from the BCWS highlighted some barriers in the move from focusing on research as a student, to research for consulting which may have led to the PI’s consulting work at the BCWS coming to an end (Prac6). The BCWS suggested that the action research model employed by the GLWFP led to some</p>	<p>“[The PI has] had meetings with the BC Wildfire Service, and while [the PI] will no longer be directly supporting the [BCWS], the [organization] have honoured their contractual commitment to [the PI] and provided an amicable closure to [the] work relationship [...] In addition, though no longer on contract with them, [the ED of BCWS] has requested that [the PI] continue to stay in touch and share the findings of future projects, to continue with a positive and supportive relationship” (Doc13)</p> <p>“[The PI has] recently been hired as a consultant to create and implement leadership workshops that specifically address gendered cultural norms. The pilot project was delivered last month to a small group, and 87% of the participants in the pilot recommended that the workshop be delivered to all staff” (Survey1)</p> <p><i>“We’re trying to work with [the PI] to do a very similar thing here in the US” (Prac13)</i></p> <p><i>“So, we have worked harder, we have been working at [the topic] prior to [the PI’s] project, but with the results of [the PI’s] project it gave us more concrete information. And since that time, we have been working at it much more intensely in the last 2 years and particularly in the last few months” (Prac2)</i></p> <p><i>“One of the challenges that we have is when the researcher tries to move the research into a career. And that was a bit tricky with [the PI] [...] it moved from the research student and the researcher to a consultant. And that’s not what [the organization] was looking for [...] I can see where [the PI] is coming from, if you just hire [the PI] then we can move the dialogue [...] [the organization] just found it to be a bit tricky” (Prac6)</i></p> <p><i>“[The action research] model led to some friction between [the PI] and [BCWS leadership] because the sense was the research is done and now [the BCWS] as the client will guide the conversation forward from there. [The PI] felt that [they] would have a stronger hand working with [the BCWS] going forward in that, so finding the balance on those questions has led to some tricky conversations [...] I think the root of it comes back to poor understanding on [BCWS’s] part of action research itself [...] I would say [the BCWS] did not understand some of the drivers that [the PI] had after the work was completed” (Prac8)</i></p> <p><i>“[The PI] has been very proactive in trying to create change. So, [the PI] has worked with the organization that [they] used as a</i></p>	<p>H</p> <p>Realized, clear project contribution</p> <p>The PI continued to work on gender and wildland fire as a consultant at the BCWS following the GLWFP. Although this professional relationship subsided, the PI continues to work as a gender consultant in other risk-management organizations and continues work on the topic via publishing articles.</p>

	friction between the PI and senior leaders as the PI is noted to have wanted a stronger role in leading the BCWS forward in action on the topic (Prac6, Prac8). However, informants suggested that the BCWS themselves wanted to guide the conversation now that the GLWFP was complete; finding the balance in this relationship was challenging (Prac6).	<i>case study to try and create a program of workshops that fit to address leadership issues within the organization” (Res2)</i>	
PI pursues PhD to continue work on gender and leadership in high-risk occupations [high level outcome]	Graduating with a distinction in their Master’s provided the PI with the confidence and motivation to continue their work on the topic which led to the start of the PI’s PhD on gender and leadership (Prac3, Prac9). The PI successfully received full funding for a PhD through the University of Wollongong starting in June, 2019 (Doc13). The PI is utilizing the same methodology as the GLWFP to examine gender, leadership, and well-being in the avalanche industry in Canada and New Zealand (Doc13). Completing a PhD in Australia is noted to be a good opportunity for ‘cross-pollination’ of knowledge to bring insights from the BC context of wildland firefighting to different occupations (Res1).	<p>“[The PI] ha[s] been successful in receiving full funding for a PhD through the University of Wollongong and will begin in June 2019. [The PI] will utilize the same methodology (Feminist Appreciative AR) to examine gender, leadership and well-being in the avalanche and guiding industry in Canada and New Zealand” (Doc13)</p> <p>“[the PI] <i>was able to graduate with a distinction and it gave [the PI] the confidence and the drive to continue on with this type of research which is why [the PI] has started [their] PhD</i>” (Prac3)</p> <p>“<i>I know that [the PI] has a master’s and is working on [their] PhD</i>” (Prac9)</p> <p>“<i>Especially in moving onto moving to work on [the PI’s] PhD in Australia [...], I think that cross-pollination of knowledge around the world is also another level of [the PI’s] contribution to bring in insights from different parts of the world to the British Columbia context</i>” (Res1)</p>	<p>H</p> <p>Realized, clear project contribution</p> <p>The PI has received full funding for a PhD exploring gender and leadership in the avalanche industry starting in June 2019</p>
Academic Pathway			
Other researchers become aware of the research [intermediate outcome]	The PI was successful at increasing the awareness of the GLWFP across researcher and practitioner spheres by presenting at conferences throughout the research process, including the Wildland Fire Canada conference in 2016 where the PI won the award for best student presentation (Prac12, Prac9). Informants who attended the conference suggested that they were surprised to hear the GLWFP discussed at national conferences as the topic was not one to be discussed on this scale previously (Prac12). The presentation at the Wildland Fire Canada conference in 2016 increased awareness of the topic and supported the creation of the gender forum, though this is only speculation (Prac12). Since this presentation in 2016, there has been increased discussion on the topic at different conferences across Canada with the introduction of the ‘Panel Pledge’ to ensure both males and females are represented on panels and submitting questions at conferences (Prac12). Other informants stated that conversations with the PI inspired them to explore the topic of gender, including understanding the complexities and exploring elements of gender and leadership they had not been aware of previously (Prac17, Prac21). The GLWFP, along with the increased sharing of first-	<p>“<i>In 2016, [the PI] presented [their] work at the Wildland Fire Canada conference [...] [the PI] won for the best presentation. I remember as I was another student there and I was impressed that [the] topic had been chosen and really surprised that this was all of a sudden something that we were talking about. Prior to [the PI] coming in 2016, there wasn’t really any mention of this [...] it was the first time that people were talking about [the topic]</i>” (Prac12)</p> <p>“<i>What we have been fighting for in the police world is a stronger relationship with academia because there is a gap there. So, for example when [the researcher] sent out the email with the invite to talk to you and you mentioned [the PI’s research], neither [my colleague] nor I had ever heard of it and that’s very common</i>” (Prac15)</p> <p>“<i>Before I went to [WTREX], I actually wasn’t interested in gender as a topic to do research in for myself, and I would say partly 60 percent of the conversations of hearing the women there made me think this is actually more interesting and complex and critical than I thought it was. And then conversations with [the PI] 40 percent of understanding the complexities and the different ways</i></p>	<p>H</p> <p>Realized, clear project contribution</p> <p>Researchers within the practitioner and academic spheres have become aware of the GLWFP through the PI sharing knowledge at conferences, through professional networks, and by publishing</p>

	<p>hand experiences within the industry, led some informants to pursue further research on the topic of gender and leadership (Prac17). Informants working at other high-risk occupations became aware of the GLWFP due to the professional networks built with the PI (Prac10). The GLWFP solidified their own perceptions about the topic and gave other risk-management organizations the opportunity to complete their own research on the topic through using new perspectives presented by the PI (Prac10). Informants were also aware of the PI publishing work on the topic which is increasing attention to the issue and providing more evidence of cultural issues and challenges faced by women in fire (Prac11, Res2). The topic of gender and leadership in wildland fire is an under studied field, so by adding another case study to evidence, the GLWFP has expanded the field of research (Res1). The GLWFP has laid a framework and base for future work on the topic to reference (Prac21). Informants have referred other researchers who are interested in exploring the topic to the PI which has resulted in other researchers referencing and citing the GLWFP within their own work (Prac21, Res3). Other researchers have become aware of the GLWFP due to the MAL program using the project as an example in future cohorts (Res1). Researchers in risk-management organizations outside of wildland firefighting have become aware of the GLWFP and noted that the PI was successful at implementing change through the project (Res1). Other students in the MAL program have been inspired by the GLWFP to create change within a difficult context and transfer lessons to their own field of research (Res1).</p> <p>Due to the relatively small number of academics who work in the field of gender and leadership in wildland fire, researchers suggested that they draw on each other's knowledge and case studies to share the work to a wider audience (Res2). For example, some researchers have used their senior positions within the academic world to share the PI's findings and ensure that the research is heard by a larger audience to contribute to gradual changes towards a more inclusive culture (Res2). However, some researchers in organizations such as police and municipal firefighting stated that they are unaware of the GLWFP and have not heard of the PI (Prac15). It is suggested that there should be a stronger relationship between the practitioner and academic spheres due to a gap in knowledge exchange (Prac15).</p>	<p><i>of thinking about it and the different ideas made me more interested in trying to pursue"</i> (Prac17)</p> <p><i>"As far as I can tell this is an under-studied area, so in providing yet another case study [the PI] has expanded the field"</i> (Res1)</p> <p><i>"[The MAL program] use [the PI's] thesis as a sample. So, a number of people have approached me based on the [PI's work] because they can see that [the PI] accomplished something successful [...] [the PI's] reputation is getting around. Other students in [the] program know about [the PI] [...] people are becoming aware of [the PI's] work simply through [the] program alone and then [the PI's] reputation in the field is spreading through the presentations that [the PI] is doing because [the PI] is actually achieving change that others are witnessing"</i> (Res1)</p> <p><i>"[The PI] has made a real effort to disseminate the findings both in person through presentation, but also through different written outlets. So, [the PI] has initiated writing up the results as peer-reviewed publications and academic journals"</i> (Res2)</p> <p><i>"Because of the relatively small number of academics who work in this area, often there is the opportunity for [researchers] to draw on each other's knowledge and case studies. For example, [researchers use their] position[s] in the academic world to also present on [the PI's] findings to distribute the knowledge that [the PI] contributed to this particular discipline which means that the message gets heard by a bigger audience"</i> (Res2)</p> <p><i>"I think [the PI's] methodology and [the PI's] commitment to the research has been both inspirational; and insightful for [researchers]"</i> (Res2)</p>	<p>articles on the findings.</p>
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Other researchers/students use research and take-up new questions on gender and leadership [high-level outcome]	Informants suggested that other students in the MAL program at RRU are taking up new questions focusing on the male dominated culture of firefighting (Res1). The GLWFP inspired researchers to look at new areas of the topic and was influential to others researching similar issues (Prac21). For example, the GLWFP supported other researchers in gaining access to new modes of inquiry and revealed that it is possible to interact with new groups in ways that is valuable and constructive (Prac21, Res3). Researchers suggested that the GLWFP was a key element, along with having discussions with female firefighters about their personal experiences, to include gender as an element within their own research (Prac17). The GLWFP contributed to a growing number of case studies exploring the topic of gender in wildland fire by the international wildland fire community (Res2). These case studies are contributing to the discussion and demonstrating the need and urgency for leadership change (Res2). The GLWFP, as well as other research from well-known scholars studying the topic, were the key implementing factors and leverage to raise awareness of the topic and for others to take the issue seriously (Prac9). Informants suggested that they have referred the GLWFP to other researchers who are interested in exploring the topic; this has led to the GLWFP being referenced in other research projects (Prac21). However, some informants suggested that they personally have not had much success exploring the topic as yet (Prac17).	<p>“[the GLWFP] <i>has been very influential and has helped me gain perspective and gain access to whole group of people that I would have just written off as worth talking to. [The PI] has shown [researchers] that it is possible to interact and get some values out of those conversations if you are able to do it well</i>” (Prac21)</p> <p>“[Other MAL students] <i>see how [the PI] was able to create change within that difficult context and [are] being inspired by what [the PI] did and being able to transfer those lessons to their own context</i>” (Res1)</p> <p>“<i>Gender is just a huge topic that is hard to tackle, hard to talk about, hard to gain research samples. So, [the PI’s] research has been really relevant in gaining access to some of those topics and then there are linkages to mental health and other aspects in my research that have been helpful</i>” (Res3)</p> <p>“<i>Most of my research is related to mental health and health behaviors, and I think that gender is absolutely a part of that within wildland fire and I cited [the PI] within my dissertation and I think relative to the topic of suppression or avoidance of the expression of emotion that was specific to some of the factors that I was looking at in my study. Although there isn’t research yet in wildland fire populations that really links those factors to mental health outcomes, I think those links likely exist and are worthy of exploration</i>” (Res3)</p> <p>“<i>I think [the PI] pretty much if anything inspired me to look into things that I hadn’t looked at</i>” (Prac21)</p> <p>“<i>I have already referred [the GLWFP] to somebody; there was somebody that contacted me doing research on how contractors are treated as separate within the wildland fire service, and I said, ‘Oh my gosh, you have got to see this other research!’ So, this person, a lot of their research is referencing [the PI’s work]” (Prac21)</i></p>	<p>M</p> <p>Realized, clear project contribution</p> <p>Evidence shows that the GLWFP inspired researchers at students to explore the topic and take-up new questions on gender and leadership.</p>
Accumulation of knowledge influences the practice of organizations [high-level outcome]	The GLWFP was the start of the conversation on gender and leadership in wildland fire within the province (Prac12). The GLWFP has contributed to building a library of work on the topic that organizations and individuals can turn to in order to justify their efforts, to support their search for funding, or support their search for sponsorships and new partnerships (Prac11). If the GLWFP had not been conducted, there would be one less resource for organizations to turn to for justification of future efforts on gender and leadership in wildland fire (Prac11). Research that provides meaningful data is an important part of organizational change to support the shaping of decisions (Prac19). The PI was successful at shedding light on a topic that	<p>“[The GLWFP has contributed to] <i>building this library of work that we can point to in order to justify our efforts when we look for funding, or when we look for sponsorships or gain new partnerships</i>” (Prac11)</p> <p>“<i>If [the PI] hadn’t done this work then it is just one less resource that we have to point to in order to understand and justify our efforts. So, it is important work, but I wouldn’t say that [the GLWFP] has changed the course of my program or the work that I lead here</i>” (Prac11)</p> <p>“<i>My hope is that the knowledge, when the director of the organization hears that 80 percent of women who respond to a survey experience discrimination at work, hopefully that</i></p>	<p>H</p> <p>Partially realized, unclear project contribution</p> <p>There is conflicting evidence to suggest that the accumulation of knowledge</p>

	<p>is not well understood within the BCWS and is a difficult topic internally to the organization (Prac19). Informants hoped that when organizational leaders hear the statistics on the number of women who experience discrimination at work, this knowledge will be translated into decision making and changes within the organization (Prac14). Some informants suggested that organizational change is happening due to increased knowledge and sharing of workplace incidents, through culture change, and through the work completed by the PI which brought visible numbers and statistics to gender and leadership within the industry (Prac2). Due to collaborating with the PI, other high-risk occupations now have a strategic plan moving forward and have established a committee to focus on professional development (Prac16). The accumulation of knowledge supported by the PI's work have influenced the organization to continuing to have conversations on the topic and take action based on the findings (Prac16).</p> <p>However, in terms of the BCWS, the GLWFP results provided a negative outlook on the organization (Prac19). Others suggested that there is the perception of not knowing the appropriate response which is stalling organizational change (Prac9). Some informants noted that there have not been any significant initiatives or hiring changes based on the knowledge presented within the GLWFP (Prac14).</p>	<p><i>knowledge translates into decision making and changes within the organization. That's my hope, but like I said, I haven't seen any significant initiatives or hiring changes, or things like that"</i> (Prac14)</p> <p><i>"[The organization] need[s] to conduct more analysis and studies of [the] workforce and try and look for opportunities to strengthen and improve it and with research that provides [the organization] with meaningful data it is an important part. And it is probably one of the gaps that [the BCWS] have as an organization is that [the organization] don't always have good meaningful information that can help shape decisions [...] [The PI] shed light on a topic that isn't well understood and obviously has some perceptions around it when it was brought forward. So, I think [the PI] was presenting a difficult topic internally, and the results that [the PI] presented provided a negative outlook on the organization which is not always easy to see especially something in academic literature that paints [the organization] in a not so favorable light. So, it is a tricky topic and that was probably one of the biggest challenges for [the BCWS] was seeing the information and the outcome of [the GLWFP]"</i> (Prac19)</p> <p><i>"I think [change] is coming forwards through workplace incidents, through a change in culture, and of course the work that [the PI] did brought us visible numbers, here are some statistics from your own association, from your own industry [...] And I think that helped galvanise action [...] what [the PI] did was give us some really good hard look at our industry and that motivated the four organizations to get together to say ok, this is our industry we are talking about and we want to make sure that this culture change happens [...] And so that's been helpful for us to focus on next steps and future goals, here's some steps but what is it we are actually aiming for"</i> (Prac2)</p> <p><i>"I think there is a little bit of a laissez-faire shoulder shrugging going on, [not knowing the next steps] and just the appropriate response. We shared all of these papers and background around and so our leaders or upper-level management, they shared those papers too, but it seems like they think 'oh here, I shared these papers around, that must mean that the problem is fixed', and that's not really true"</i> (Prac9)</p>	<p>through the GLWFP influenced the practice of the BCWS.</p>
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Appendix 7. References

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