Biologists Canada: A plan to create a national organization to engage with conflicts in regulation of the practice of biology

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Executive Summary

The College of Applied Biology, the legislated body responsible for the regulation of applied biology in British Columbia, engaged the researcher to develop a plan to create a mechanism to address a number of ongoing and potential conflicts in the regulation of applied biology. The mechanism to be created was a national organization, called Biologists Canada, which would assist both provincial regulators of applied biology as well as members of the profession in other regions of Canada. Regulation of applied biology is still developing provincially across Canada; therefore, services Biologists Canada could offer have a tremendous opportunity to prevent further conflicts.

The researcher conducted a collective case study of national organizations of other natural resource professions. The researcher, in consultation with the College, focused the investigation on central themes in order to gain understanding to inform recommendations to the College. The researcher investigated how case study organizations: developed and maintained national standards in their profession; determined membership structure, governance, involvement and funding; accredited academic programs; and, engaged external stakeholders in the pursuit of organizational goals.

The researcher reviewed publically available documents published by case study organizations and interviewed senior representatives of case study organizations to investigate themes. The researcher noted common and successful practices and then contextualized them with realities specific to the field of applied biology to determine recommendations. Recommendations were prioritized based on effective use of limited resources.

The research project developed many recommendations; a summary of recommendations appears below. Additional information regarding the recommendations is contained in section 11.0 of the report.

Summary of Recommendations

Those responsible for establishing Biologists Canada should:
- focus resources and efforts towards the creation and operation of a Biologists Canada Accreditation Board;
- employ a governance structure that includes national and sector representation utilizing a consensus-based approach to decision making. See Appendix 13.3 for a sample membership representation diagram;
- design a stakeholder consultation process to develop a national registration guideline for entry into and ongoing practice in the profession of biology. See Appendix 13.5 for a suggested consultation process; and
- develop services and practices aimed at representing the interests of provincial regulators, emerging sectors and the profession to national and international audiences.

Table of Contents

Definitions

All definitions provided are intended to inform how the author has used the terms or concepts in this research. Alternative definitions may exist.

Accreditation: the process by which an organization assesses and evaluates an academic program to ensure education will provide graduates with necessary knowledge, skills, experiences and/or competencies necessary for entry into a profession.

Applied Biology: the application of applied biological sciences including the collecting or analyzing inventories or other data or carrying out of research or assessments, to design, evaluate, advise on, direct or otherwise provide professional or technical support to projects, works undertakings or field practices on public or private lands, but does not include pure scientific research or teaching. (College of Applied Biology Act, 2002, Section 1.1)

Certification: the process by which a regulator attests that an individual applicant is competent to practice their respective profession based on comprehensive criteria. Certification is ongoing.

Consultation: the process in which feedback is obtained regarding an issue from stakeholders.

Licensure: the process by which a regulator attests that an individual applicant is competent to practice their profession in a given jurisdiction and authorizes them to do so. Right-to-practice regulators often use licenses and not registration or certification to attest a professional's competence. The license confers a right to practice.

Registration: the process by which a regulator attests that an individual applicant is competent to practice their respective profession by adding their name to an official register upon acceptance. Often used in conjunction with a protected professional title, such as Registered Professional Biologist.

Stakeholders: those who have a stake in or care about the outcome of a conflict or dispute; can be active parties who have a direct stake or secondary parties who have an indirect stake (Burgess, 2004).

Acronyms

Canadian Council of Technicians and Technologists (CCTT)
Canadian Federation of Professional Foresters Associations (CFPFA)
Canadian Forestry Accreditation Board (CFAB)
Canadian Institute of Forestry (CIF)
Canadian Technology Accreditation Board (CTAB)
College of Applied Biology (the College)
Engineers Canada (EC)
Engineers Canada Accreditation Board (ECAB)
Engineers Canada Qualifications Board (ECQB)
Technology Accreditations Canada (TAC)
Technology Professionals Canada (TPC)

1.0 Introduction

In Canada, many professions are regulated; a body responsible for regulation has established standards for entry and practice in the profession. Regulation in this sense exists in the public interest to ensure that those practicing are and continue to be competent in their area of practice. Professionals are relied upon for their expertise in making decisions that, if incorrect, have the potential to cause harm. For example, if an engineer is not competent in his/her work then it is possible a structure could fail and cause harm. Beyond competence, professionals are required to "maintain a standard of personal and professional conduct that does not reflect adversely on the College or its members" (College of Applied Biology Code of Ethics, 2012, Principle 7). Therefore regulation exists to ensure both the competence and conduct of professionals.

The profession of biology was granted self-regulating status in the province of British Columbia (BC) through the *College of Applied Biology Act 2002*, which established the College of Applied Biology (the College) to regulate the profession (College of Applied Biology, 2012). The researcher noted that through its experience, the College has encountered a number of regulatory issues that exist in the Canadian context such as lack of: regulation in many provinces; consistency amongst those provinces that do regulate; support for provinces and professionals seeking the benefits of self-regulation; public, professional and academic awareness as to the practice of applied biology; national and international mobility of applied biology professionals due to inconsistent or absent Canadian regulation; and, engagement with academic bodies regarding foundational elements necessary to achieve professional registration. In order to address many of these issues and prevent further conflicts the College approached the researcher to create a mechanism with which many of these issues could be better addressed.

The researcher, in consultation with the College, embarked on a project to establish a plan to create a new national organization, to be called Biologists Canada, to represent the profession of biology as a means to engage with these issues. The purpose and mandate of Biologists Canada would be to support and assist provincial regulators of applied biology as well as qualified practitioners across Canada in voicing and representing the profession to a national audience. Therefore, the central research question of the project was: What is the approach recommended for establishing a national organization, Biologists Canada, aimed at determining and promoting a common standard of conduct and practice in applied biology?

Two component research questions were also identified. How could Biologists Canada account for a power imbalance in membership in a way that is complementary to its organizational goals? What would be the best strategies for engaging in dialogue with stakeholders in order to achieve organizational goals? In answering these questions, the deliverable for the client was a set of prioritized recommendations regarding how the College should proceed in developing such an organization as well as the role and function of such an organization.

The following report provides the answers to these questions and is organized as follows. Background and context is provided regarding the College, natural resource professional regulation, and the conflicts that exist within the profession, with which Biologists Canada will proactively engage. A review of literature is presented which connects the project to existing literature, connects the reader to social science and dispute resolution concepts being applied to the research, and connects the research project to the field of dispute resolution. Next, a research design is presented which articulates the paradigm, methodology, methods and rationale regarding the choices made in answering the research question. The methodology section also highlights the strengths and weaknesses of such choices. Findings are then presented and discussed according to key themes. Finally, prioritized recommendations are presented that integrate thematic recommendations with the context and realities of the College to offer a viable plan to establish Biologists Canada.

2.0 Background and Context

The following subsections present background and context that is necessary to grasp in order to understand the: mandate of the College, the regulatory environment in Canada, the profession of biology, regulatory conflicts, and the potential value of Biologists Canada.

2.1 The College of Applied Biology and Relevant Legislation

The College is governed by the *College of Applied Biology Act*, which came into effect in 2003 (College of Applied Biology Act, 2002). The Act was the first legislation of its kind in North America and is the first time applied biologists have been granted full professional status through self-governing legislation. Applied biology means,

> The application of applied biological sciences including the collecting or analyzing inventories or other data or carrying out of research or assessments, to design, evaluate, advise on, direct or otherwise provide professional or technical support to projects, works undertakings or field practices on public or private lands… (College of Applied Biology Act, 2002, Section 1.1)

Applied biology, as defined by the College, does not include pure research or teaching. Examples of applied biology include creating and maintaining vegetation and wildlife inventories, undertaking contaminated site assessments, and completing impact assessments for development projects.

The profession of biology is also regulated in Alberta. The Alberta Society of Professional Biologists (ASPB) regulates the profession and is established by the *Professional and Occupational Associations Registration Act of Alberta.* The ASPB defines the practice of biology in the *Professional Biologists Regulation* as,

> (i) inventorying, surveying, sampling, interpreting, reporting, evaluation and advising on activities related to biological sciences,
>
> (ii) preparing, administering and implementing plans or programs for managing biological resources
>
> (iii) conducting research activities related to biological sciences, and
>
> (iv) teaching biological sciences at a university, college or technical institute (2002).

The ASPB definition of the profession of biology includes teaching whereas the College definition does not.

The College sets conduct and performance standards to which members are held accountable; ensures the competence of their members through compulsory rules for Continuing Professional Development, audits, investigations and procedures; and, evaluates and comments on legislation pertinent to the purpose of the College from an apolitical perspective (College of Applied Biology, 2011).

Therefore, self-regulation of applied biology by the College creates input and output standards for the profession. Input standards are those qualifications that are necessary to enter the profession such as education, work experience, and competency (Green & Hrab, 2003). The College enforces their input standards through established bylaws, staff screening and committee oversight and approval. Output standards are the practice, conduct and behaviour of the professional following entry into the profession (Green & Hrab, 2003). The College monitors and enforces their output standards through audits, ongoing requirements for CPD, investigations, and discipline processes. Through establishing and enforcing these standards the College is fulfilling its mandate to protect the public and the public interest with respect to the profession of biology.

The College is an organization mandated to protect and respect the public interest, as opposed to a member interest organization that is concerned with pursuing the members' personal and professional interests within the profession (College of Applied Biology Act, 2002). The difference is key and informs the values, purpose, and approach of the organization. Whereas a member interest organization is solely responsible to their membership in demonstrating value to the member, a reason to join and to continue membership, a public interest organization must rank the public interest above all others and hold its membership to account in the interest of the public.

The College regulates the profession utilizing right-to-title as opposed to right-to-practice regulation. Some professionals, such as physicians, lawyers and engineers, are regulated by right-to-practice legislation, which means that in order to practice in a given province the professional needs to be licensed with the regulatory body. Simply put, if an engineer wants to practice engineering in British Columbia (BC) they need to be registered as a Professional Engineer in BC (Professional Engineers and Geoscientists of BC, 2011). There is no way to bypass the need for registration, nor is there a strong need for the regulating body to demonstrate to its members that membership is valuable.[1] Applied biology, on the other hand, is regulated in BC by right-to-title legislation, which means that in order to use the title "Professional Biologist" the practitioner must be registered with the College (College of Applied Biology Act, 2002). If the biologist is not registered with the College they can still work as a biologist; however, they cannot claim to be a professional, nor can they engage in certain activities, that under provincial legislation require membership in the College (Forest Planning and Practices Regulation, 2004). One effect of this difference, with respect to this research, is that there is an organizational need to demonstrate the value of membership to current and potential members; Biologists Canada will assist the College in this endeavour.

Because professional self-regulation is within provincial jurisdiction (*Constitution Act*, 1867), there is no legal authority to create a national regulator of a profession. There is, however, clear value in national professional standards; therefore, national organizations exist that dialogue with provincial regulators to promote a common standard. There is no

[1] This is not to say that right-to-practice regulators do not have to demonstrate value to their membership; however, for reasons discussed later, the need is not as strong as right-to-title regulators.

such organization for applied biology, and Biologists Canada will attempt to address this gap.

In attempting to promote a national standard and assist in inter-provincial professional mobility, the federal and provincial governments and the Government of Canada have entered into agreements containing provisions for equal recognition of provincial professional certification, licensure or registration. The College has had experience operating in such an environment as the Government of British Columbia entered into the *Trade, Investment and Labour Mobility Agreement with the Government of Alberta 2006* and the *New West Partnership Trade Agreement 2009* with the governments of Alberta and Saskatchewan. Article 13.1, of Section C, of the New West Partnership Trade Agreement states:

> Any worker certified for an occupation by a regulatory authority of a Party shall be recognized as qualified to practice that occupation by the other Parties. (2009, P. 3)

Furthermore, the Government of British Columbia is a signatory of the *Agreement on Internal Trade 1995,* which is an inter-governmental agreement between the governments of the provinces and territories and the Government of Canada. Chapter 7 of the agreement concerns labour mobility and its purpose is to,

> …ensure that any worker certified, licensed, registered or officially recognized in one province or territory, upon application, will be certified, licensed, registered or officially recognized for that same occupation by any other province or territory without the worker being required to undertake any material additional requirements, such as education, training, examination, or assessments. (AIT Questions and Answers, 2012, p. 1)

These various agreements mean the College must accept registered professional biologists from provinces across Canada. Currently, Alberta is the only other province that regulates the applied biology profession; however, the provinces of Manitoba and Saskatchewan have expressed interest in regulation. As the applied biology profession grows, the BC College of Applied Biology may have to accept newly registered professional biologists coming from jurisdictions with different and possibly inferior registration requirements.

2.2 The Applied Biology Profession, Regulatory Issues and the Value of Biologists Canada

The College finds itself in an interesting position within the regulatory environment in North America as it is both spearheading the development of applied biology regulation within Canada and being looked to by other provinces for guidance within the field. More specifically, practitioners in Manitoba are looking at the College model and assessing its applicability to their province.

The College is entrusted with protecting the public interest with regard to the profession of biology. The College must proactively identify ways to best serve the public interest.

Biologists Canada has been identified as the vehicle with which the public interest can be best served and protected by creating a consistent national standard for entry and practice in the profession; which will in turn, increase competence and create increased public trust in the profession. This is important as professionals are relied upon for their expertise in making decisions that have the potential to cause harm. Therefore, Biologists Canada will be of value to the public across Canada, in establishing and promoting standards that do not currently exist, but in the public interest, should exist.

As noted, professional regulation is a provincial matter (*Constitution Act*, 1867). The profession of biology, however, extends beyond provincial borders. Applied biology work is conducted across Canada and in other countries. Large-scale projects often traverse lines of jurisdiction. Furthermore, applied biology professionals often work in many jurisdictions throughout their career; differences in regulation can make professional mobility difficult. The result of provincial jurisdiction is that inconsistent and varying standards can and do develop in different regions. These inconsistencies are a growing problem for applied biology regulation and the public.

From the perspective of the College, the inconsistencies can lead to decreased mobility of professionals, longer and more arduous registration processes, and compromised capacity to establish and enforce standards. Moreover, the College is subject to additional legislation such as the *Trade, Investment, and Labour Mobility Agreement*, which contains provisions for mutual professional qualification recognition. Therefore, under this agreement the College must accept applicants deemed to be Professional Biologists from Alberta as equivalent to those deemed to be Registered Professional Biologists in British Columbia. The problem is that the Alberta standard is less rigorous[2] than the College's and many applicants who have failed to meet the College standard have used the trade agreement to gain entry to the College. This is a problem for the College and interferes with the organization's ability to fulfill its public interest mandate. Furthermore, as discussed, there is evidence that provincial trade agreements will expand to include more provinces.[3]

Therefore, it is in the interest of the public to ensure that other provinces, which are in the process of developing provincial applied biology self-regulation, adopt the same standard as the College. The College will have to be able to inform and engage with governments, professional societies, academic agencies, industry, and professionals, as all groups are vital to creating self-regulation legislation. The College would like to create a national body that can coordinate and facilitate efforts to develop absent provincial regulation and

[2] The College of Applied Biology requires a written scientific report to demonstrate certain professional competencies related to design and operation of a project (College of Applied Biology Rules, 2011, Section 1.3). The ASPB does not have this requirement and instead requires a resume (ASPB, Eligibility for Membership, 2012). Furthermore, due to differences in legislative structure, ASPB course requirements exist in policy rather than rules: therefore, the ASPB has discretion to allow exceptions, whereas the College does not.

[3] *The New West Trade Partnership Agreement* is a legislated agreement involving BC, Alberta and Saskatchewan, which builds on the *Trade, Investment, and Labour Mobility Agreement* that exists between British Columbia and Alberta. Therefore, it is reasonable to assume that over time the agreement will be expanded further to include more provinces, such as Manitoba.

national standards. Furthermore, a separate body is needed to avoid the perception that the College is exceeding their mandate and jurisdiction.

From the perspective of an existing applied biology professional, establishing a national organization to facilitate a common standard in applied biology has tremendous value. First, the aims of the organization will essentially brand the practice of applied biology and provide greater awareness of what an applied biology practitioner is, and importantly, what they are not – e.g. a forester or agrologist. This will provide value in highlighting the specific skills and competencies a professional biologist can provide for employers. Second, a common standard of applied biology practice will provide greater employment opportunities by facilitating greater professional mobility both nationally and internationally.[4] Finally, the national organization will provide value, via membership, to practitioners in provinces that do not currently have provincial regulation.

From the perspective of an emerging applied biology practitioner, the national organization would provide the platform with which to dialogue with academic institutions to ensure that: the foundational practices and methods of applied biology are protected, the needs of the profession are reflected in academic training, and, eventually, programs can become accredited for professional registration. Accreditation could clarify and streamline the registration process and result in efficiencies for regulators.

From the perspective of an applied biology professional with international credentials, the national organization would provide a specialized source of information for international professionals looking to work in Canada. Furthermore, the national organization may, in the long term, be able to broker mutual recognition agreements, on behalf of provincial regulators, with other countries. These mutual recognition agreements would assist internationally trained practitioners to achieve registration in Canada and allow Canadian industries to be more competitive when working abroad.

2.3 Background of Case Study Organizations

The following case study organizations were chosen because they operate nationally across Canada, are profession oriented[5], and represent natural resource professions. The organizations were chosen to provide a representation of organizations that would be similar to Biologists Canada and operate within similar contexts, such as Canadian legislation and agreements.

[4] In the international context, the College has brokered mutual recognition agreements between comparable regulatory regimes in other countries. This process is difficult within Canada as regulation is provincial rather than federal jurisdiction. Therefore individual agreements need to be created for each province, which further complicates an already complicated task.

[5] As opposed to issue or member oriented. The organizations represent the profession, which operates in the public interest.

2.3.1 Engineers Canada

Engineers Canada was established in 1936 as the national organization of the provincial and territorial associations that regulates the practice of engineering in Canada, these associations are its sole members. The organization serves its members by delivering national programs that "ensure the highest standards of engineering education, professional qualifications and professional practice" (EC About Engineers Canada, 2012, para 1). The organization accredits Canadian undergraduate programs, develops national guidelines, and acts as a voice for member organizations to national and international audiences (EC About Engineers Canada, 2012).

2.3.2 Canadian Federation of Professional Foresters Associations

The Canadian Federation of Professional Foresters Associations was established in 1982 by the provincial professional forester associations of Canada, the Canadian Institute of Forestry and the Canadian Forestry Accreditation Board. The federation acts as an advocate for matters "identified by its member agencies as having national importance or consequence" (CFPFA Certification Standards, 2008, p. 3). The federation provides a forum for members to communicate regarding matters such as certification or academic standards for accreditation (CFPFA Certification Standards, 2008).

2.3.3 Canadian Forestry Accreditation Board

The Canadian Forestry Accreditation Board was established in 1989 by existing provincial professional forester associations and the Canadian Institute of Forestry with support from the Association of University Forestry Schools in Canada (CFAB About Us, 2012). The Board's sole purpose is to accredit Canadian post-secondary forestry programs to ensure that programs meet or exceed educational standards acceptable for registration with provincial professional forestry associations across Canada (CFAB About Us, 2012).

2.3.4 Canadian Institute of Forestry

The Canadian Institute of Forestry was established in 1908 to be the national voice of forest practitioners, which includes all professions with a professional interest in forestry. The institute's mission is to provide national leadership in forestry, promote competence of practitioners, and foster awareness of various forestry issues (CIF Governance, 2012). The institute also represents provinces and territories that do not have professional forestry regulation, and does so through membership with the Canadian Forestry Accreditation Board and the Canadian Federation of Professional Foresters Associations.

2.3.5 Technology Professionals Canada

Technology Professionals Canada was established in 2010 as a partnership between the professional technology associations of Alberta, British Columbia, Ontario, and Saskatchewan. The partnership works together to deliver "accreditation, professional

registration and accountability in service to the public and members" (TPC About TPC, 2011, p. 1).

2.4 Conclusion

Given understanding of the College's mandate, the profession of biology, and legislative and regulatory issues, a clear value for Biologists Canada has been demonstrated. With this in mind the researcher endeavoured to create a plan to develop Biologists Canada and in doing so selected analogous case study organizations to examine. A brief introduction was presented to gain understanding as to the purpose and function of each organization.

The following section provides a literature review of dispute resolution and multi-disciplinary concepts that will guide and inform the research. Together, section 2.0 and 3.0 aim to provide the necessary context to understand and ground the research.

3.0 Literature Review

The purpose of this literature review was threefold. First, discussion is presented outlining the process the researcher used to locate analogous research and understanding gained from that research. Second, dispute resolution concepts are presented to ground the research in the dispute resolution discipline. Third, multi-disciplinary concepts, such as social power and stakeholder engagement, are explored in order to develop principles to guide the research.

3.1 Literature Search

The researcher searched various online databases utilizing University of Victoria's search engine Summon using key words or a combination of key words relevant to the research project. Summon is an advanced search engine that searches through the University's digitized collections, citations and in print text to assist the research in locating desired literature (What is Summon, 2012). The researcher used the following key words singularly or in combination: profession, professional, association, organization, regulation, self-regulation, power imbalance, membership, national, federal, and standards. The search was conducted to find relevant literature that would provide the researcher with an understanding of similar approaches or methodologies used in analogous research. However, very little literature or information was found that applied to the context of this research.

The only literature of application was a report conducted for Technology Professionals Canada by the Canadian Standards Association (CSA) entitled Canadian National Accreditation Program for Technology Education Programs (CSA Report, 2012). Interestingly, the report utilized a similar methodology as used in this research to determine recommendations regarding the establishment of a national accreditation program.

The following sections aim to explore dispute resolution concepts to gain understanding regarding the concepts and their application to this research project, and explore other multi-disciplinary concepts that are relevant to determine guiding principles, which are presented in section 3.5 of the report.

3.2 Dispute Resolution Concepts

The following subsections aim to explore dispute resolution concepts that were central in identifying conflicts that affect the College. Furthermore, dispute resolution concepts also inform the approach utilized in this research project to address many of these conflicts.

3.2.1 Conflicts and Disputes

Conflict is a divergence between two or more party's beliefs, goals, objectives, attitudes, standards, needs and/or expectations (Chicanot & Sloan, 2009). A conflict is a disagreement or incompatibility that are recognized by the parties involved (Mayer,

2000; Yarn, 1999). In essence a conflict is a recognized difference that "touches" those involved in a significant way (Lebaron & Pillay, 2006, p. 12). Parties involved could be two individuals or two nations. Equally, the scope of the disagreement could be as small as a disagreement between a romantic couple regarding where to live or as large as multiple states disagreeing as to the management of a river.

Conflict can be conceptualized as a state in which the parties exist (Yarn, 1999). This concept helps to distinguish between conflicts and disputes (Yarn, 1999). If conflict is a state of disagreement, then a dispute is a manifestation of that conflict (Chicanot & Sloan, 2009). A dispute is a symptom due to the existence of conflict (Yarn, 1999). For example, a conflict may exist, such as a disagreement with regard to acceptable standards to regulate the biology profession, and a dispute may emerge as an event, such as a verbal disagreement between regulatory bodies or arguments between regulator staff and frustrated applicants who are denied entry.

Just because a conflict is present does not mean that a dispute will occur; however, existence of conflict means there is a potential for disputes (Yarn, 1999). Similarly, just because a dispute has not been identified does not mean conflict does not exist and is not doing harm. Conflicts and disputes can cause harm and expend unnecessary resources. Resolving conflicts and disputes often requires additional resources to be expended. Therefore, there is a value in engaging with the sources of conflict to try to resolve the issue and prevent further disputes.

3.2.2 Conflict and Dispute Prevention

Conflict and dispute prevention can be defined as actions taken to prevent a dispute from occurring or proactively "managing disputes to avoid unnecessary costs and delays" (Pirie, 2000, p. 49). The central idea is to prevent the incompatibilities or disagreements that constitute a conflict from occurring and thus avoid potential for future disputes (Yarn, 1999).

Conflict/dispute prevention is a broad concept and much literature regarding the idea is centred upon the idea of preventing extreme conflicts that result in violent disputes and war (Ackermann, 2003). However, the value of conflict prevention has been accepted by the international community and has application to many contexts (Ackermann, 2003).

Prevention focuses on engaging with a conflict at its early stages in order to prevent a dispute from emerging (Lund, 2002 as cited in Ackermann, 2003). The scope of preventative engagement can be small or large, which is to say engagement can be short-term and focus on avoiding immediate disputes, such as armed conflict, or can be long-term in approach and address structural issues that are central to the conflicts existence, such as lack of national standards in a regulatory environment (Ackermann, 2003).

3.2.2.1 Conflict Prevention and Biologists Canada

This research project is an application of the above dispute resolution concepts. The purpose of the research project is to develop a plan to build a mechanism with which to address conflicts identified by College staff and the researcher.[6] The intent of this mechanism, a national organization called Biologists Canada, is to engage with current conflicts, such as a divergence in and/or absence of national regulatory standards in the profession of biology. The mechanism is long-term in its approach addressing structural issues, which underpin current conflicts and provide the potential for disputes.

3.3 Multi-disciplinary Concepts

The following concepts are referred to as multi-disciplinary concepts because they have had application in a number of disciplines. For example, the concept of social power has been considered in dispute resolution, sociology, and psychology. Therefore, it would not be accurate to describe these concepts as dispute resolution concepts. However, each concept has been used and applied in dispute resolution literature.

3.3.1 Social Power

The College has stated to the researcher that they are concerned about a possible power imbalance that could occur in the membership structure of Biologists Canada. While no membership structures were pre-determined, the College stated that the organization would have to consider membership structures that allowed for broad inclusion of practitioners from across Canada. Therefore, in order to ensure the College's needs are met in this regard, the researcher decided to explore literature relating to social power in order to generate a principle to guide research.

Power is a ubiquitous term that is used in a variety of literature but is often undefined. Social power, as opposed to economic or political power, engages with personal and group relations. Social power is important when considering membership structures of organizations, which creates a relationship between groups of individuals.

Power is not something that is possessed but something that exists among people (Dahl, 1957). To say that a person has power is meaningless unless you specify over whom they have power (Emerson, 1962). Therefore, power is better conceptualized as social power. A simple expression of this relationship would be:

> *A* has power over *B* to the extent that he can get *B* to do something that *B* would not otherwise do. (Dahl, 1957, p. 202-03)

[6] As mentioned, conflicts that have been identified by the College include lack of: regulation in many provinces; consistency amongst those provinces that do regulate; support for provinces and professionals seeking the benefits of self-regulation; public, professional and academic awareness as to the practice of applied biology; national and international mobility of biology professionals due to inconsistent or absent Canadian regulation; and, engagement with academic bodies regarding foundational elements necessary to achieve professional registration.

The magnitude or capacity of a person's power is related to the degree to which the other person is dependent upon them (Emerson 1962). Simply stated, if someone heavily relies upon someone for something, e.g. employment, service provision, care, etc., the person upon whom they rely will have more power. Furthermore, if the person who is dependent does not have alternatives to achieving these goals, then the power asymmetry will be even greater (Lee, 2010).

Moreover, Raven (1992) makes a distinction between social power and social influence. Social power is defined as the potential to exert such an influence, whereas social influence is defined as,

> … a change in the belief, attitude or behaviour of a person – the target of influence, which results from the action, or presence, of another person or group of persons - the influencing agent. (Raven, 1992, p. 218)

Therefore, the presence of social power does not mean social influence will occur.

French and Raven (1959; Raven, 1992; 2008) assert that there are six bases of social power, which can be drawn upon to exert influence. The six bases are: reward, coercion, legitimacy, reference, expertise, and information.

Legitimate, expert and information power are of primary relevance to this research in building guiding principles. Legitimate power derives from the perception of the influenced that the influencer has legitimate authority or merit in exerting influence (Raven, 1992). Legitimate power may be derived from position (Sharpia, 2009). For example, in a dispute, the College may ask a professional to apologize to another member as part of a conditional admission. The apologizing party may oblige because they believe the College has the legitimate right to request them to do so.

Legitimate power may be derived from a sense of reciprocity (Sharpia, 2009). For example a person may feel compelled to give his friend a car ride to the airport because the friend did him a favour earlier. Similarly, legitimate power can be drawn from a sense of equity, which is founded in a norm of fairness (Sharpia, 2009). This power can be considered a broader form of reciprocal power in that a person feels they are owed something due to the fact that it is fair. For example, a member of an organization may feel that they have a legitimate right to fair representation and to have their voice heard simply because it seems fair to them.

Expert power is when the person being influenced perceives the influencer as having greater knowledge, experience, and competency in the subject matter (Sharpia, 2009). This power is often found in professional relationships. For example, in a lawyer-client relationship, the client may simply agree with the lawyer's legal strategy because the client believes the lawyer is an expert in the field. In essence, the party with less knowledge is relying upon the professional's expertise. This behaviour might be different if a sibling or peer had proposed the legal strategy.

Related to expert power is information power, which is employed when someone tries to influence another by presenting a logical argument, aimed at changing his or her minds. A key distinction between expert power and information power is that with expert power the person being influenced doesn't feel the need to understand the reason behind a course of action, they have faith in the expert, whereas, with information power the influenced person needs to be convinced before they change their behaviour (Sharpia, 2009).

3.3.1.1 Social Power and Biologists Canada

Given the position of the College as a regulator, leadership and staff have experience with legitimate, informational and expert power relations with their membership. Considering that one of Biologists Canada's purposes will be to support provincial regulators, the College is concerned about Biologists Canada membership power-dynamics[7] since membership could consist of regulated and non-regulated members.

Therefore, College staff in developing Biologists Canada, are interested in how it could draw upon its sources of social power to effect membership to achieve organizational goals. Application may take the form of education, informing prospective members of the value of membership. Legitimate power or expert power may be utilized to educate members regarding Canadian applied biology regulation and the benefits of competent practice.

As mentioned, the College is also interested in power-dynamics between members. It is assumed that individual membership in Biologists Canada would be voluntary. Therefore the College is attuned to the fact that if members feel unrepresented or in a inferior power position they may not engage with the organization or cease to be a member. The following section explores literature related to this concern and builds upon the concept of social power presented.

3.3.2 Perceived Power Imbalance and Member Satisfaction

Biologists Canada leadership will have a relationship with members in that the organization will be providing a service in exchange for financial compensation, which may take the form of individual or organizational annual dues. Therefore, Biologists Canada will have to ensure that members see value in the services offered and are satisfied, which is somewhat dependent upon how a member perceives his/her social power within the organization or relationship.

With this point in mind the concept of perceived power imbalance and its relation to member[8] satisfaction is relevant. When a service provider is in possession of scarce

[7] Power dynamics in this context speaks to the relationship individuals will have with the organization and fellow members.

[8] Literature in this area refers to customers rather than members explicitly. However, given the facts that: a professional relationship that will occur between members and the organization; membership is voluntary;

resources, such as access to professional designation, or professional prestige, and a member depends upon those resources for employment or career advancement, the "service provider is in a position of power superiority over the customer" (Lee, 2010, p. 1115). Furthermore, members in this position may experience customer dissatisfaction due to multiple reasons including role ambiguity and the "perception of an inferior position" (Lee, 2010, p. 1116).

Role ambiguity is common for first-time consumers of professional services as they may be unfamiliar with their role in the service encounter (Lee, 2010). This can lead to decreased role performance even though customers possess the skills and knowledge to participate (Kearney, 1978). If role ambiguity is unaddressed, customers may associate their perceived inferior power position with a subordinate role. A difference in status labels can lead to decreased competency and performance in achieving goals (Lewis & Blanchard, 1971). Therefore, perception of an inferior position can lead to decreased customer performance and, therefore, decreased satisfaction (Bettencourt, 1997). In the professional services context, a perceived inferior position can affect the way a customer comprehends available information regarding the services provided. This can lead to lack of comprehension about services provided and lead to membership dissatisfaction (Lee, 2010).

3.3.2.1 Perceived Power Imbalance, Membership Satisfaction and Biologists Canada

In preparing a plan to create Biologists Canada, mechanisms will need to be recommended which address role ambiguity and educate members as to their role within the service delivery. Implementation of these mechanisms will support members and members who perceive organizational support will reciprocate in ways that facilitate the achievement of organizational goals (Bettencourt 1997). Beyond educating members as to their role within the organization and services provided, Biologists Canada must consider how it accommodates a broad and diverse membership in order to represent different levels of professional experience.

Furthermore, the College is aware that perceived power imbalance within professional membership can cause conflict. In 2004, federal bodies representing two branches of the profession of accounting attempted to merge (McClearn, 2012). However, the initiative failed in large part because many accountants perceived their counterparts as "inferior" in professional qualifications and designation (McClearn, 2012). Moreover, at a provincial level, College membership has expressed that they feel the Albertan standard for professional registration is less rigorous than the College's. This has caused conflict between the provincial regulators of applied biology.

Therefore, the research study was conducted with a view towards preventing this perceived conflict. How Biologists Canada will structure membership and account for varied levels of professional power will be central to the organization's success. How

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and, members will purchase their membership through payment of annual dues - the application of this literature seemed relevant and appropriate.

Biologists Canada communicates and engages with their membership will be paramount in addressing membership power imbalances. Beyond membership engagement, Biologists Canada will have to engage with many other client-defined stakeholders such as: applied biology professionals, applied biology students, provincial governments, post-secondary academic agencies, other natural resource professions, provincial professional regulators, other biology associations, and the public in general. Therefore, stakeholder engagement concepts will be of importance in conducting this study.

3.3.3 Stakeholder Engagement

Stakeholders are those parties who have a stake in or care about the outcome of a conflict or dispute (Burgess, 2004), or the parties who are "affected by the outcome of a decision-making process" (Spangler, 2003, p 1.). Stakeholders can be active parties who have a direct stake or secondary parties who have an indirect stake (Burgess, 2004). Direct stakeholders may be actively involved in the issue and actively support or advocate for a certain outcome or decision. Indirect stakeholders may not be actively involved in the issue but will be affected by the outcome one way or another. Regardless, stakeholders, both direct and indirect, have an interest in engaging with the issue in an attempt to secure a positive outcome. Therefore, stakeholder representation and engagement become integral in achieving positive outcomes for stakeholders.

Stakeholders may be involved in various issues with wide-ranging scopes. An issue may affect two stakeholders or 200,000. Therefore, it is common for groups of stakeholders who share similar values or advocate for a similar outcome to be represented by someone in the engagement process, a stakeholder representative. This allows for a more focused engagement process, as it would be very difficult to negotiate or consult with 200,000 stakeholders (Spangler, 2003).

The central idea behind identifying stakeholders is to ensure that all parties who will be affected by a decision-making process will have a say in effecting such a decision. To this end, the, inclusion of stakeholders will "improve the quality of the outcome or its implementation" (Chicanot & Sloan, 2009, p. 68). When stakeholders are involved and engaged they will ensure the best decisions for the future are made (Cady, 2007).

Therefore, since it is advantageous to get stakeholders involved, the question becomes: How to do it? The International Association for Public Participation provides a useful framework for understanding and the broad spectrum of stakeholder engagement methods. Generally speaking, engagement processes can be understood as those that: inform, consult, involve, collaborate, or empower (IAP2 Public Participation Spectrum, 2007). The level of public or stakeholder involvement increases as the spectrum moves from inform to empower (IAP2 Public Participation Spectrum, 2007). Furthermore, as the spectrum moves from inform to empower more power is placed in the hands of stakeholders in making decisions. Therefore, as the spectrum moves, those who initiated the engagement have less and less power.

To inform is to provide stakeholders with information needed to understand the issues and problems and consider alternative options and/or solutions (IAP2 Public Participation Spectrum, 2007). To consult is to seek and obtain public feedback and then inform the public as to how that feedback affected the process (IAP2 Public Participation Spectrum, 2007). To involve is to work directly with the public throughout the entire process (IAP2 Public Participation Spectrum, 2007). This process values and ensures that stakeholder concerns are considered at multiple stages of the decision making process. To collaborate is to partner with stakeholders at all points in the decision-making process (IAP2 Public Participation Spectrum, 2007). Collaboration means that all parties are involved in the consideration of options as well as deciding upon the preferred solution. Finally, to empower is to place decision-making authority entirely with stakeholders (IAP2 Public Participation Spectrum, 2007).

In creating a plan to develop Biologists Canada, stakeholders will need to be defined and considered. Stakeholder representatives may need to be determined and engagement strategies to engage with those representatives will have to be considered. The level of stakeholder input and decision-making authority will also have to be considered. The purpose of this consideration will be to determine what method or strategy will best aid the organization in pursuit of its organizational goals. Furthermore, through stakeholder engagement processes organizational goals may be defined, refined or amended.

3.4 Guiding Principles

The purpose of this section of the literature review was to produce principles, which will guide the research in order to ensure the project satisfies the needs of the College. Based on the literature presented the following principles were developed which have guided the researcher in determining content analysis themes and interview questions.

The research project should:

1) consider power dynamics when considering organization-member relations and developing membership structure (Raven, 1992; Lee, 2010);
2) utilize the organizations sources of social power to educate membership as to their role and interaction in the organization to increase member satisfaction (Lee, 2010); and,
3) engage with stakeholders to better achieve organizational goals (Chicanot & Sloan, 2009; Cady 2007).

4.0 Research Design

The research for this project was undertaken to answer the research question and in doing so create a deliverable for the College. The research question for the project was: What is the approach recommended for establishing a national organization, Biologists Canada, aimed at determining and promoting a common standard of conduct and practice in applied biology? Two component research questions were identified. One: How could Biologists Canada account for a power imbalance in membership in a way that is complementary to their organizational goals? Two: What would be the best strategies for engaging in dialogue with stakeholders in order to achieve organizational goals? To accomplish these tasks the following research design was implemented. The following section will present the design of the research and highlight the paradigm, methodology, and methods used in answering the research question.

4.1 Research Paradigm

The research project was undertaken within an interpretative research paradigm. Interpretive Social Science is concerned with learning about "the personal reasons or motives that shape a person's internal feelings and guide decisions to act in particular ways" (Neuman, 1997, p. 68). Interpretive social science aims to gain an understanding as to how people construct meaning through meaningful social action (Neuman, 1997). Meaningful social action is an activity in which people attach subjective meanings.

Interpretative Social Science operates from the assumption that social life is a meaningful social construction. Social life cannot be observed independent of social beings (Neuman, 1997). Therefore, social life is continually maintained, reconstituted and reconstructed through interaction and communication with others. Social reality, therefore, is the real or perceived experience of a human being. Furthermore, human beings are "engaged in a process of creating flexible systems of meaning through social interaction" (Neuman, 1997, p. 70). Through this process, interpretive social scientists are interested in: What do people rationalize to be true? What do people determine to be important? How do they define their reality (Neuman, 1997, p. 70)?

Through analysis of social action an interpretative social scientist can produce a description of how a "group's meaning system is generated and sustained" (Neuman, 1997, p. 83). This description is not concerned with whether a group's values are right or wrong, but understanding how they are different and how they inform social action. Therefore, unlike other research paradigms, values are an integral part of the scientific process (Neuman, 1997).

This project was concerned with how stakeholders and members perceive value in participation and engagement with Biologists Canada. In forming recommendations for the College, stakeholder and potential members' values, which were identified through content analysis and interviews, had to be considered. To accomplish this task following methodology was utilized.

4.2 Methodology

The research project was a collective case study analysis, which is an instrumental case study that is "extended to several cases" (Stake, 2005, p. 446). Instrumental case studies are examined to provide understanding regarding an issue (Stake, 2005). The purpose of the case study is not primarily to learn about the case but to draw lessons or generalizations from the case (Stake, 2005). A collective case study uses multiple instrumental cases in order to provide a better understanding than could be drawn from the use of a single instrumental case. Each case was examined in order to provide understanding as to how that organization has operated to achieve its organizational goals, which are germane to those of Biologists Canada.

In this research, case studies existing national organizations that operate in similar regulatory environments in the professions of engineering, forestry and applied science. Organizations were selected because they operated in Canada nationally, they were profession, as opposed to member or issue, oriented, and dealt with a natural resource profession. Appendix 13.1 further outlines the process and rationale for determining case study organizations. Case study organizations were Engineers Canada, the Canadian Federation of Professional Foresters Associations, the Canadian Forestry Accreditation Board, the Canadian Institute of Forestry and Technology Professions Canada. While Engineers Canada provides all the services the College was interested in, in forestry those services were split into three organizations. Three forestry case study organizations were investigated due to a different organizational model in the profession.

Technology Professionals Canada was selected because the College has a growing membership at the technologist practitioner level. There was interest in gaining some understanding with regard to technicians and technologists so the College could be better informed as to how Biologists Canada could support them as well. Furthermore, Technology Professionals Canada is a newly established organization, which provided the opportunity for the College to gain some understanding of the challenges facing a newly established organization of this type. Additionally, two other entities are briefly touched upon in the investigation of the applied science technicians and technologists profession, the Canadian Council of Technicians and Technologists and the Canadian Technology Accreditation Board. These entities were examined due to a shared history with Technology Professionals Canada that is discussed in the project.

4.3 Methods

The methods utilized in this research project were a combination of survey; content analysis; in-depth low-structured interviews; comparative analysis and focused synthesis.

4.3.1 Survey

A survey of existing Canadian professional associations, institutes and organizations was conducted to determine suitable case study organization. A search was conducted given

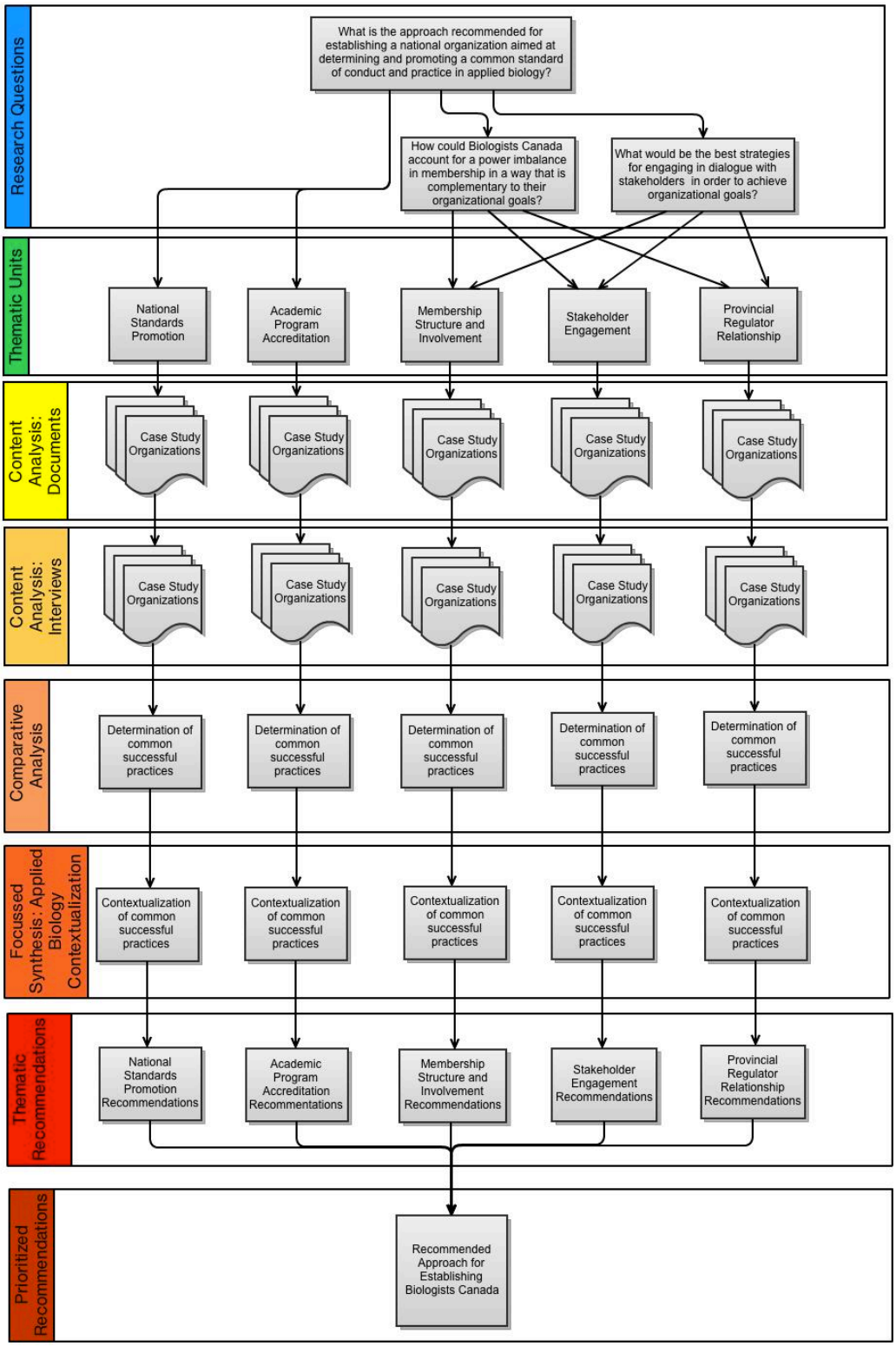
criteria that were determined in consultation with the College. Case studies had to: exist within and across Canada; be profession, as opposed to member, oriented; and be concerned with a natural resource profession.

With these criteria in mind the researcher conducted an internet search utilizing: professional association inventories, such as the Canadian Information Centre for International Credentials (CICIC). Provincial trade agreements, such as the Trade, Investment and Labour Mobility Agreement (TILMA); and government legislation archives, such as BC Laws. The search was conducted to gain understanding of the various organizations that exist within this sector, the legislation that created these organizations, and to identify potential case study organizations.

4.3.2 Research Design Flowchart

Once case study organizations were selected the following methods were utilized in determining a recommended approach to establishing Biologists Canada.

Figure 1: Biologists Canada Research Design Flowchart



4.3.3 Content Analysis of Publically Available Documents

Content analysis is the analysis of written and oral communication, which could be anything from formal policies to informal conversations (Druckman, 2005). Content analysis contains many techniques that aid the researcher to systematically compare content in comparative analyses (Druckman, 2005). Techniques allow the researcher to make systematic and objective inferences concerning specific "characteristics of messages" (Holsti, 1969, p. 14 as cited in Druckman, 2005, p. 257). Content analysis is performed for the purposes of providing description, what happened, who did what, or inference, how it happened, why it happened etc. (Druckman, 2005). The content analysis for this research was interested in both purposes. For example, College staff were interested in who developed national standards as well as how they were developed. Both were essential in determining a recommendation suitable for College staff.

Given the modest amount of documents available to the public, the researcher had the resources to review all documents. Documents that were reviewed included organization policies, annual reports, news releases, web-site material, policy and position papers, board or council minutes, and other various reports.

In order to engage with the research question, the researcher, in consultation with College staff, determined several broad themes with which to approach and code content. Those themes were: national standards development and maintenance, academic program accreditation, membership structure and involvement, stakeholder engagement, and provincial regulator relationship and funding. In order to gain understanding with regard to each theme several questions were developed. For example, in order to gain understanding regarding national standards development and maintenance the following questions were asked:

- How are national professional standards developed?
- Who are consulted in their development?
- What processes are used to consult?
- How are standards maintained and/or updated?
- How do standards evolve with industry and academic trends?

Documents were then reviewed and coded in an effort to answer these questions to gain understanding regarding the theme. Appendix 13.2 outlines the questions that were used to investigate content analysis themes.

4.3.4 Content Analysis of In-Depth Low-Structured Interviews

Once publically available sources were exhausted the researcher conducted In-Depth Low-Structured Interviews with senior representatives of case study organizations in order to confirm understanding gained from review of documents and to gain understanding in areas that could not be gained through review of documents.

In-depth low-structured interview were well suited to engaging with the research question because they granted the researcher insight into the lived experiences of the informants (Hesse-Biber & Leavy, 2010). In-depth low-structured interviews offered the researcher access to "deep information or knowledge" (Johnson, 2002, p. 104 as cited in Hesse-Biber & Leavy, 2010). This type of knowledge was not accessible from the public document review. In-depth low-structured interviews were chosen for this project because they are resource effective and could be tailored to fill in gaps in data identified by the document review.

In-depth interviews were chosen due to the subject matter of the project. As mentioned, an important component of the project was understanding how to account for power imbalances in membership structure as well as understanding how to dialogue with stakeholders to achieve organizational goals. These topics required in-depth discussions with participants.

Participants for interviews were chosen because they are, or have been, in a position whose responsibilities include matters relating to: program accreditation, mutual recognition agreements, membership buy-in, national standards, organizational relationships, and/or provincial professional regulator relationships. These participants were of interest because they had experience:

- in the advocacy/regulatory environment in which Biologists Canada will exist;
- consulting and dialoging with academic institutions and building accreditation programs;
- working with professional regulators to promote and create national standards;
- working with international organizations building mutual recognition agreements to facilitate greater professional mobility; and,
- accommodating a broad and diverse membership.

Therefore, the knowledge participants possessed was of great relevance to engaging with the research question.

The questions developed for the interview were the same questions used to investigate content analysis themes. This was done because the purpose of the interviews was to, one, address any gaps in understanding that were present following the content analysis of publically available documents and, two, confirm understanding gained from the content analysis.

Content analysis questions were distributed to interview participants prior to conducting the interview, which was done for multiple reasons. First, the researcher was seeking complex information, and prior consideration of broad interview questions gave the participants time to prepare and order their thoughts on various matters. Second, as representatives of large public organizations, prior consideration of research questions allowed the participant to gain comfort with the interview process. Prior distribution of content analysis questions was not intended to structure the interview, but to set out broad "lines of inquiry" to guide discussion (Hesse-Biber & Leavy, 2010, p. 103).

Interviews took place via telephone and were approximately one hour in length. The researcher took notes during the interview to capture answers to interview questions and any other data that emerged from discussion. Interviews were recorded to allow the researcher to revisit the interviews and complete notes.

4.3.5 Comparative Analysis

Findings gained from the content analysis and interviews were then analyzed in an effort to determine recommendations. Findings from each case study were compared against each other to determine common successful practices. For example, it was noted that all professions underwent a process and procedure to accredit academic programs. Accreditation processes and procedures were compared and a common successful practice was noted and presented to as a recommendation.

Comparative analysis was deemed to be necessary as part of process to developing recommendations out of the findings of the content analysis and interviews. It is noted though, that comparison in it of itself is not the focus of this case study, but instead as a way to synthesize understanding gained from each case in order to produce recommendations for the College.

4.3.6 Focussed Synthesis – Biologists Canada Considerations

Focussed synthesis is a policy analysis method of research that includes a variety of sources of information and synthesizes the information together to create policy options and recommendations (Majchrzak, 1984). Focussed synthesis was adapted to this project and was employed in the project as a way of drawing together the various sources of data with organizational knowledge, past-personal knowledge of the researcher, past-personal knowledge of College staff, and internal and unpublished documents (Majchrzak, 1984). Focussed synthesis was utilized in this project to account for the organizational knowledge and direction that is being added by the College, for example, the College's experience with the *Trade, Investment and Labour Mobility Agreement*. This method allowed the researcher mobility within the design to ensure that the College's needs were met.

Focussed synthesis was used following the determination of common successful practices from comparative analysis and appears in the sections called 'Biologists Canada Considerations.' The researcher reviewed findings and noted any large issues that College staff should be aware of when considering recommendations. The process of noting issues was informed by organizational knowledge the researcher had gained through years of experience with the College and organizational knowledge communicated to the researcher by College staff.

4.3.7 Ethical Considerations

The researcher applied to the University of Victoria Human Research Ethics Board for approval of the research design. Approval was granted and is presented in a certificate in

appendix 13.8. Approval was sought to ensure the research design carried a minimal risk of harm to participants and that the benefits of the research outweighed potential harm.

The research used every precaution in the research to respect participants and ensure their confidentiality and privacy was protected. The research engaged in a consent process that ensured that at multiple points throughout the research process consent was gained and the participant was informed regarding the research project, their participation and potential harms. All participants signed participant consent forms.

4.3.8 Strengths and Limitations of Research Design

The research design allowed the researcher and the client to gain an understanding of current practices and organizational history of case study organizations. In that sense the case study design allowed for the assessment of tangible subjects rather than abstract concepts. Furthermore, the case study design was advantageous in that it allowed the researcher the resources to go deeper into complex and contextualized subjects, such as stakeholder engagement practices. This was achieved through the review of documents and through in-depth interviews. Given a larger sample, the researcher would not have been able to engage to the same level of depth in subjects the client was interested in. This is assuming that the researcher had to maximize finite resources such as funding and time, which was the case with this research project.

Furthermore, the case study organizations shared many similarities with each other and with the proposed organization the College of Applied Biology was seeking. Some central similarities were that all organizations operated in Canada at a national level; all organizations represented natural resource professions; and all organizations represented the profession primarily rather than individual issues or causes within the profession. Given the similar context with which the organizations operated, the lessons learned from the organizations could easily be transferred to the applied biology context.

Given the narrow focus of case study organizations, the research design may have excluded valuable lessons from international agencies, such as the Society of Biology in the United Kingdom. However, broadening the scope to include international agencies may have reduced the transferability of results given the much different contexts in which the organizations would exist, which essentially is a trade-off between sources of knowledge and the transferability of that knowledge.

The researcher could have also used different methods to include Canadian and international agencies in the research. For example a questionnaire or survey could have been utilized to increase the sample size and gain a broader understanding. However, the researcher felt that these methods would not allow the researcher the opportunity to delve more deeply into complex issues important to the client, such as organizational history related to national standards development.

5.0 Findings – Engineers Canada

Findings below have been summarized from data collected from publically available organizational documents and interviews conducted with organization representatives. Documents which were analyzed included website material, policies and procedures, news releases, and various reports. Questions were framed to provide an understanding of a theme, such as national standards development and maintenance. Documents were then read and analyzed in order to answer these questions. Following this exercise, interviews were conducted with representatives from case study organizations. (Interview questions can be found in appendix 13.2) All participants were asked the exact same questions in an effort to 1) confirm understanding gained from analysis of documents and 2) gain understanding in areas, which could not be achieved through document analysis.

Discussion of all findings includes consideration of common successful practices of case study organizations and the application of those considerations to the context and reality of biology regulation.

5.1 National Standards Development and Maintenance

Engineers Canada has developed and maintained, in consultation with stakeholders, national guidelines for entry into and continued practice in the profession of engineering. The Engineers Canada Qualifications Board is primarily responsible for the development and maintenance of national guidelines (EC personal communication, 2012). To develop a base-line national guideline the board worked with many stakeholders including senior admission staff from provincial regulators and the National Council of Deans of Engineering and Applied Science (EC personal communication, 2012). The board used facilitated discussions and consultations to establish an understanding of the standards and requirements each provincial regulator employed. From this basis the board worked to determine commonalities and areas in which there was room for movement or harmonization (EC personal communication, 2012). A process of review and commentary occurred with provincial regulators to establish a national guideline. The spirit of the document was such that each provincial organization would work towards the harmonization of standards expressed in the guideline, which is a continual work in progress. In 1999, the Qualifications Board was able to facilitate negotiations leading to the Inter-Association Mobility Agreement, which allowed for the mutual recognition of provincial licensure among the member-associations of Engineers Canada (Qualifications Board, 1999).

The Qualifications Board maintains and updates national standard guidelines. The board does this by staying current on international trends in engineering to ensure Engineers Canada guidelines are relevant, and through continued communication with provincial regulators. Furthermore, Engineers Canada also dialogues and consults with Sector Councils and leaders in various engineering sectors (EC personal communication, 2012).

5.2 Academic Program Accreditation

The Canadian Engineering Accreditation Board, a standing committee of Engineers Canada, accredits undergraduate engineering programs that meet or exceed educational standards for entry into the profession (EC Accreditation Criteria and Procedures, 2010). The board is composed of 12 members with broad representation from each region of Canada (EC Accreditation Criteria and Procedures 2010).

The accreditation process begins by the academic agency inviting the accreditation board to accredit a program. An accreditation team is assembled to conduct an accreditation visit by the board and the provincial regulator in the region (EC Accreditation Criteria and Procedures, 2010). The team is composed of fifteen volunteer members representing various disciplines academically and non-academically. Prior to the visit, pre-accreditation documentation is sent to the academic institution for review or completion, which include accreditation visit procedures, schedule of accreditation process, documentation required for visit and a questionnaire to be completed by the academic agency (EC Accreditation Criteria and Procedures, 2010). Once this documentation has been completed an accreditation visit can take place. Visits are generally three days long and include: interviews with senior administration staff, faculty, and students; tours of facilities; and review of exams, papers, theses, lab materials and other relevant material. The visiting team then drafts a report to the accreditation board. The board then renders an accreditation decision. If accreditation is granted it will be for a specific term with a maximum of six years and the program is published as an accredited program. If accreditation is not granted there is an appeal process academic agencies can pursue (EC Accreditation Criteria and Procedures, 2010). If during the accreditation term a program makes a significant change, they have a responsibility to report such a change to the accreditation board. Furthermore, when an academic program applies for accreditation renewal it has a responsibility to highlight any program changes. Engineers Canada has revoked accreditation before (EC personal communication, 2012).

Programs are evaluated against qualitative and quantitative accreditation criteria, which have been developed by the accreditation board. The visiting team and board use five main categories in their program evaluation. First is continual improvement: a program must have “processes in place that demonstrate that program outcomes are being assessed in the context of the graduate attributes, and that the results are applied to the further development of the program (EC Accreditation Criteria and Procedures, p. 12, 2010). Second, the board and team look at graduate attributes, which look at criteria such as the ability to analyze problems, design, investigate, communicate, manage projects and work professionally and ethically (EC Accreditation Criteria and Procedures, 2010). Third, the board and visiting team look at program policies and procedures regarding student admission, promotion and graduation, and counselling and guidance. The board and team evaluate these policies and procedures to ensure there is an acceptable auditing process to ensure these policies and procedures are met (EC Accreditation Criteria and Procedures, 2010).

Next, the board and team review and assess curriculum content. Engineers Canada has created an approach and methodology for quantifying curriculum content in which one hour of lecture is equal to 1 Accreditation Unit (AU) and one hour of laboratory work is equal to 0.5 AU. To satisfy the curriculum content criteria a program must have 1950 AU including minimum AU requirements for mathematics, natural sciences, engineering science, engineering design, complementary studies and laboratory experience and safety procedures instruction (EC Accreditation Criteria and Procedures, p. 16, 2010). Finally, the board and team evaluates the program environment looking at the quality of the educational experience, faculty support for students, leadership, expertise and competence of faculty, professional status of faculty, financial resources, authority and responsibility of engineering program and curriculum committee (EC Accreditation Criteria and Procedures, 2010).

Accreditation criteria are developed and maintained by the accreditation board in consultation with the National Council of Deans of Engineering and Applied Science and provincial regulators (EC personal communication, 2012).

Engineers Canada funds the accreditation visit and procedure. Provincial regulators fund Engineers Canada by paying a fee equal to $10.21CAD per active licenced provincial member (EC personal communication, 2012). Out of that funding, Engineers Canada funds the accreditation board and their work. The goal of accreditation is to ensure that undergraduate engineering programs offered by Canadian academic agencies will meet or exceed accreditation criteria which are reflective of acceptable educational standards for professional licensure in Canada (EC Accreditation Criteria and Procedures, p. 5, 2010).

The value of accreditation is said to be fourfold. From the provincial regulators perspective, accreditation drastically reduces the resources the regulator must invest in the assessment of applicant's academic credentials. This is assuming that the applicant has graduated from an accredited program (EC personal communication 2012). From the academic agencies point of view, it provides a marketing tool to attract potential students and assure them of a certain standard of education. From a student's perspective, it provides a mechanism to ensure that their academic training will adequately prepare them for entry into the engineering profession. Finally, from Engineers Canada's point of view, it assists in the promotion of a national standard in engineering education (EC personal communication 2012).

5.3 Membership Structure, Involvement and Funding[9]

Constituent members of Engineers Canada are the provincial associations responsible for regulating the engineering profession (EC Constituent Associations, 2008). Members of Engineers Canada are organizations and not individuals. Membership was so structured \ to fulfill the purpose of the organization: to support provincial regulators at a national level (EC personal communication, 2012).

Engineers Canada communicates with members through many publications. *Engineering On the Hill* is a newsletter distributed which updates members on current Engineers Canada activities; the focus of the newsletter is on national and federal activities (EC personal communication, 2012). Engineers Canada also publishes *Between Us*, which focuses on regulatory activities. Engineers Canada also communicates to members through its annual report, a detailed summary of activities and finances (EC Annual Report, 2010).

Beyond publications, Engineers Canada communicates with member organizations through various board and committee meetings and consultation processes. An example of this is ongoing communication related to the accreditation process and criteria. Member organizations can also request that certain information be communicated to provincial committees (EC personal communication, 2012).

Engineers Canada represents their constituent members interests to others by representing common interests and positions to national and increasingly international audiences to promote the profession (EC personal communication, 2012). Engineers Canada does this through publication of national guidelines, policy and position papers, and negotiation of mutual recognition agreements. Furthermore, Engineers Canada protects the image of the profession by holding the legal official marks on relevant professional terms, such as engineer, engineering, professional engineer and P. Eng. (EC About Us, 2012). This protection ensures that those who have not received proper engineering training, are not conducting engineering work and are not professional engineers cannot represent themselves as engineers. This protection assists in promoting national standards in the profession and assists constituent members in protecting the public's interest (EC personal communication, 2012).

Membership value comes from two main areas: 1) accreditation services and 2) national voice to address national issues and facilitate the development and maintenance of national guidelines. Accreditation streamlines the assessment of academic qualifications

[9] The research design for this project identified two separate themes:1) Membership Structure and Involvement and 2) Provincial Regulator Relationship and Funding. The first was intended to look at all members of the organization and gain understanding regarding membership structure and involvement in the organization. The second was designed to look at the specific role of provincial regulators as one of the members of a case study organization. However, subsequent research indicated that provincial regulators are the primary members of the case study organizations, making the themes redundant. Here we review findings from both themes together.. Appendix 13.2 outlines the content analysis questions as initially designed.

of applicants, which is of value for provincial regulators. Pooling together the collective weight of the engineering profession is of value for provincial regulators because it allows them to better engage with issues at a national or international level. For example, Engineers Canada monitors and lobbies on any draft federal legislation bearing on the engineering profession, such as international trade agreements or immigration policies (EC personal communication, 2012). National guidelines assist the profession in establishing common standards and assist constituent member associations in assuring inter-provincial mobility necessary for growth in the profession and required by the *Agreement on Internal Trade.* The value of a national facilitator was evident when Engineers Canada brokered an Inter-association Mobility Agreement, between constituent associations prior to the *Agreement on Internal Trade* (Qualifications Board, 1999).

Constituent organizations fund Engineers Canada through a portion of dues individual professional engineers pay annually for licensure. Of yearly dues, $10.21 per licenced member is sent to Engineers Canada (EC personal communication, 2012). Through this funding, Engineers Canada represents more than 250,000 members of the Canadian engineering profession (EC Welcome, 2012).

5.4 Stakeholder Engagement

Engineers Canada has multiple ways to engage academic, industry and federal government stakeholders. Engineers Canada's primary link to academic stakeholders is through the National Council of Deans of Engineering and Applied Science, the Chair of which is an advisory member on the Engineers Canada Board (EC personal communication, 2012). Furthermore, Engineers Canada's CEO and Director of Education attend National Council meetings. The Engineers Canada Accreditation Board has a Dean's Liaison committee with the resources to address specific issues (EC personal communication, 2012).

With regard to Industry, Engineers Canada attends and participates with the alliance of Sector Councils.[10] Engineers Canada also attends annual engineering meetings of various engineering disciplines, such as aerospace. It partnered with the Canadian Council of Technicians and Technologists and Human Resources and Skills Development Canada to produce the Engineering and Technology Labour Market Study. The study included ten sub-studies that included national and international engineering employment trends (Engineering and Technology Labour Market Study Final Report, 2009).

With regard to government, Engineers Canada only engages with the federal government of Canada. It has a government relations committee prepares position papers. Engineers Canada staff primarily engage in government relations and work closely with Foreign Affairs and International Trade Canada and Citizen and Immigration Canada on salient issues, such as trade agreements and immigration policy (EC personal communication,

[10] Federal government funding of the Sector Councils has been cut; therefore, Engineers Canada is unsure of sector council involvement going forward. (EC personal communication, 2012).

2012). They also work with Human Resources and Skills Development Canada on projects including foreign credential recognition (EC News Release, Dec, 2011).

Engineers Canada has many ways to engage with government such as a "picnic-on-the-hill" which invites Members of Parliament and their staff to attend (EC personal communication, 2012). Additionally, the Engineers Canada Board of Directors invites Members of Parliament for a "meet-and-greet" once a year. Finally, Engineers Canada operates a "bridging program" where one Professional Engineer from each national electoral riding will meet with the elected Member of Parliament to discuss the top three concerns they have regarding the profession (EC personal communication, 2012).

Engineers Canada notes that a multi-pronged government relations approach has been successful including bureaucratic and political elements of federal government. It fosters relations with staff who support key stakeholders in facilitating relations and dialogue (EC personal communication, 2012). Additionally, Engineers Canada notes that creating specific taskforces and committees, such as the Dean's Liaison Committee, has been very successful. The committee structure allows for more specialized engagement with issues (EC personal communication, 2012).

5.5 Conclusion

Engineers Canada is a large comprehensive organization that engages in activities in all four themes investigated. It spearheaded the process to develop national standards with provincial regulators, their sole members, and continues to maintain them. It operates a highly respected accreditation body that accredits programs across Canada aiding in maintaining academic standards of practice.

Engineers Canada has broad national membership and seeks to not only support their constituent organizations in national matters but acts as a representative for the profession to international audiences.

Engineers Canada is unique in the comprehensive nature with which the organization engages with stakeholders in government, industry, and academia. It utilizes a multi-pronged approach that consists of multiple processes to ensure that all relevant stakeholders are aware of issues and concerns.

6.0 Findings – Canadian Federation of Professional Foresters Associations

Findings below have been summarized from data collected from publically available organizational documents and interviews conducted with organization representatives.

6.1 National Standards Development and Maintenance

Of the three forestry organizations examined, the Canadian Federation of Professional Foresters Associations (CFPFA) is responsible for national standards development and maintenance. The CFPFA, in conjunction with CFPFA members[11]along with academic representatives[12], developed a set of certification standards that outlines common competencies required for entry into the forestry profession (CFPFA Certification Standards, 2008). The Inclusivity Project, as it was named, used many different processes in order to develop the common certification standards now present (CFPFA Certification Standards, 2008).

The CFPFA met in 2000 to agree on baseline areas of competence and corresponding skills for each competence (Certification Standards, Attach 7, 2008). From this common basis, a questionnaire was distributed to over 150 people representing all forestry sectors (CFPFA personal communication, 2012). The questionnaire presented all the attributes of current academic standards and recommended knowledge areas, as determined by provincial regulators, and asked for their opinion on the core knowledge required for entry level practice (Certification Standards, Attach 5, 2008). Additionally, the UNBC Curriculum Committee, UNBC Advisory Board and several invited guests developed a model curriculum that provided an example of how the certification concepts could be applied (Certification Standards, Attach 5, 2008). Utilizing the questionnaire results and model curriculum the CFPFA facilitated workshops and specialized meetings to engage with specific topics (Certification Standards, Attach 5, 2008). From these processes CFPFA members were able to draft the Certification Standards for the Profession of Forestry in Canada. The Ordre des Ingénieurs Forestiers du Québec chose not to ratify or implement these standards (CFPFA Certification Standards, 2008).

The Certification Standards are treated as a living document, and small revisions occur annually or biannually as the organization learns from experiences (CFPFA personal communication, 2012). Comprehensive reviews may occur roughly every five years. For large updates or reviews, external stakeholders, such as academic agencies, would be contacted formally and included in the process (CFPFA personal communication, 2012).

[11] CFPFA members include professional associations in provinces with professional forestry regulation, the Canadian Forestry Accreditation Board and the Canadian Institute of Forestry.
[12] Academic representatives include the University of Northern British Columbia, University of British Columbia, University of Alberta, University of New Brunswick and Lakehead University

6.2 Membership Structure, Involvement and Funding

Members of the Canadian Federation of Professional Foresters Associations (CFPFA) are the provincial regulators of forestry in Alberta, British Columbia, New Brunswick, Newfoundland & Labrador, Nova Scotia, Ontario, Québec[13] and Saskatchewan (Certification Standards, 2008). Additionally the Canadian Forestry Accreditation Board and the Canadian Institute of Forestry are members (Certification Standards, 2008). CFPFA members are organizations and not individuals. The Canadian Institute of Forestry is also a member representing forest practitioners from provinces and territories who do not have right-to-practice or right-to-title regulation: Manitoba, Prince Edward Island, the Yukon, Northwest Territories and Nunavut (Certification Standards, 2008; CFPFA personal communication, 2012).

Membership is structured in this manner to fulfill the organization's purpose: to "advocate for matters identified by its member agencies as having national importance or consequence" (Certification Standards, p. 3, 2008). Furthermore, the CFPFA is mandated to provide a member's forum for communication on common matters such as certification and academic standards for program accreditation (Certification Standards, 2008).

Communication with member organizations occurs mainly through direct dialogue and annual reports. For large projects, formal consultations will occur, such as those used in the Inclusivity project to create certification standards (Certification Standards, 2008; CFPFA personal communication, 2012). Communication with members depends significantly on the matter to be communicated.

Little information is available on how the CFPFA represents members' interests to others. The CFPFA has developed a handbook for assessing credentials of foreign-trained applicants and graduates of non-accredited programs wishing to practice professional forestry in Canada (Canadian Federation of Professional Foresters Associations, 2012). Furthermore, the CFPFA has published articles in the *Forestry Chronicle*, a long-standing publication of the Canadian Institute of Forestry. The CFPFA will soon develop a website (CFPFA personal communication, 2012).

The CFPFA seems to provide a co-ordinating function between member organizations in engaging with common issues, such as certification standards and academic program accreditation. CFPFA is funded by member agencies utilizing a similar system as the CFAB discussed in section 7.2 of this report (CFAB personal communication, 2012).

Value in membership stems from the co-ordinating and facilitating function described above. The CFPFA helped develop common certification standards of significant value to provincial regulator member agencies especially given the realities of the *Agreement on Internal Trade*, which provincial regulators must operate within (CFPFA personal

[13] Ordre des Ingéniers Forestiers Do Québec have chosen not to ratify or implement the certification standards at this time (Certification Standards, 2008).

communication, 2012). Provincial regulators recognized the value to common national certification standards and to this end, with assistance from the CFPFA, created a mutual recognition agreement between member organizations containing more robust rules and regulations for interprovincial mobility than the *Agreement on Internal Trade* (CFPFA personal communication, 2012). The agreement is still in effect. CFPFA continues to be vital in the maintenance of national certification standards.

6.3 Stakeholder Engagement

Little is known about ongoing stakeholder engagement strategies by the CFPFA. However, the CFPFA engaged with academia, regulators and industry for the Inclusivity project to develop national certification standards. Engagement with academic agencies and regulators has already been discussed. However, engagement with industry occurred via a questionnaire distributed to "users and providers of professional services" to develop understanding regarding the "core knowledge" students need to enter the forestry profession (Certification Standards, p. 32, 2008). The CFPFA noted that for any large reviews or projects relevant stakeholders would be consulted (CFPFA personal communication, 2012). The CFPFA also engaged with federal government that lead to the CFPFA creating a mutual recognition agreement between provincial regulators prior to the *Agreement of Internal Trade* (CFPFA personal communication, 2012). Little is known regarding ongoing government relations.

6.4 Conclusion

The primary focus of the CFPFA seems to be national standards development and maintenance. The CFPFA has worked with provincial regulators of forestry to establish a common national standard for the profession. The CFPFA continues to maintain national standards and develop tools to aid internationally trained practitioners.

The organization is unique in its structure. The CFPFA, the CFAB and the CIF together provide services and engage in activities in all four themes. This model has allowed each organization to specialize and focus on certain areas. For the CFPFA, harmonizing national standards within Canada appears to be their focus.

The CFPFA is also distinctive in how it has endeavoured to engage with lack of regulation in some provinces and territories. The CIF provides a vehicle with which practitioners from unregulated provinces can gain some form of representation at the CFPFA.

7.0 Findings – Canadian Forestry Accreditation Board

Findings below have been summarized from data collected from publically available organizational documents and interviews conducted with organization representatives.

7.1 Academic Program Accreditation

The Canadian Forestry Accreditation Board was established by the provincial regulators of forestry and the Canadian Institute of Canada (Policy Statement, 2008). The board's objective is to provide members with the service of program accreditation where Canadian university forestry programs will be reviewed to ensure they "meet or exceed common educational standards acceptable for professional forestry registration" (Policy Statement, p. 1, 2008).

The accreditation process takes roughly 36 weeks to complete and begins with the selection of a review team and a questionnaire being sent by the board to the academic agency seeking program accreditation. Questionnaire responses are then distributed to the review team, which assists in their visit preparation. The review team then conducts an accreditation visit evaluating the program based on accreditation criteria. The visit includes interviews with senior administrative officers, faculty members, students, recent graduates, and employers (Policy Statement, 2008). Review team tours physical facilities such as laboratories, libraries and computing facilities. Finally, the review team reviews teaching material and student work as well as policies and procedures related to program structure.

Following the visit, the review team prepares sends a draft accreditation review report to the academic agency head for review and comment. With academic agency comments, the review team prepares final accreditation review report and submits it to the board for consideration and decision. The Canadian Forestry Accreditation Board then renders their accreditation decision and the decision is conveyed to the academic institution (Policy Statement, 2008). If accreditation is not granted there is an appeal process academic agencies may pursue. Programs must notify the board if any significant changes occur during the accreditation term or when the program is applying for a new accreditation term (CFAB personal communication, 2012).

The review team consists of at least four Registered Professional Foresters or Ingénieurs forestiers who are appointed by the board. Consideration is given to ensure the team has broad representation of forestry experience and shall include a member of the board, an academic member and at least three members with accreditation experience.

Forestry programs are evaluated based on accreditation criteria, which consist of general, curriculum, program outcomes, and program environment criteria. General criteria sets out the general parameters of the accreditation including: eligibility for accreditation; accreditation term, which is a maximum of six years; significant program changes and reassessment; and, the recognition that the academic agency bears burden of proof in

demonstrating that graduating students have competence in necessary areas (Policy Statement, 2008).

Curriculum criteria are designed to ensure that if met, graduates will have demonstrated competency in areas required by an entry-level forester. The curriculum criteria are organized in three sections: Foundational Studies, Core Forestry Studies and Complementary Studies. Foundational studies looks at the biological sciences, physical sciences, social sciences and humanities that a program must have (Policy Statement, 2008, p. 5). Core forestry studies require a minimum of four full-time terms that ensure students experience resource growth, development, management and utilization as well as leadership skills, information acquisition and analysis, communications and professionalism and ethics (Policy Statement, 2008, p. 5). Complementary studies include courses over and above the foundational and core curriculum but essential for practice at high levels of competence (Policy Statement, 2008, p. 6). Considerable flexibility is given for assessing complementary studies.

Additionally for an undergraduate program to be considered for accreditation the program must be a science-based degree consisting of eight full time terms over four years or equivalent. The board also accredits Masters forestry programs, which must demonstrate that a combination of undergraduate and graduate course work will produce graduates possessing the same level of expected outcomes as those expected from an accredited undergraduate program (Policy Statement, 2008).

After curriculum criteria are assessed, program outcomes are assessed which focus on the competencies of graduates exiting an accredited program. Graduates must have the skills and knowledge able to practice as an entry-level forest practitioner. Examples include but are not limited to: an understanding of the science of forest ecosystem structure, dynamics, and processes; be able to identify, formulate and solve forest problems; communicate professionally to multiple audiences; and understand and appreciate relationships among natural resources (Policy Statement, 2008, p. 6).

Finally, program environment criteria are considered, which is primarily a qualitative evaluation. The review team and board will consider the quality, experience and competence of faculty, faculty-student resources and contact, program commitment to research and professional development, and program governance and leadership (Policy Statement, 2008).

Programs are evaluated based on accreditation criteria that were developed when Canadian academic agencies approached the Canadian Federation of Professional Foresters Associations about academic program accreditation (CFAB personal communication, 2012). An initial draft of a policy statement concerning program accreditation was drafted by a former university dean of forestry and brought forward to the CFPFA and their members for review. Councils of provincial regulators, excluding Québec, finalized and adopted the policy statement. CFAB decisions are binding on member agencies.

The accreditation board is funded through contributions from member agencies. The board determines a budget and provides an assessment to each provincial regulator based on a fixed fee per active Registered Professional Forester (CFAB personal communication, 2012). The Canadian Institute of Forestry pays a fixed percentage of the board's budget each year (CFAB personal communication, 2012). The board then funds the accreditation process.
The value of accreditation is demonstrated in the amount of work provincial regulators would have to do if forestry program accreditation did not exist, which would be either extraordinarily costly or impossible for some regulators (CFAB personal communication, 2012). Value for academic agencies is demonstrated in them initiating contact with the CFPFA to build an accreditation process (CFAB personal communication, 2012). The CFAB notes that accreditation is valuable given the reality that provincial regulators and the profession operate under the *Agreement on Internal Trade*, which means an Registered Professional Forester in Nova Scotia must be accepted, without significant additional training, as a Registered Professional Forester in British Columbia, therefore it was in the provincial regulators interest to ensure a consistent standard of education across Canada (CFAB personal communication, 2012). Program accreditation assists in this endeavour.

7.2 Membership Structure, Involvement and Funding

Members of the Canadian Forestry Accreditation Board (CFAB) are the provincial regulators of forestry in Alberta, British Columbia, New Brunswick, Newfoundland & Labrador, Nova Scotia, Ontario, Québec, Saskatchewan and the Canadian Institute of Forestry (CFAB Member Agencies, 2012). Membership is structured to provide regional inclusion on the CFAB and reflects the membership structure of the CFPFA. Each member appoints a member to the CFAB, however that member does not represent the member organization but instead must prioritize the responsibilities and duties of the CFAB above those of their member organization (CFAB personal communication, 2012). For example, when determining a budget, the CFAB must determine what funding is needed to fund accreditation services without regard for member organizations financial position. Simply stated, a CFAB member does not have to receive provincial approval prior to making decisions (CFAB personal communication, 2012). CFAB decisions are binding upon member organizations (Policy Statement, 2008).

The CFAB communicates with members through direct dialogue and an annual report and financial review (CFAB personal communication, 2012). The CFAB also sends a report to the CFPFA, which, in turn, the CFPFA can disseminate to member agencies (CFAB personal communication, 2012). Communication with member agencies primarily occurs through the CFPFA (CFAB personal communication, 2012). Member agencies are consulted for any significant changes or reviews, furthermore, any change to the CFAB Policy Statement must be agreed to by all signed on member agencies (CFAB personal communication, 2012).

The CFAB represents their members' interests through the accreditation of academic programs using accreditation criteria developed by member agencies. Accreditation

criteria have been harmonized with national certification standards. CFAB members gain value through the accreditation service, which, as discussed, reduces the resources provincial regulators must invest into the assessment of forestry practitioner's academic credentials. Accreditation further provides value to members in assisting in the standardization of forestry education, which facilitates with inter-provincial forester mobility.

The CFAB is funded through support from member agencies. Provincial regulatory members fund the CFAB based on an assessment proportional to the number of active Registered Professional Foresters. Additionally, the Canadian Institute of Forestry pays a fixed percentage of the CFAB's budget (CFAB personal communication, 2012).

7.3 Stakeholder Engagement

The Canadian Forestry Accreditation Board, given its purpose, primarily engages with academia. The board engages with the Association of University Forestry Schools of Canada and with individual schools through the accreditation process. The association assists in offering advice and opinions but does not have authority over the board (CFAB personal communication, 2012). Engagement occurs more regularly through direct communication. For large projects or reviews academic agencies would be consulted more formally.

The CFAB noted that a necessary task in stakeholder engagement is continual education of stakeholders about accreditation (CFAB personal communication, 2012). Academia leaders move in and out of important positions; therefore the board needs to be actively educate stakeholders regarding program accreditation (CFAB personal communication, 2012).

Industry is engaged with indirectly through the experience of board and accreditation team members (CFAB personal communication, 2012). For large projects or reviews the CFAB would consult relevant industry stakeholders (CFAB personal communication, 2012).

7.4 Conclusion

The CFAB is unique in that its sole function is to accredit post-secondary forestry programs in Canada. The CFAB has worked with members to create and maintain national accreditation criteria. CFAB membership consists of provincial regulators across Canada and the CIF, representing unregulated provinces. Given its function, the CFAB has chosen to engage primarily with academic stakeholders. The CFAB has been successful in harmonizing accreditation criteria with CFPFA certification standards, which provides great value to provincial regulators.

8.0 Findings – Canadian Institute of Forestry

Findings below have been summarized from data collected from publically available organizational documents and interviews conducted with organization representatives.

8.1 Membership Structure, Involvement and Funding

The Canadian Institute of Forestry (CIF) is comprised of individual members, sustaining corporate sponsors and partners. Individual membership consists of multi-disciplinary forest practitioners, not just Forestry Professionals. Membership in the organization is voluntary. Corporate sustaining sponsors and partners are organizations, businesses, or entities that support the activities of the CIF and wish to financially assist in the provision of services. Many provincial forestry regulators are partners with the CIF.

Membership is structured to fulfill two roles 1) to provide national leadership in forestry through promotion of competence of forestry professionals and fostering public awareness of forestry issues (CIF governance, 2008), and 2) to represent provinces without professional forestry regulation to the CFPFA (Certification Standards, 2008). Membership is organized into eighteen sectors representing regions across Canada. The CIF Board of Directors consists of one representative from each sector. The CIF also noted that many of their sectors were instrumental in achieving provincial regulation in the region (CIF personal communication, 2012). In the past, sectors lobbied provincial government to draft legislation to regulate the profession in the province (CIF personal communication, 2012).

The CIF utilizes electronic sources to communicate with members via email newsletter, annual report, and social media. Additionally, the CIF publishes the *Forestry Chronicle*, a professional and scientific journal published since 1925 (CIF Forestry Chronicle, 2008).

The CIF communicates members' interests to external audiences through the board of the organization. Given the broad scope of its membership, CIF appreciate that external communication may not represent all view points on a given issue or topic (CIF personal communication, 2012). However, the board strives to put forth communications that represent the majority of membership. External communications must be science-based, balanced in their perspective, and constructive in their purpose (CIF personal communication). The CIF utilizes what they call "SWAT teams" which consist of 3-10 members who have specialized expertise regarding the issue to be communicated and communication experience to develop news releases, national newsletters, and editorials (CIF annual report, 2010). The CIF also publish policy papers, position statements and technical reports offering commentary and constructive solutions to forestry issues (CIF policy and position, 2008).

Membership value derives from many sources. Forester members who are members from provinces without professional regulation may find value in gaining a voice or representative to the CFPFA. However, the CIF notes that since membership in the CIF is

voluntary[14] the ability of the CIF to represent Foresters regarding regulatory matters at a national level is diminished (CIF personal communication, 2012). While the mechanism for representation exists, it is not utilized well.

Members also draw value from access to continued professional development through a national online lecture series and continued forestry education program (CIF continuing education credits, 2008). Ongoing professional development is a requirement for continued licensure, registration or certification with some provincial regulators. Furthermore, benefit from a forum for knowledge exchange and membership in a community of practice (CIF personal communication, 2012).

The CIF is funded through yearly dues: $170.00CAD per active member, $35.00CAD for students and $60.00CAD for retired members (CIF Dues Information, 2008). Furthermore, the CIF receives funding from corporate sustaining members and partners for certain projects or services. For example, many provincial regulators provide funding to assist in the continued professional development program (CIF annual report, 2010).

8.2 Stakeholder Engagement

The Canadian Institute of Forestry uses electronic outlets to engage with any entity it needs to achieve goals. The CIF may engage with businesses, media, organizations, or government. For example, CIF collaborated with the Canadian Council of Forestry Ministers to produce a report outlining how CIF activities contributed to achieving the Canadian Council of Forestry Ministers vision (CIF Annual Report, 2010). The report used various stakeholder engagement strategies including a mechanism for individual member input and live and electronic workshops conducted in each sector (CIF Annual Report, 2010). The CIF continues to electronically dialogue with the Council. The CIF also engages in a number of partnerships, such as the Forestry Research Partnership at the Canadian Ecology Centre, to facilitate knowledge exchanges (CIF Annual Report, 2010).

The CIF communicates with external stakeholders through news releases and policy and position papers intended to raise awareness and understanding regarding forestry issues. To this end, the CIF has engaged with businesses to ensure their national media campaigns accurately reflect forestry realities (CIF personal communication, 2012). It also liaises with the CFPFA and CFAB through their appointees.

The CIF noted that all their external communications and engagements rely on a constructive, balanced and science-based approach essential to success. Most external stakeholders are used to hearing negative feedback, and that the CIF believes its approach is welcome (CIF personal communication, 2012).

[14] CIF membership is voluntary contrasted with membership with forestry provincial regulators, which is required for right-to-practice regulators and *de facto* required for right-to-title regulators.

8.3 Conclusion

The CIF is mainly a member interest or issue oriented organization. However, the CIF through its ties to the CFAB and CFPFA has a regulatory role as a representative of unregulated provinces. The CIF is broadly represented through 18 sectors across Canada and provides numerous valuable services to members, such as access to continued professional development.

The CIF is unique in that the organization is not defined by a single profession, but instead by a sector and seeks membership from all professions that work within that sector. Furthermore, given its broader scope the organization engages with a multitude of groups to ensure awareness of forestry issues.

Unlike other organization investigated CIF membership is voluntary and members are primarily individuals rather than organizations.

9.0 Findings – Technology Professionals Canada

Findings below have been summarized from data collected from publically available organizational documents and interviews conducted with organization representatives.

9.1 National Standards Development and Maintenance

National standards for applied science technicians and technologists were developed prior to the establishment of Technology Professionals Canada (TPC). However, the member organizations of TPC were all members of the Canadian Council of Technicians and Technologists who, in conjunction with the National Council of Deans of Technology and the Council of Registrars, developed the National Technology Benchmarks™ (TPC personal communication, 2012). The benchmarks were originally developed for program accreditation purposes but were later expanded for use as certification benchmarks for entry into the profession. TPC currently recognizes the benchmarks. The benchmarks were developed through a National Technology Benchmarks Committee, which included academic and provincial regulator representation. As noted, the committee also included representation from the National Council of Deans of Technology and the Council of Registrars (TPC personal communication, 2012). The committee used a consultation process to dialogue regarding harmonizing provincial standards into national benchmarks (TPC personal communication, 2012).

The benchmarks are maintained through the National Technology Benchmarks Committee, TPC members have representation through the Council of Registrars. Academic and industry trends are identified through representation on the benchmark Committee. It is unknown how TPC will be involved in benchmark maintenance in the future.

9.2 Academic Program Accreditation

Technology Professionals Canada is an interesting case as they are creating an independent organization called Technology Accreditations Canada (TAC) to provide accreditation services to Technology Professionals Canada member associations. However, the Canadian Technology Accreditation Board (CTAB), a body of the Canadian Council of Technicians & Technologists remains the sole provider of accreditation services in the discipline. Technology Professionals Canada recognizes CTAB accredited degrees, however, there will come a point in the future will they no longer will (TPC personal communication, 2012). Therefore, the following section will be divided into two sections: 1) presentation of the CTAB accreditation process and 2) presentation of TPC efforts to create Technology Accreditations Canada.

9.2.1 Canadian Technology Accreditation Board

The CTAB accreditation process begins when an academic agency applies for accreditation. The program staff must then complete and submit required pre-visit documentation, which provides general information about the academic agency, detailed

information about the program in question and samples of student work (CTAB National Accreditation Guide, 2010). Once documentation is received CTAB, in consultation with "related provincial constituent member association," selects an accreditation team to visit the academic agency (CTAB National Accreditation Process, 2010, p. 1). The visiting team examines all facets of the program with primary importance weighted on program outcomes. The team also examines all facilities, student services, faculty, and professional development of staff (CTAB National Accreditation Process, 2010, p. 1).

The accreditation team then submits a written report to the outlining the results of the review of the program and any recommendations for improvements to the program to the academic agency for review and comment (CTAB National Accreditation Process, 2010, p. 1). With comments, the accreditation team assembles the Final Visiting Team Report and submits it to the CTAB for decision. If accredited, the academic agency will have an initial accreditation term of up to four years (CTAB National Accreditation Process, 2010). After the initial term the academic agency will have to submit a variance report in years five and eight highlighting any program changes since the last review. Therefore, accreditation is extended. Every year 10% of accredited technology programs are selected for a random audit visit to ensure no significant changes have occurred and quality of program is maintained. All programs will be randomly audited at least once every ten years (CTAB National Accreditation Process, 2012, p. 1).

Programs are evaluated against the National Technology Benchmarks ™ which contain specific criteria specialized to the program being evaluated. The pre-visit documentation should demonstrate how the program meets or exceeds the National Technology Benchmarks™. Within the documentation, attention is paid to the "list of program strengths, course outlines, evidence of student work, the organization's governance, faculty qualifications, and the management of the program (CTAB National Accreditation Process, 2012, p. 1)." During the accreditation visit the team meets with faculty, students, graduates, advisory committee members, and senior administration to evaluate the program (CTAB National Accreditation Process, 2010). As noted, accreditation criteria are based on the National Technology Benchmarks.™.

CTAB accreditation is funded, at least in part, by fees in which the academic agency pays for the service of accreditation. It costs $4000.00CAD plus an application fee to for a national program accreditation and $575.00CAD for annual maintenance (CTAB Fee Breakdown, 2012). CTAB also offers international accreditations, which cost a minimum of $7000.00USD per program plus associated travel expenses (CTAB Fee Breakdown, 2012).

The value of national accreditation is that it demonstrates to the professional community that an academic agency has achieved national academic standards (CTAB Value, 2012). Accreditation also provides a framework and mechanism for the continual improvement in quality and efficiency of technology programs (CTAB Value, 2012).

9.2.2 Technology Accreditations Canada

Technology Professionals Canada has approved a budget and mandate to create Technology Accreditations Canada (TAC) in the near future. TAC will be a stand-alone organization to preserve the independence of the accreditation process from TPC functions (TPC personal communication, 2012). TAC is currently funded by TPC, however ongoing funding is still to be determined. TPC solicited the expertise of Canadian Standards Association (CSA) to develop recommendations as to TACs creation. Extensive stakeholder engagement was used to determine recommendations concerning accreditation and audit practices. The CSA report produced several key findings. Stakeholders desired one national accreditation body (CSA Report, 2012). Furthermore, CSA recommended that clear, auditable procedures be developed for: development and approval process for standards; accreditation process; training and measurement of auditors; and accountability and reporting (CSA Report, 2012).

A provisional committee has been established to oversee the creation of TAC, which will include: a neutral public member to oversee process; provincial representation, not necessarily from regulators; a CTAB representative; and a National Council of Deans of Technology representative (TPC personal communication, 2012). One goal of the process to create TAC will be to incorporate the enhancements recommended by CSA to create a better accreditation process and service that will be of increased value to TPC member organizations (TPC personal communication, 2012).

9.3 Membership Structure, Involvement and Funding

Technology Professionals Canada is composed of provincial regulators in British Columbia, Alberta, Saskatchewan and Ontario; members are organizations and not individuals (TPC March 18th Communication, 2011). The member organizations operate under a Memorandum of Alliance. TPC has not yet incorporated, but will in the future (TPC personal communication, 2012). Membership is structured in this manner to fulfill TPC's purpose: to assist provincial regulators with voicing common issues at a national level. TPC is very clear in the separation of roles between TPC roles and member organization roles (TPC personal communication, 2012). The TPC does not engage in the activities that are within provincial authority, but instead provides a common voice to national and international audiences.

Provincial regulators are involved in the organization through the Leadership Council and the CEOs meeting (TPC personal communication, 2012). The Leadership Council is composed of the presidents of the four member organizations. The Council meets a minimum of once per year to discuss high level issues (TPC personal communication, 2012). The CEOs meetings occur roughly once a month and discuss more operational issues and prepare items for the Council (TPC personal communication, 2012). Decisions occur via consensus (TPC personal communication, 2012), acknowledging that member organizations have legislated authority and duty regarding the profession.

TPC communicates with member organizations directly through direct dialogue such as telephone conversations or email. Member organizations may then choose to communicate information further to their individual members. The leadership council also provides a mechanism with which Council-to-council communication can occur from member organizations to the TPC Leadership Council. TPC also communicates through CEOs meetings where the TPC managing director is also present. Finally, the TPC also releases news communiqués and website materials, however, these are not necessarily specifically targeted to member organizations but to the public in general.

TPC is funded through member organizations which pay $6.00 per full-paying certified provincial member (TPC Jan 26th Minutes, 2011). Member organizations benefit by having a common national voice with increased weight.[15] Having a national organization will assist in stakeholder engagement to address common issues at a national level (TPC personal communication, 2012). Furthermore, members benefit from an enhanced accreditation service (CSA Report, 2012; TPC personal communication, 2012). TPC also notes that many individual practitioners have expressed to their provincial regulator their desire to have national representation (TPC personal communication, 2012). Therefore, some practitioners identify the need and value in having national representation to address common issues.

9.4 Stakeholder Engagement

Technology Professionals Canada uses multiple processes to engage with stakeholders in academia, and federal government. TPC uses a multi-level process with their news communiqués in which it is developed and released on the TPC website as well as distributed to target audiences. For example, for communiqués related to TAC, TPC directly sent the release to the National Council of Deans of Technology, the Council of Registrars as well as academic institutions including deans, program leads and instructors (TPC personal communication, 2012).

Similarly TPC believes stakeholders should be involved in developing TAC and invited representatives from TPC member organizations, the Council of Registrars, the Canadian Technology Accreditation Board, industry and academic to participate (TPC Technology Accreditation, 2011; TPC personal communication, 2012). Furthermore, the TPC engaged the Canadian Standards Association to conduct a thorough stakeholder engagement process for input on enhancing the accreditation service (TPC personal communication, 2012). Stakeholder workshops took place physically and virtually across Canada including participants from provincial regulators and College programs to determine how well the current system was meeting their needs (CSA Report, 2012). Interviews were undertaken with peer accreditation bodies to discuss their processes from an "operational perspective" (CSA Report, 2012).

TPC also engaged with federal government, such as Human Resources and Skills Development Canada to discuss issues relevant to member agencies. Engagement

[15] The combined membership of TPC member organizations represents roughly 85% of the profession in Canada (TPC March 18th Communication, 2011).

occurred through dialogue and in-person meetings (TPC personal communication, 2012). TPC noted that lack of incorporation of the organization has limited its engagement with Human Resources and Skills Development Canada due to the fact that the organization provides funding.

TPC engagement with industry has been limited and is a goal moving forward. It is currently looking for regional industry representation to contribute to the TAC development process. TPC has also engaged with peer organizations in the USA, the American Accreditation Board for Engineering Technology and the National Institute of Certification in Engineering Technologies to share information and discuss future cooperation (TPC Home, 2012; TPC personal communication, 2012). TPC member organizations also leverage provincial contacts on behalf of TPC, but only if the Leadership Council has approved the approach (TPC personal communication, 2012).

Of consultation processes utilized, TPC has had success with targeting communiqués to specific audiences ensuring all relevant audiences are reached (TPC personal communication, 2012). The stakeholder workshops were also successful, providing opportunity for stakeholder dialogue to produce valuable insights (TPC personal communication, 2012). Facilitators were key in the success of stakeholder workshops. (TPC personal communication, 2012).

9.5 Conclusion

Technology Professions Canada is a unique organization because it is a newly created organization that is in a period of transition. TPC wishes to engage in activities and provide services in all four themes, however, efforts in these areas are in the beginning stages. TPC has created a budget and timeline to create an accreditation body, TAC. TPC has reached out and is developing stakeholder relationships with all relevant bodies.

TPC is a unique organization in that another national organization within the profession exists, CCTT. TPC represents roughly 85% of the profession, however, that only consists of four provinces. Furthermore, TPC is unsure as to its involvement in maintaining National Technology Benchmarks ™ as ownership of the benchmarks is still being determined.

Further, within the profession an accreditation body already exits, CTAB, and they have some unique practices as well. Unlike other professions investigated where accreditation is a profession-paid service, CTAB utilizes a user-pay system where the academic organization pays for the accreditation visit. TPC, who is funding and overseeing TAC currently, is unsure if they will pursue a profession or user-pay system.

TPC is also unique in its membership structure in that provincial regulators have final approval of all TPC decisions through their leadership council. In other organizations investigated, provincial regulators may be bound by the national organizations decision, this cannot occur with TPC.

10.0 Discussion

Discussion of findings includes presentation of common successful practices of case study organizations and contextualization of those practices against the reality in which Biologists Canada could exist. This discussion centres on the four themes that were used to collect and analyze data.

10.1 National Standards Development and Maintenance

Many commonalities exist from the organizational history of the case study organizations. Each organization recognized the need and value for harmonized national standards and sought to create them. This initial harmonization effort seemed a large long-term project. An essential beginning step was to bring together provincial regulators and other stakeholders to establish a common basis for initiating consultation. Consultation with external stakeholders was a key component in project success. The two central groups needed were provincial regulators and academic representation. The creation of national standards in most organizations either developed out of or in conjunction with academic program accreditation. Therefore, academic representation in national standards development and maintenance is key for changes addressing academic program accreditation and provincial registration.

Additionally, consultation with industry and service providers ensures national standards are supportive of industry trends and needs. The extent to which industry input is reflected in national standards development or maintenance is at the discretion of the case study organization and their members, as too with engagement and consultation with industry. Consultation with industry could occur directly in a national standards maintenance process, such as the Qualifications Board, or through other interaction with industry. However, the key is that feedback from all sectors of the profession is incorporated.

Content analysis indicated the spirit of national standards harmonization efforts vary. Engineers Canada produced national guidelines which provincial organizations have worked towards implementing. The Canadian Council of Technicians and Technologists, in consultation with members, created the National Technology Benchmarks™. The Canadian Federation of Professional Foresters Associations created certification standards with which provincial regulators, excepting Québec, ratified and implemented (Certification Standards, 2008). Therefore, if Biologists Canada seeks to develop harmonized national standards, those involved will have to determine the purpose and authority of such a document.

Once harmonized national standards are created, their maintenance becomes manageable and much less resource intensive than the process to create them. Stakeholders involved in developing national standards generally also help with ongoing maintenance, especially if significant changes or reviews occur.

Table 1 below provides a summary of key comparable points of national standards development and maintenance findings. The intent of the table is to provide a quick reference tool when comparing organizations within the theme.

Table 1: Summary: National standards development and maintenance findings

	EC	CFPFA	TPC
Body responsible for development and maintenance	Qualification Board	The CFPFA	National Technology Benchmarks Committee
Parties consulted in development and/or maintenance	Provincial Regulators and National Council of Deans of Engineering and Applied Science	Provincial Regulators, various universities and colleges.	Provincial Regulators, Council of Registrars, National Council of Deans of Technology
How standards are maintained	Stakeholder feedback, monitor industry trends, periodic review	Periodic review, Comprehensive reviews with stakeholder input	Through committee, stakeholders have representation on committee.
How standards evolve with industry and/or academic trends	Qualifications board ensures standards are relevant internationally; monitors worldwide trends. Feedback is used in updating and revision.	Experience of board, staff and volunteers assist in identifying and engaging with trends. Large reviews involve formal consultation processes	Industry and academic representation on NTB committee, including Council of Registrars, which represent TPC member agencies.

10.1.1 Biologists Canada Considerations

Based on findings and discussion and in an effort to provide context members of the College should consider the following when assessing recommendations:

1) Establishing harmonized national standards could be a lengthy and costly process, so cost should be considered when prioritizing recommendations.
2) Documents that create national standards can vary in spirit, so the purpose of an applied biology standards document needs to be determined, such a document could be authoritative or aspirational in nature.
3) Academic, regulator and industry representation and stakeholder input is valuable, so stakeholder relations will need to be fostered.
4) Ongoing maintenance of standards is necessary, so mechanisms should be implemented that allow for continued upkeep of national standards and continued stakeholder engagement.

The preceding discussion of findings and considerations has informed the development of recommendations regarding how Biologists Canada can develop and maintain national standards. The following section discusses academic program accreditation findings noting common themes.

10.2 Academic Program Accreditation

All professional organizations stated that accreditation was of benefit to themselves and their members. Accreditation criteria are closely linked to national standards, as the National Technology Benchmarks™ are to assist in certification and academic program accreditation (TPC personal communication, 2012). Similarly, criteria for accrediting Canadian forestry programs have been harmonized with the certification standards for entry into the forestry profession (CFAB personal communication, 2012). Therefore, accreditation of academic programs assists in developing and maintaining a national standard in education.

From provincial regulators perspectives program accreditation significantly reduces the resources they must invest in assessing the academic credentials of an applicant. The professional regulator can be assured the applicant possesses the necessary academic competencies[16] required for registration, licensure or certification.

Developing and maintaining accreditation is not an internal project but one carried out by engaging various stakeholders. All case study organizations developed their accreditation criteria in consultation with provincial regulators and academia. It was common that case study organizations engaged a national organization representing academic considerations such as the National Council of Deans of Technology, National Council of Deans of Engineering and Applied Science or the Association of University Forestry Schools of Canada. Industry had a limited role in developing accreditation criteria. Organizations continue to maintain accreditation with stakeholder input.

The common procedure for the accreditation of a program is as follows:

1) The academic agency initiates request for program accreditation either directly or through provincial regulator.
2) The accreditation board, in consultation with provincial regulator, composes accreditation visit team.
    i) accreditation team lead by accreditation board member
    ii) team has broad representation of relevant disciplines
    iii) some team members have prior program accreditation experience
3) The accreditation board distributes pre-visit documentation to academic agency.
    i) pre-visit documentation provides an opportunity for academic agency to demonstrate through evidence that relevant accreditation criteria have been met or exceeded.
4) The accreditation team receives pre-visit documentation and prepares for visit.
5) The accreditation team visits academic agency.

[16] Competency is a term used in many different ways, even within the credential assessment environment. Please refer to appendix 13.7 for a brief discussion regarding the term.

   i) accreditation team conducts interviews with broad spectrum of individuals including but not limited to: senior administration staff, faculty, students, and graduates.
   ii) accreditation team tours all relevant facilities of program
   iii) accreditation team reviews relevant documentation associated with the program including but not limited to: student work, teaching materials, examinations, laboratory materials, and program policies and procedures

6) The accreditation team prepares written report and submits to academic agency for review and comment.
7) With academic agency feedback, the accreditation team prepares final accreditation report and submits report to accreditation board.
8) The accreditation board renders a decision
9) If accreditation is denied, the academic agency may pursue appeal process.

Academic programs are evaluated against established accreditation criteria involving qualitative and quantitative considerations. Accreditation criteria are generally outcome or competency based.[17] Programs are evaluated to ensure graduates will possess specific knowledge, skills and competencies through upon graduation from the program. It may be the case that training related to a certain competency is contained in a concentrated course in one academic agency and across several courses in another. The goal of competency-based assessment is to ensure the necessary graduate outcomes are present. As discussed, accreditation criteria are closely linked with certification, registration or licensure requirements, therefore the competency-based accreditation criteria ensures that over the course of an academic program, graduates will have the necessary academic training for entry into their corresponding profession.

Common elements of the program evaluation process are evaluation of: graduate outcomes and/or attributes; program curriculum; program policies and procedures, leadership, faculty, and governance; and, facilities and student support.

Funding of the accreditation process differed between the organizations. Engineers Canada and the Canadian Forestry Accreditation Board fund accreditation services out of provincial regulator funding. The Canadian Technology Accreditation Board funds accreditation services through fees, which the academic agency must pay. Technology Accreditations Canada is unsure as to how accreditations will be funding, but are considering both models (TPC personal communication, 2012).

Case study organization accreditation boards operate with a degree of autonomy and independence as separate standing committees, with or without controlled sources of

[17] Engineers Canada is currently working towards competency assessment (EC personal communication, 2012).

funding or as separate organizations entirely. For example, TPC has expressed that TAC will be a separate organization, it was noted this would provide independence of the accreditation process from other TPC operations (TPC personal communication, 2012). It is assumed that TPC member organizations would also be members of TAC.

Table 2 provides a summary of key comparable points from academic program accreditation findings. The intent of the table is to provide a quick reference tool when comparing organizations within the theme.

Table 2: Summary of key points of academic program accreditation findings

	EC	CFAB	TPC	CTAB
Body responsible for accreditation	Engineers Canada Accreditation Board (standing committee)	Canadian Forestry Accreditation Board	Technology Accreditations Canada (separate organization funded by TPC, in development)	Canadian Technology Accreditation Board
Process for accreditation	Pre-visit documentation filled out by academic agency, then accreditation visit, and then accreditation decision.	Pre-visit documentation filled out by academic agency, then accreditation visit, and then accreditation decision.	Undetermined	Pre-visit documentation filled out by academic agency, then accreditation visit, and then accreditation decision.
Processes to evaluate	Interviews with staff, students and instructors. Tours of all facilities. Review of any relevant material.	Interviews with staff, students and instructors. Tours of all facilities. Review of any relevant material.	Undetermined	Examines and tours all facets of program with primary importance weighed on program outcomes.
Broad accreditation criteria	Continual improvement, graduate attributes, program policies and procedures, curriculum content, and program environment	General, curriculum (foundational, core and complementary studies), program outcomes, and program environment.	Undetermined	National Technology Benchmarks to assess program strengths, weaknesses, course outlines, evidence of student work, organization governance, faculty qualifications, and management of program.
Accreditation Team	15 volunteers representing different disciplines academically and non-academically	At least four RPFs. Team has broad representation of forestry experience. Includes member of CFAB.	Trained qualified auditors	Determined in consultation with provincial regulator in area.
Funding process	EC funds accreditation	CFAB funds accreditation	Undetermined	User-fee system
Oversight	Academic agency declares any significant changes to accreditation board	Academic agency declares any significant changes to accreditation board	Auditable practices and procedures	Academic agency submits variance reports periodically to highlight any program changes year. Random audits occur as well.

10.2.1 Biologists Canada Considerations

Based on findings and discussion and in an effort to provide context members of the College should consider the following when assessing recommendations:

1) Programs are the only entities currently accredited. Few if any applied biology programs exist. Furthermore, there are many different biology programs and other biological science programs such as environmental science with diverse program and elective-course structures. Individuals working to establish an accreditation process will have to engage with these challenges.
2) Accreditation services can be funded in different ways. Those establishing an accreditation process will have to consider the financial feasibility of the two models presented.
3) There is tremendous value in developing accreditation services; they assist in developing and maintaining national standards.
4) Accreditation criteria generally utilize competency-based assessment. The College utilizes course-based and competency-based assessment when evaluating applicant's academic credentials. The College will have to consider whether strictly competency-based assessment is feasible for applied biology. It should also consider whether course-based curriculum assessment is feasible for accreditation.

The preceding discussion of findings and considerations has informed the development of recommendations regarding how Biologists Canada can develop an academic accreditation program. The following section discusses membership structure, involvement, and funding findings noting common themes.

10.3 Membership Structure, Involvement and Funding

The case organizations varied somewhat in membership composition. However, the primary members of case study organizations are provincial regulators of the corresponding profession. Forestry organizations have varied membership structures, which reflect the different roles of each organization and the fact that forestry regulation is not present in each province and territory.

Organizations are generally structured to ensure equal representation from member organizations and to assist them in engaging with common national issues. Representatives or appointees from member organizations generally comprise the case study organization board of directors or council. Therefore, members are involved in the governance of the organization and provide direction to operations.

Communication primarily exists between case organizations and their member organizations. Members retain authority in determining whether information is disseminated to individual practitioners. Organizations studied also publish materials such as newsletters, policy and position papers, communiqués, news releases, editorials, and other website material which is available for member and public viewing.

The benefit in membership and participation in the organization is generally derived from: providing academic accreditation services; facilitating the establishment and development of national professional standards; and, offering a voice to engage with common national issues to national audiences and stakeholders. A majority of organizations were funded through member organization contributions, which consists of a fee per active licensed, registered or certified practising member.

Table 3 below provides a summary of key comparable points of membership structure, involvement and funding findings. The intent of the table is to provide a quick reference tool when comparing organizations within the theme

Table 3: Summary of membership structure, involvement and funding findings

	EC	CFPFA	CFAB	CIF	TPC
Members	Provincial Regulators	Provincial Regulators, CFAB, and CIF	Provincial Regulators, and CIF	Individuals	Provincial Regulators in AB, BC, Sask and Ont.
Organization Structure	National Board, Accreditation Board, Qualifications Board, and various committees	National Board composed of individuals from member organizations	National Board composed of individuals from member organizations	National Board, Regional Sectors	Leadership Council, CEOs Meeting
Organization Purpose	Support provincial regulators of engineering at a national and international level	Advocate for matters identified by members as having national or international consequence	Accredit post-secondary forestry programs	Promote competence of forestry professionals and awareness of forestry issues	Assist provincial regulators with voicing common issues at a national and international level
Communication	Publications, Newsletters, Annual Report, Board and committee meetings.	Direct dialogue, annual reports, and meetings.	Annual report, financial review, direct dialogue, meetings.	News releases, Annual reports, policy and position papers, publications, and editorials	News releases, direct dialogue, e-mail, and meetings.
Funding	Members pay EC $10.21 per active licensed engineer	Provincial regulators pay CFPFA a fee based on number of active registers/licensed foresters	Provincial regulators pay CFAB a fee based on number of active registers/licensed foresters. CIF pays fixed % of budget	Individuals pay annual dues. Partners provide funding for specific programs	Members pay TPC $6.00 per active technician or technologist

10.3.1 Biologists Canada Considerations

Based on findings and discussion and in an effort to provide context, members of the College should consider the following when assessing recommendations:

1) Individuals assessing recommendations will have to determine the strategic direction and purpose of Biologists Canada in order to employ governance structures to achieve organizational goals.
2) Like forestry, the practice of applied biology is not regulated in all provinces and territories. Biology is regulated in only two provinces: therefore, individuals assessing recommendations must determine the feasibility of a provincial-regulator-only membership structure.
3) Individuals assessing recommendations should consider strategies the forestry profession have utilized to represent provinces without regulation.
4) Biologists Canada could be comprised of both organizations and individuals. Communications strategies will have to be developed to address this difference.
5) Funding per active registered professional biologist may not meet the financial needs of Biologists Canada; other options and funding structures may have to be considered.

The preceding discussion of findings and considerations has informed the development of recommendations regarding how Biologists Canada can fund, structure and govern the organization. The following section discusses stakeholder engagement findings noting common themes.

10.4 Stakeholder Engagement

All organizations felt that stakeholder engagement was essential in achieving organizational goals. They engaged with government, academia, provincial regulators, businesses, national media, industry and other entities. Determining relevant stakeholders is the prerogative of organizations, however, engaging with academia and government are central to their purpose. All organizations utilized multi-pronged engagement strategies targeting specific audiences. Organizations used a variety of publications to communicate and deployed them passively, through website publication, and actively, through sending them to specific stakeholders. When engaging with academia, targeting stakeholders working many positions has been successful, such as deans, program leads, administration staff and individual instructors.

Successful government engagement strategies have focused on the same multi-level process engaging bureaucratic and political elements of government using multiple processes. Furthermore, engaging support staff was essential to ensuring communications where heard. With regard to government engagement, case study organization focus engagement on federal government only reflecting their organization's mandate. Member organizations can engage with provincial governments themselves.

Engagement strategies were specific to the issue or project being addressed. For large projects, such as the creation of certification standards, stakeholders were invited to participate in many processes including surveys, questionnaires, meetings, and workshops. Additionally, when documents were drafted, many opportunities for stakeholder review and comment were provided.

Ongoing engagement and communication were also found to be important. Dedicating specialized resources for engagement, such as Engineers Canada's Dean Liaison Committee, has proven successful. A specialized task force, committee or team can focus more on a certain issue or relationship and delve deeper into the issue (EC personal communication, 2012).

A key element of stakeholder engagement is not only for the case study organization to receive feedback but to educate stakeholders regarding realities, complexities and/or issues in professional regulation in Canada. Educating stakeholders assists in achieving organization goals.

Additionally, maintaining a constructive, science-based approach was important for external communications. Furthermore, leveraging provincial contacts established through member organizations, on behalf of the national organization, has been valuable.

Organizations seem to occupy the role of facilitator in external stakeholder engagement. Case studies coordinate the positions and interests of member organizations and then facilitate discussion, through many processes, with external organizations in order to engage with issues or concerns.

Table 4 provides a summary of key comparable points of stakeholder engagement findings. The intent of the table is to provide a quick reference tool when comparing organizations within the theme.

Table 4: Summary of stakeholder engagement findings

	EC	CFPFA	CFAB	CIF	TPC
Academic Engagement	National Council of Deans of Technology, Dean's Liaison Committee	Not CFPFA's role.	Association of University Forestry Programs. Also dialogues with deans and program leads	Not CIF's role. Communicates with CFAB.	News releases to multiple levels in Academia. Invited representatives to be involved in development processes. National Council of Deans of Technology, Council of Registrars
Government Engagement	Government relations committee works with multiple agencies and ministries. Picnic on the Hill, "Bridging Program"	Worked with federal government to establish inter-association mutual recognition agreement prior to AIT	Not CFAB's role	Canadian Council of Forestry Ministers	Engaged Human Resources and Skills Development Canada

	EC	CFPFA	CFAB	CIF	TPC
Industry Engagement	Sector Councils, Labour Market Study, Attend engineering discipline meetings, such as aerospace	Included in large reviews. Included via questionnaire in Inclusivity project	Engagement occurs through board and former accreditation team experience	Engagement occurs through partnerships and corporate sponsors	Limited to date. Looking for representation to aid in the development of TAC
Other Engagement	Peer international organizations			National media	Peer international organizations

10.4.1 Biologists Canada Considerations

Based on findings and discussion and in an effort to provide context, members of the College should consider the following when assessing recommendations.

1) Given limited resources, specialized stakeholder engagement may be more difficult
2) Due to the fact that applied biology is regulated in only two provinces, provincial contacts may be limited.

The preceding discussion of findings and considerations has informed the development of recommendations regarding how Biologists Canada can engage and consult with various stakeholders to achieve organizational goals. The next section presents recommendations for all themes discussed to assist the College in developing Biologists Canada.

11.0 Recommendations

The following sections present thematic and prioritized recommendations. The thematic recommendation section outlines the lessons developed regarding each theme reviewed in Sections 5, 6, 7, 8 and 9. The prioritized recommendations section offers broad priorities and rationale regarding implementing thematic recommendations.

11.1 Thematic Recommendations

The following subsections present the recommendations developed from each theme that was investigated.

11.1.1 General

1) The College of Applied Biology should communicate with the Alberta Society of Professional Biologists regarding the creation of and membership in Biologists Canada.

11.1.2 National Standards Development and Maintenance

1) Leaders of Biologists Canada[18] should begin a facilitation and consultation process to determine a common standard of registration between existing professional regulation in British Columbia and Alberta.
2) In an effort to lower costs of a national standards consultation process and provide increased opportunity for inclusion, internet-based processes, such as web-meeting and webinar workshops, should be used when possible.
3) Biologists Canada should create a committee dedicated to oversee the development of national standards, based on the following considerations:
    i) Committee members should include representatives from provincial regulators with credential assessment experience.
    ii) The committee should strive for members with academic, government and industry experience across many geographic regions in Canada.
    iii) The committee should strive to create a common baseline set of standards to be used to engage with stakeholders for their input and commentary.
    iv) The committee should continually contribute input on national standards with ongoing stakeholder input. Additionally, the committee should address any new provincial inconsistencies identified by members.
    v) A review mechanism should be built into the committee's terms of reference to ensure the consistent quality of national standards.

[18] Leaders of Biologists Canada are still to be determined. It is assumed that initial leadership may be comprised of representatives from the College and the Alberta Society for Professional Biologists. Leadership may expand to include executive director and other support staff.

vi) A standards document should be developed by the committee, as a national registration *guide* to allow flexibility for existing professional regulation and adequate time to implement necessary changes.

4) Academic requirements for national registration guidelines should be harmonized with accreditation criteria. See Appendix 13.6 for further discussion.

11.1.3 Academic Program Accreditation

1) There is a clear benefit in academic program accreditation; Biologists Canada should create and operate a Biologists Canada Accreditation Board.
2) The Biologists Canada accreditation board should have independent governance from Biologists Canada.
3) The Biologists Canada Accreditation Board should utilize evidence-based procedures outlined in section 10.2 as a framework for developing an accreditation process for biology.
4) The Biologists Canada Accreditation Board will have to develop applied biology specific accreditation criteria specific for Professional Biologist and Technologist education.
5) Biologists Canada Accreditation Board should comprise members with accreditation experience, academic credentialing experience, and/or various discipline and sector experience. Additionally, members should be included from regions across Canada.
6) The Biologists Canada Accreditation Board should invite stakeholders from academia, industry and peer accreditation boards to assist in developing an accreditation process.
7) Academic stakeholders should be involved at all levels including national associations such as The Canadian Council of Deans of Science, deans, senior administration staff, and senior instructors.
8) Accreditation criteria should be harmonized with the academic requirements of national registration guidelines. See Appendix 13.6 for further discussion.
9) The Biologists Canada Accreditation Board should include an audit program to ensure no changes have occurred during accreditation terms.
10) The Biologists Canada Accreditation Board should consider a user-fee based accreditation system.

11.1.4 Membership Structure, Involvement and Funding

1) The membership structure for Biologists Canada should include a national Board of Directors and Regional Sectors in provinces or areas that do not have provincial regulation.
2) The National Board of Directors should be comprised of representatives from each regulatory body as well as from unregulated Sectors. Regional representation should be reflected in committees or task forces.
3) The National Board of Directors should operate using a consensus-based model to protect the legislated mandates of regulatory members.
4) The National Board of Directors should create governance document centered on a clear definition of organizational mandate to assist, and not interfere with,

provincial regulators in representing their interests to national and international audiences.

5) The National Board of Directors should develop specific communication policies that address communication to member organizations, individual members and individual practitioners belonging to member organizations.
6) Biologists Canada should be comprised of biology regulatory bodies from British Columbia and Alberta and individual members from other provinces and territories.
7) Funding for Biologists Canada should come from two sources:
    i. a fee, to be determined, per registered practicing member of the College of Applied Biology and the Alberta Society of Professional Biologists; and,
    ii. individual member dues for members joining from regions without applied biology regulation.
8) The leadership of Biologists Canada should seek additional and/or start-up funding from federal government agencies such as Human Resources and Skills Development Canada (HRSDC).[19]
9) The leadership of Biologists Canada should consider representing and assisting sectors without regulation pursue professional legislation where appropriate.
10) The leadership of Biologists Canada should endeavour to create communication and engagement strategies targeted to members to educate them regarding the responsibilities and accountabilities of professional regulation
11) The leadership of Biologists Canada should endeavour to foster partnerships with government or other organizations to assist in funding services, such as Continued Professional Development.
12) Biologists Canada should endeavour to Incorporate under the *Canada Not-for-profit Corporations Act*
13) Once incorporated, Biologists Canada should endeavour to hold the official marks for terms related to the profession of biology, such as Applied Biology, Professional Biologist, Biologist, and any other relevant terms or titles. Protection of terms and titles will ensure accurate public perception of the profession.

11.1.5 Stakeholder Engagement

1) The leadership of Biologists Canada should dedicate resources to specific stakeholder engagement committees or task forces for federal government, academia and industry.
2) External engagement should be a two-way process, which consists of gaining external feedback whilst educating external stakeholders regarding profession matters.
3) Biologists Canada bodies should endeavour to publish a variety of materials to engage with specific audiences in a deliberate and targeted approach with multiple instruments for specific projects.
4) External communications should be apolitical, objective and science-based.

[19] The College is currently engaged in an application process with HRSDC to gain funding to implement recommendations. Biologists Canada would assist HRSDC in facilitating labour mobility and creating a common national standard with which to assess foreign credentials of international applicants.

5) Engagement with federal government should focus on political and bureaucratic levels, including support staff.
6) Stakeholder engagement is valuable; processes utilized should be tailored for specific projects or issues.
7) Multiple consultation processes involving all relevant stakeholders should be utilized when creating national registration guidelines.
8) The leadership of Biologists Canada should facilitate among stakeholders when creating national registration guideline.

11.2 Prioritized Recommendations

Many recommendations have been presented regarding disconnected themes. The following section aims to present broad priorities in implementing recommendations and offers supportive rationale.

11.2.1 Accreditation Recommendations

The leaders of Biologists Canada should focus resources and efforts implementing thematic recommendations to create and operate a Biologists Canada Accreditation Board.

Rationale:
Biologists Canada should implement these recommendations because academic agencies already see the value in accreditation and have engaged in these activities in other disciplines. They have already contacted the College seeking accreditation and given this desire, beginning stakeholder relationships may be less difficult. Stakeholder relationships could be further utilized for other organizational goals such as developing accreditation standards that can assist in the larger project of developing national registration guidelines.

Accreditation offers a tangible benefit to perspective members. It will provide immediate value to member organizations in reducing resources necessary to assess individual applications, providing cost savings to the College and the Alberta Society of Professional Biologists. Accreditation could also assist provincial regulators in assessing internationally trained applicants. Furthermore, accreditation services can be funded through a user-fee system to offset costs given limited resources available, and therefore, may not be a cost intensive.

Moreover, creating accreditation criteria could have the additional benefits of increasing student awareness of Biologists Canada, which could assist in attracting members to provincial regulators and Biologists Canada.

Finally, implementing these recommendations would support guiding principles 2: Biologists Canada should to educate membership as to their role and interaction in the organization to increase member satisfaction. Implementing these recommendations

would also support guiding principle 3: Biologists Canada should engage with representative stakeholders to achieve organizational goals.

11.2.1 Governance and Membership Recommendations

The leaders of Biologists Canada should implement thematic recommendations regarding a governance structure that has national and sector representation utilizing a consensus-based approach to decision making. See Appendix 13.3 for a sample membership representation diagram.

Rationale:
This governance structure is recommended because it would allow for inclusion beyond the College of Applied Biology and the Alberta Society of Professional Biologists (ASPB), allowing for broad membership across Canada with room for expansion. Sector structures would provide a means for assisting other regions in moving towards professional regulation; histories of the CIF (CIF personal communication, 2012) and the College support this.

The governance structure allows for mixed funding and ensures that existing professionals pay similar dues as non-professionals. See Appendix 13.4 for a proposed funding structure. The structure provides a consensus-based decision-making approach for the national board of directors that respects members with legislated mandates. Consensus-based decision-making ensures that no legislated member would be forced to accept a decision that would violate its mandate.

Furthermore, the structure would also allow the two provincial regulators of biology, to establish a national registration guideline to avoid further inconsistencies with regulation to be developed in other provinces. This is possible because it is likely that the College and the ASPB would be the founding members until sectors could be developed.

Finally, Implementing these recommendations would support guiding principle 1: Biologists Canada must be aware and account for power dynamics in creating a membership structure, allowing for inclusion and representation of a broad membership while respecting different provincial mandates.

11.2.3 Stakeholder Consultation Recommendations

The leaders of Biologists Canada should endeavour to design a stakeholder consultation process to develop a national registration guideline for entry into the profession of biology. See Appendix 13.5 for a sample consultation process.

Rationale:
Biologists Canada should implement these recommendations because stakeholder consultation has benefited the organizations studied and should aid Biologists Canada. Engaging stakeholders will ensure a representative and quality national registration guideline. Ongoing engagement with academia will ensure that post-secondary education

will provide foundational learning for professional practice. This task should be simplified with the identification of accreditation criteria

Engaging industry will ensure that its needs and trends are understood. Engaging government will ensure that any national guideline reflects the realities of interprovincial agreements. Engaging stakeholders will also establish relationships for further relations for reoccurring input on Biologists Canada services.

Creating national guidelines will benefit existing provincial regulators in assisting with inter-provincial mobility now and more so once additional provincial regulators emerge. They will also benefit future provincial regulators in providing a template for provincial regulation; sectors should assist in this transition. Additionally, creating national guidelines will benefit the profession in assisting with international stakeholder engagement.

Finally, Implementing these recommendations would support guiding principles 2: Biologists Canada should provide a mechanism to educate membership as to their role and interaction in the organization to increase member satisfaction. Implementing these recommendations would support guiding principle 3: Biologists Canada should engage with representative stakeholders to achieve organizational goals.

11.2.4 Organizational Services Recommendations

The leaders of Biologists Canada should implement the thematic recommendations regarding services and practices aimed at representing the interests of provincial regulators, emerging sectors, the profession, and the public interest to national and international audiences.

Rationale:
Biologists Canada should implement these recommendations because ongoing maintenance of accreditation criteria, registration guidelines and stakeholder relationships will ensure the profession is adaptive to regional, national and international trends or changes. Offering national services can further promote and enhance national guidelines in the profession, such as professional development programs or conferences. Moreover, new services could offer Biologists Canada additional revenue streams.

Implementing these recommendations could assist in international competitiveness and growth of the profession. For example, Biologists Canada could broker international mutual recognition agreements with peer national organizations, such as the Society of Biology in the United Kingdom. Implementing these recommendations could also assist the profession in determining a common standard with which to evaluate internationally trained applicants. Biologists Canada could be well positioned to assist in collecting labour market data to identify trends, changes or challenges and communicate them to stakeholders and membership. Finally, implementing these recommendations would be supportive of all three guiding principles.

11.3 Implementation Resources and Time

Table 5 provides an estimation of the time and resources needed to implement recommended tasks. Concrete estimations are difficult at this point in the project. However, the table prioritizes tasks and provides an approximate resource cost.

Table 5: Implementation resources and time

Tasks	Body	Priority	Resources/Time
Communicate with ASPB	College of Applied Biology	High	The College Registrar and support staff could begin dialogue with minimal resources.
Create National Board of Directors	College and ASPB at inception	High	Utilizing electronic technologies, both organizations may be able to establish a board with minimal cost. However, staff from each organization would have to support the board, at least during inception.
Incorporate the organization	National Board of Directors	High	The board, with support staff, would have to draft the necessary documentation for incorporation and pay incorporation fees, which are roughly $200.00 CAD.
Seek start-up funding	National Board of Directors	High	Seeking funding would require extensive time to develop funding applications, researching funding opportunities and foster relationships with proposed funders. Dedicated support staff would be required.
Develop governance documents including mandate, membership structure and communication policies	National Board of Directors	High	Dedicated support staff would be needed to assist in drafting these documents. Refining documents could be time intensive. The high priority element of this task is determining information required for incorporation. Other policies can be developed or refined in the future.
Create Biologists Canada Accreditation Board	National Board of Directors	High	The National Board will need to seek out qualified individuals to join the accreditation board. This could be a lengthy process. The National Board may also wish to seek out individuals to assist in the development of the accreditation board, but not necessarily in the operation of the accreditation board.
Develop accreditation criteria	Biologists Canada Accreditation Board	High	Once the accreditation board is formed, they will need to engage academic stakeholders and start a process to develop accreditation criteria. This could be resource intensive project commanding lots of time and funding. TPC created a budget and timeline of 18 months to create its accreditation board. This timeline seems reasonable for Biologists Canada.
Determine accreditation funding structure	National Board of Directors and Biologists Canada Accreditation Board	High	During the development of the accreditation criteria, support staff will need to develop a financial plan for the accreditation board and determine a sustainable funding structure. This may require significant staff work.
Create National Standards Committee	National Board of Directors	Medium	This will require similar amounts of work as the creation of the accreditation board. It may be the case that those already involved with Biologists Canada may be qualified and willing to sit on the committee, thereby reducing the effort needed to establish the committee.

Tasks	Body	Priority	Resources/Time
Facilitate consultation process to determine national standards guideline	National Standards Committee	Medium	This task will require significant resources and time. Consultation processes should be held across Canada with multiple stakeholders, including industry. It is estimated this process may take 1-2 years. Biologists Canada may also seek external consultants to aid in designing and managing this project. Identified accreditation criteria should assist in creating common education standards, which should lower resources needed
Create engagement committees	National Board of Directors	Medium	This task should not be very resource intensive. Committees may be able to meet using electronic media
Harmonize national registration guideline and accreditation criteria	National Standards Committee and Biologists Canada Accreditation Board	Medium	Harmonization should be considered at the onset of the national standards development process. Accreditation criteria can be used as a starting point to develop national education standards. If proactively managed this task should not be resource intensive.
Accredit academic agencies	Biologists Canada Accreditation Board	Low	Accreditation work would be done primarily by accreditation visiting teams who work voluntarily. Costs of accreditation are unknown until a funding structure is determined. Each visit may require 1-3 days.
Develop foreign credential assessment process	National Standards Committee	Low	Identification of accreditation criteria will greatly reduce resources needed to develop this process. Committee staff support would be required to aid in drafting documents.
Conduct accreditation audits	Biologists Canada Accreditation Board	Low	A trained auditor, most likely an accreditation board member, would conduct accreditation audits. Each audit would take roughly 1-3 days to complete. Detailed costs of audits should be researched by support staff and considered in determining an accreditation costs.
Develop regional sectors	National Board of Directors	Low	Resource and time costs for this task are unknown and depend largely upon the region in question. Once stakeholder relationships have been developed in these regions, Biologists Canada would have a better understanding of what is needed.
Gain official trademarks of relevant biology profession terms	National Standards Committee	Low	Acquiring official trademarks would be primarily a one-time investment. Staff support would be needed for research and preparation of documents.
Publish organizational materials	Communication committees	Low	Communication committees will have to consider publication costs. Electronic publications would cost significantly less. Publications would require some staff support.

While specific timelines for implementation cannot yet be determined, it is imagined that it will take roughly five to ten years for Biologists Canada to become established and offer all services recommended. As discussed, an accreditation board should be established, which should take roughly two years. The next priority should be the creation of a national registration guideline, which could take roughly two years to complete as well. Next, Biologists Canada should endeavour to establish recommended organizational services, depending on the service; this could take one to two years. Finally, in an ongoing capacity, Biologists Canada should support regional sectors and assist them in advancing the profession; this project could take five plus years.

11.4 Conclusion

The researcher, in consultation with the College, embarked on a project to establish a plan to create Biologists Canada, a new national organization to represent the profession of biology as a means to engage with regulatory issues. To create this plan the researcher conducted research to answer the following research questions: What is the approach recommended for establishing a national organization, Biologists Canada, aimed at determining and promoting a common standard of conduct and practice in applied biology? How could Biologists Canada account for a power imbalance in membership in a way that is complementary to its organizational goals? What would be the best strategies for engaging in dialogue with stakeholders in order to achieve organizational goals? In answering these questions, this report was created which presents prioritized recommendations regarding how the College should proceed in developing such an organization as well as the role and function of such an organization.

The report outlines recommendations regarding developing: national standards, national accreditation criteria, representational governance and membership structures, and stakeholder consultation processes. It was determined that creating a Biologists Canada Accreditation Board would be a high priority because the services provided by such a body would aid in national standards development and stakeholder consultation. Furthermore, accreditation services can be funded by academic agencies via a user-pay system assisting Biologists Canada during initial years when resources will be limited.

It was also determined that creating national standards for the profession of biology is necessary and beneficial and that leadership of Biologists Canada should prioritize their development. Moreover, a governance and membership structure was proposed that would allow for national inclusion and room for expansion as professional regulation emerges in new provinces. Finally, it was recommended that in all significant efforts, stakeholders be consulted and engaged with through various processes.

Further research should be conducted in two central areas:

1) A concrete financial should be developed for Biologists Canada that includes funding for implementation of recommendations; and

2) Specific research should be conducted to assist Biologists Canada in developing accreditation criteria.

Implementing these recommendations is important because the profession of biology is growing. Proactive measures need to be taken to ensure the profession is standardized across Canada in order to avoid interprovincial and international disputes, such as divergent professional standards. Implementing these recommendations will help grow and solidify the profession ensuring that all biologists across the country contain the knowledge, skills, and competencies necessary for competent practice. Successful implementation will be of benefit to the biology practitioner, the profession, and the public nationally and internationally.

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13.0 Appendices

The following appendices aim to provide increased understanding and clarity regarding many complexities that exist within the research project.

13.1 Process to Determine Case Study Organizations

The following subsections outline the process the researcher utilized in determining suitable case study organizations.

13.1.1 Survey

Prior to selecting case study organizations with which to discern lessons and recommendations for Biologists Canada, the College wanted a brief survey done of the Canadian natural resource professional organization and association environment. The survey was intended to identify case study organizations with which to conduct more in-depth analysis.

13.1.2 Survey Criteria

The following criteria were developed to guide and define the scope of the survey conducted to determine suitable case study organizations.

13.1.2.1 Criteria 1: Canadian Scope

In discussion with the College several criteria were established to define the scope of the survey's environment. First, the survey would need to be bound within Canada. The rationale for this criterion is founded in the unique structure of the regulatory legislation in Canada, in which licensure and title protection are within provincial jurisdiction rather than federal. This is often not the case, in a survey of Biology Regulation in European states, Samis (2011) identified that all European biology regulation occurred at a national level. Therefore, considering that Biologists Canada will have to operate in this unique environment, it seemed that it was logical to limit the scope of the survey to Canada.

13.1.2.2 Criteria 2: Natural Resource Professions

Second, the scope of the survey was focussed on natural resource professions. There are multiple reasons for this criterion. The College of Applied Biology of BC has a strong history that is linked to the forestry profession of the province. With this in mind, the College recognizes that the profession of biology is not insulated from other professions. In many large-scale projects, multiple natural resource professions work together and are collectively relied upon for their expertise and competency. Therefore, it would be in Biologists Canada's interest to have a similar structure to other natural resource professional organizations to enhance working relationships.

13.1.2.3 Criteria 3: Profession Oriented Organizations

Third, the scope of the survey is limited to organizations that are engaged with the member or public interest in a profession. Organizations exist which focus on natural resource subject matter, such as environmental advocacy organizations, however, they do not engage with the issues or interests that are central to natural resource organizations.

Additionally, the College expressed an interest in the legislation that underpins natural resource professional organizations. Therefore, the survey also sought to identify pieces of legislation that lend authority to regulator organizations and legal status to professional associations.

13.1.2.4 Conclusion

With these criteria in mind a survey was conducted to identify federal and provincial natural resource organizations, orders and associations and the legislation that enables them. The following table was produced from searching the World Wide Web utilizing: professional association inventories, such as the Canadian Information Centre for International Credentials (CICIC); Provincial trade agreements, such as the Trade, Investment and Labour Mobility Agreement (TILMA); and government legislation archives, such as BC Laws.

13.1.3 Themes and Determination of Case Study Organizations

The following subsections present findings from the survey conducted to determine suitable case study organizations.

13.1.3.1 Theme 1: Central Professions

From the data collected from the survey several themes emerged which aided in identifying suitable case study organizations. The first theme noted was that natural resource professions, within Canada, centered around six central professions or areas: Biology, Engineering, Forestry, Agrology, Geoscience and Applied Science technicians and technologists. It is important to note that the profession of Engineering has many specialties which may not involve natural resource concerns, such as electrical engineering, however, many areas of engineering do work in natural resource areas, such as mechanical, structural, environmental or civil engineering.

13.1.3.2 Theme 2: Professional Regulation Models

The second theme that was noted was that there are two different models of professional regulation in the natural resource sector. One focuses on a certain profession, for example forestry, and regulates all professionals and practitioners within. The other focuses on common elements of practice, for example work done by technologists and technicians, and regulates them across various professions. Applied science technicians and technologists operate according to the second model. Instead of creating regulatory bodies that are centered on a certain profession, applied science looks at the type of work conducted across various professions at the technologist or technician level and regulates

that practice. Therefore, regulated applied science technicians and technologists may work across multiple natural resource professions.

There does not seem to be consensus across the Canadian natural resource regulatory sector regarding the separate technician/technologist regulation model. For example, the Association of Saskatchewan Forestry Professionals regulates forestry technologists (Association of Saskatchewan Forestry Professionals, 2012). Moreover, the College of Applied Biology of British Columbia regulates applied biology technologists (College of Applied Biology, 2012). Whereas, the Association of Professional Engineers and Geoscientists of British Columbia do not regulate technologists or technicians (Association of Professional Engineers and Geoscientists of British Columbia, 2012), instead leaving that activity to the Applied Science Technologists and Technicians of British Columbia (Applied Science Technologists and Technicians of British Columbia, 2012). Therefore, some professions regulate technicians/technologists and some do not. The reasoning for this is beyond the scope of this study, however, it is important to note that multiple models exist.

Applied Science technicians and technologists are included in this survey because, although their regulatory framework is different, they represent a meaningful population of natural resource practitioners. Furthermore, applied science technicians/technologists have a fairly robust regulatory framework across Canada. In developing a plan to establish Biologists Canada, regulatory considerations regarding technicians and technologists will need to be considered.

13.1.3.3 Theme 3: Strength of Regulatory Framework

A third theme noted from the survey was the strength or weakness of the profession's regulatory framework. This to say, that some professions have very stable and established national and provincial bodies while other professions do not or are in periods of transition. The profession of Engineering is very well represented at the federal and provincial level. Engineering has multiple federal bodies that address public and member interests as well as engineering specializations. Engineers Canada represents the public interest of the engineering profession at a national level. The organization is strongly represented across the country with membership consisting of all provincial and territorial regulators or the profession.

Geoscience, like engineering, has a robust regulatory framework. However, many provincial regulators of geoscience have merged with the corresponding provincial engineering regulator into one body. Therefore, the regulatory environment is somewhat mixed. Currently, geoscience is regulated in all Canadian provinces and territories except for Prince Edward Island and the Yukon.

Forestry was also noted to have a fairly strong regulatory framework. The Canadian Federation of Professional Foresters Associations, the Canadian Institute of Forestry along with the Canadian Forestry Accreditation Board represents member and public interests of the profession at the national level. The organizations have a mixed

membership consisting of all provincial regulators, provincial member interest associations, corporate sponsors and individual members. With regard to regulation, no forestry regulation exists in Manitoba, Prince, Edward Island, or the territories.

Applied Science Technicians and Technologists have strong regulatory representation across Canada. However, the profession seems to be in the middle of a division in which two national organizations are competing for provincial regulator membership. The Canadian Council of Technicians and Technologists is the older national organization and represents Manitoba, Newfoundland & Labrador, New Brunswick, Nova Scotia and Prince Edward Island. The organization works closely with the Canadian Technology Accreditation Board to accredit post-secondary technology programs.

Technology Professionals Canada is a newly formed national organization. The organization began when four provincial regulators, British Columbia, Alberta[20], Saskatchewan and Ontario decided to leave the Canadian Council of Technicians and Technologists because the interests of their members were not being served adequately at the national level (TPC Communiqué, 2011). Technology Professionals Canada now represents 85% of technologists and technicians that once belonged to the Canadian Council of Technicians and Technologist (TPC Communiqué, 2011) and are working towards creating an accrediting body called Technology Accreditations Canada.

Agrology has strong provincial regulatory representation across Canada. Provincial regulatory bodies exist in every province while no regulation exists in the three Canadian territories. The Agricultural Institute of Canada is the organization that represents members and provincial regulators at a national level. However, only four provinces are members: Ontario, Newfoundland & Labrador, New Brunswick and Prince Edward Island. Therefore, national representation is weak compared to other organizations.

Biology is weakly represented across Canada. Biology is provincially regulated in two provinces: British Columbia and Alberta, and has no national regulatory representation.

13.1.4 Case Study Organizations

Based on the themes noted from the survey and through consultation with the Client, the following organizations have been selected as case study organizations: Engineers Canada, Canadian Federation of Professional Foresters Association, Canadian Forestry Accreditation Board, Canadian Institute of Forestry, and Technology Professionals Canada.

13.1.4.1 Engineers Canada

Engineers Canada was selected as a case study organization because the organization has a long history of representing provincial regulatory interests on the national stage. The organization represents a very stable and publically visible profession and represents

[20] The Association of Science and Engineering Technology Professionals of Alberta also regulates the profession in the Yukon, Northwest Territories and Nunavut.

more than 250,000 members of the profession (Engineering Canada, 2012). The organization has a highly developed accreditation process and has experience working with multiple sub-disciplines of the profession. Furthermore, the organization's membership consists solely of provincial regulatory bodies and, therefore, serves as an appropriate case in determining the best approach in establishing Biologists Canada

13.1.4.2 Canadian Federation of Professional Foresters Associations, Canadian Institute of Forestry and Canadian Forestry Accreditation Board

Three case study organizations were selected from the profession of forestry for multiple reasons. Each organization has a specific function that when looked at together, comprise the services the College of Applied Biology is interested in. From initial review, it seems the organizations are integrated and work together to achieve joint aims. Finally, to omit one organization from this research would, given the preceding two points, provide an incomplete understanding of the activities the profession engages in at a national level.

Organizations representing the forestry profession are a good candidate for this research because the profession of biology, in BC, grew out of a shared history of natural resource management with foresters. Furthermore, the organizations differ from Engineers Canada in two key ways that will offer Biologists Canada added insight. First, the Canadian Institute of Forestry represents both member and public interests, as opposed to public interest approach by Engineers Canada. Second, accreditation occurs through a separate board that works in conjunction with the other organizations, whereas, Engineers Canada's accreditation board operates within the organization.

13.1.4.3 Technology Professionals Canada

Technology Professionals Canada was selected because the organization represents technicians and technologists. The College of Applied Biology regulates applied biology technicians and the technician category is a rapidly growing segment of the organization's membership. Therefore, in building a plan to create Biologists Canada it was determined by myself in consultation with the College that understanding some of the national professional realities specific to technicians and technologists would be valuable.

Technology Professionals Canada represents 85% of the corresponding professional population in Canada (TPC Communiqué, 2011). Furthermore, the organization has is only two years old and has had to engage with some of the questions that this research study will consider, such as membership structure or establishing an accreditation program. Unlike the other case study organizations, Technology Professionals Canada might offer some unique insights as to the experience of starting a national professional organization.

13.2 Content Analysis Questions

Biologists Canada – Interview Questions

National Standards Development and Maintenance
1) How are national professional standards developed?
2) Who are consulted in their development?
3) What processes are used to consult?
4) How are standards maintained and/or updated?
5) How do standards evolve with industry and academic trends?

Program Accreditation
1) How are programs accredited?
2) How is accreditation criteria developed?
3) How does the organization begin an accrediting relationship with an academic institution?
4) How is accreditation funded?
5) Who does the accreditation (e.g. an accreditation team)? What is their composition and why?
6) What checks and balances exist to track new or changing academic programs?
7) What is the goal and value of program accreditation?

Membership Structure and Involvement
1) What is your organization's membership structure? (i.e. organizations, individuals, corporations, etc.)
2) Why is membership structure like this?
3) How does the organization communicate with members?
4) How do members gain value from participation and membership?
5) How does the organization represent their member's interests to others?

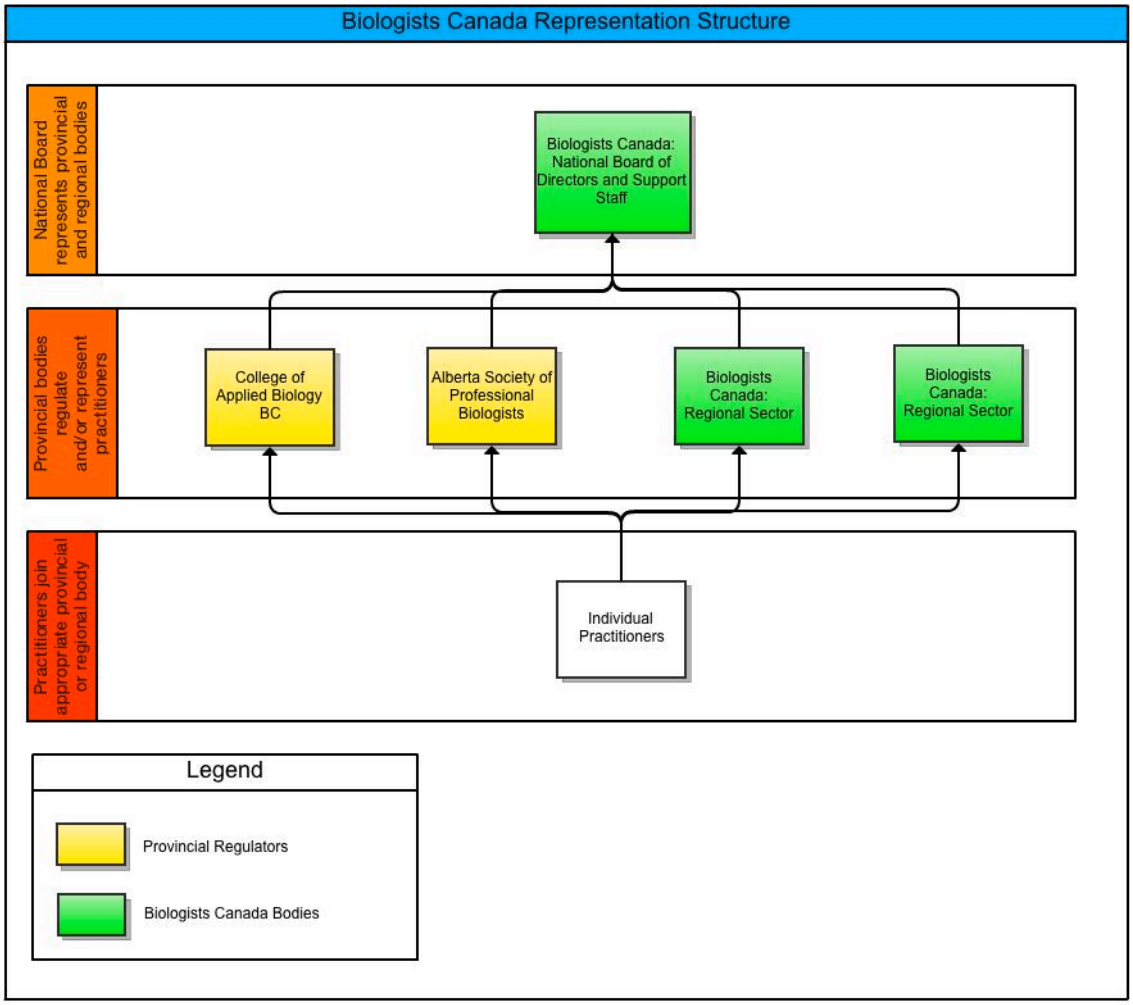
Stakeholder Engagement
1) How does the organization engage with stakeholders, such as academia, industry or government?
2) Have you encountered any difficulties beginning and/or maintaining these relationships?
3) What types of process have you used to engage stakeholders?
4) What processes have worked well? Which processes have been less successful?

Provincial Regulator Relationship and Funding
1) How are provincial regulators involved in your organization?
2) How are provincial regulator interests expressed and represented at a national level?
3) As members of your organization, how do provincial regulators fund or contribute financially to your organization?
4) How are different provincial standards or requirements a) identified and b) addressed?
5) Do provinces, which do not have regulation of the profession, have a role in your organization?

13.3 Proposed Biologists Canada Representation and Governance

Figure 2 outlines how Biologists Canada will assist in the representation of practitioners at a national level as well as assist in the representation of practitioners in regions absent provincial applied biology regulation.

Figure 2: Proposed Biologists Canada Representation Structure



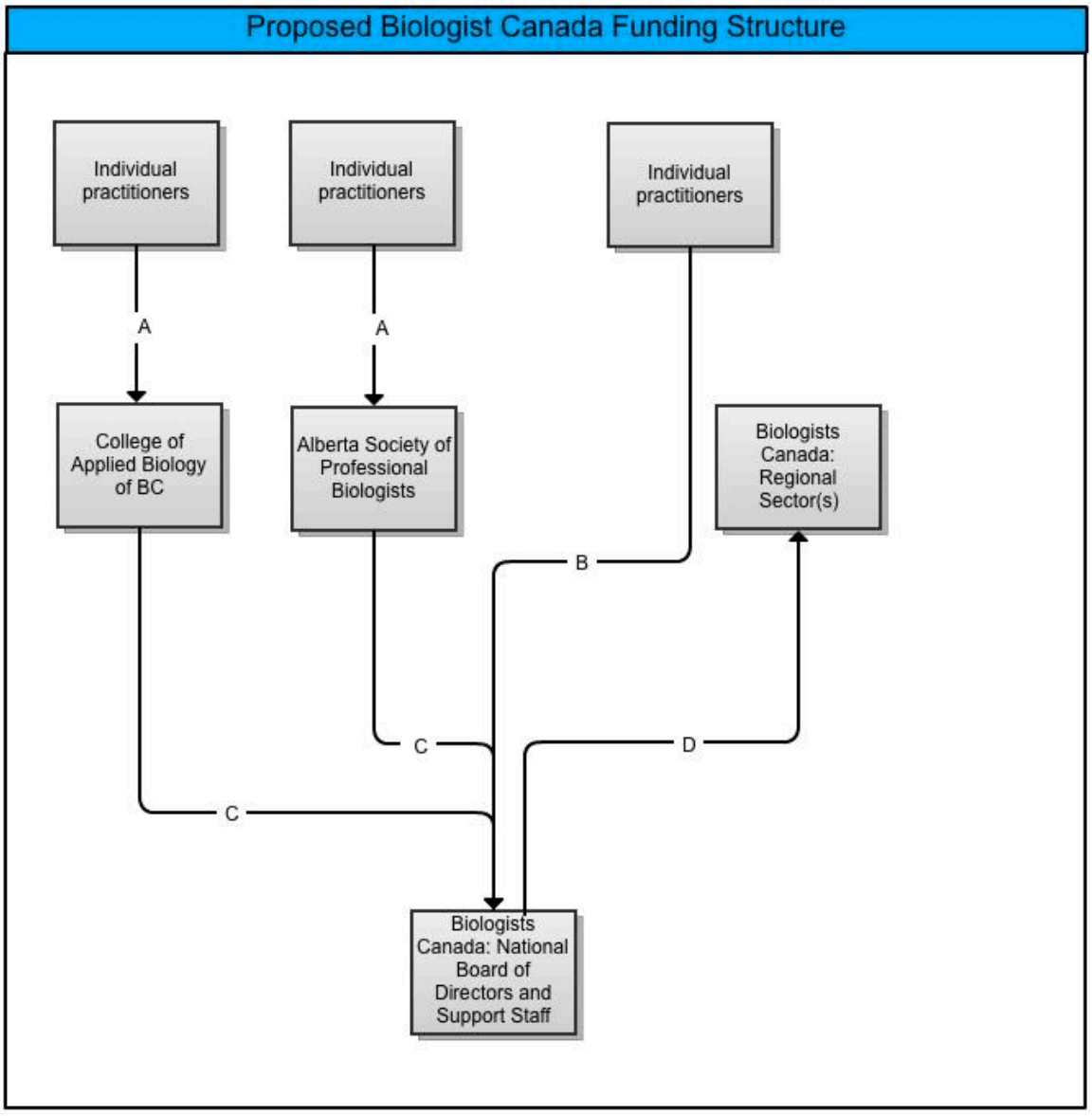
The National Board of Directors would be comprised of representatives from provincial regulators and regional bodies. The board would utilize consensus-based decision-making to oversee the governance of the organization. Consensus-based decision-making is being utilized to ensure that representatives from provincial regulators would not be bound decisions by the national board, which could have the capacity to violate provincial regulation. Board composition would allow for broad regional representation. The board may also wish to have members included that represent significant stakeholder groups, such as academic or industry.

Leaders of Biologists Canada, in creating the organization, will have to determine the specific governance structure that they wish to utilize and outline that it in organizational by-laws prior to incorporation.

13.4 Proposed Biologists Canada Funding Structure

Figure 3 outlines how biology professionals from all regions will fund Biologists Canada.

Figure 3: Biologists Canada Funding Structure



A. Individual practitioners, who meet registration requirements, become registered members of a provincial regulator of applied biology. Members pay annual dues to maintain registration.

B. Individual practitioners, who meet yet to be determined entry requirements, may join Biologists Canada and pay annual membership dues. Dues are to be comparable to provincial regulator dues.

C. Provincial regulators fund Biologists Canada by forwarding a portion of active registered member dues to Biologists Canada. Amount yet to be determined.

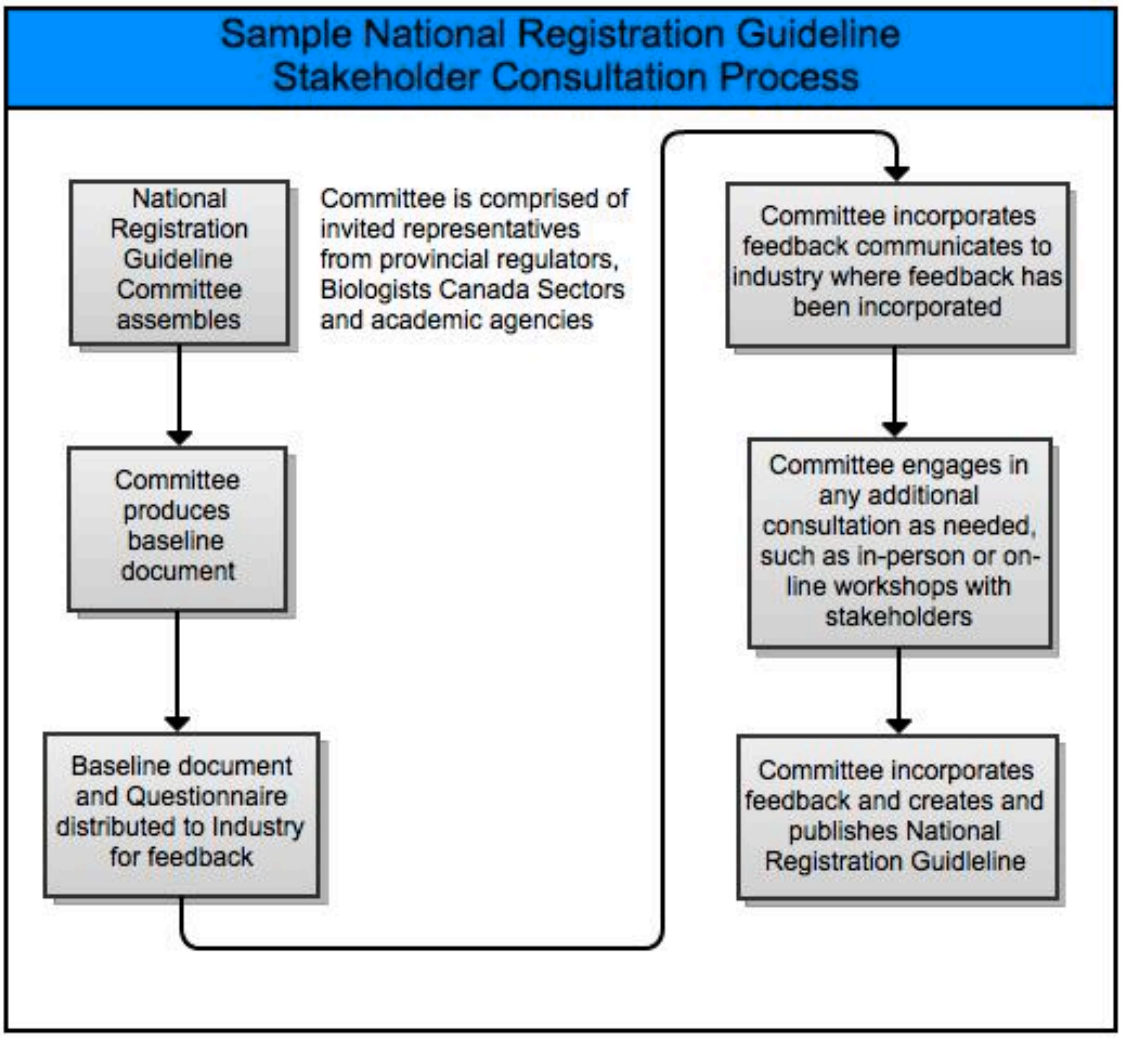
D. Biologists Canada uses a portion of individual member dues to support and fund regional sectors.

Through this funding structure all individual practitioners will pay roughly the same amount of money to achieve provincial regulation and/or representation as well as national representation in their profession. The funding structure allows Biologists Canada to support regions that do not currently have provincial regulation. Furthermore, the funding structure is flexible and allows for the development of further regions and/or the inclusion of newly developed provincial regulators.

13.5 Sample National Registration Guideline Stakeholder Consultation Process

Figure 4 is intended to provide a simple framework with which to design a consultation process to engage with stakeholders to achieve a national registration guideline. It is imagined that any such process would be more complex and nuanced than the process outlined in the figure, however, the figure is intended to serve as a starting point for those considering such a process.

Figure 4: Sample National Registration Guideline Stakeholder Consultation Process



13.6 Professional Registration Requirements, Accreditation Criteria and Harmonization

The relationship between professional registration requirements and accreditation criteria is important to understand as the concepts can easily be confused. Registration requirements, which are also known as licensure requirements or certification standards speak to the comprehensive qualifications that an individual must possess to gain entry into a professional regulatory organization. An individual may be required to have certain academic training, professional experience, personal character, and other related competencies. For example, the College requires applicants seeking RPBio registration to have a certain standard of education with specific courses, a certain amount of time of professional experience following academic training, academic reports or published scientific articles, and character references. Therefore, registration requirements are holistic and look at all aspects of a prospective professional.

Accreditation criteria are the tools that accrediting bodies use to evaluate an academic program. Accreditation may ensure that certain courses are present in a program or that graduates will possess certain competencies obtained from a course or combination of courses.

Harmonizing registration requirements and accreditation criteria means that the academic portion of the registration requirements requires the same outcomes as accreditation criteria and vice versa. Therefore, accreditation criteria are only harmonized with the academic portion of registration requirements and do not speak to professional experience or character. For example, the College requires a second year or higher genetics course in the education qualification to become a Registered Professional Biologist (College of Applied Biology Rules, 2011). Therefore, it would make sense to ensure that a accreditation criterion be that academic programs require graduates to take a second year or higher genetics course.

Harmonization is essential because a value of accreditation is that provincial regulators do not need to look behind an applicant's academic credentials if they have graduated by an accreditation body the provincial regulator recognizes.

13.7 Competency Discussion

It has been the experience of College staff that the term ‘competency’ is used in different ways in the context of credential assessment. Therefore a brief discussion of how the term is being used in this research is necessary.

Competency is often used to mean the demonstration of ability, skill, understanding and/or knowledge, which is to say that a certain proficiency or competency has been achieved. However, where the concept of competency gets blurred is when the source of ability, skill, understanding or knowledge is considered. Competency is often used to mean the demonstration of ability regardless of the source. This usage of the term can be problematic because it leads to the term being used in a way to mean substitution of academics for experience. For example, some academic agencies allow students to take fewer courses if they can demonstrate that necessary competencies have been gained through prior experience. The problem is that while a practitioner might know *how* to do something, demonstration of that ability might not show they know *why* they are doing it. The “why” is essential for it speaks to the foundational knowledge that a professional must possess to make discretionary judgements.

Therefore, College staff maintain that a balance of professional experience and foundational academics are essential in determining if a professional has the ability to practice competently.

Within this research the term academic competencies is used in regard to accreditation criteria to mean the demonstration of ability, skill, knowledge, and/or understanding that was gained through academic training and/or experience. Therefore, the source of these competencies is purely academic.