

***Canadian Federation
of Professional Foresters Associations***

***Certification Standards
for the
Profession of Forestry in Canada***

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Prepared by the following

CFPFA Members

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Association of Saskatchewan Forestry Professionals
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Ontario Professional Foresters Association
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Registered Professional Foresters of Newfoundland Labrador
Canadian Institute of Forestry
Canadian Forestry Accreditation Board

In collaboration with the member schools of the Association of University Forestry Schools in Canada

Introduction

The Canadian Federation of Professional Foresters Associations (CFPFA) is a national organization founded in 1982 to act as an advocate for matters identified by its member agencies as having national importance or consequence for forest practitioners. The member agencies are the professional forester/ingénieur forestier regulatory associations (“regulatory members” or “regulatory bodies”) established through provincial legislation, or similar means, as well as the Canadian Institute of Forestry (CIF), representing provinces without a recognized professional regulatory presence, and the Canadian Forestry Accreditation Board (CFAB), a body created by the CFPFA member organizations for review of university level forestry programs in Canada.

Whether in a “*right-to-title*” or a “*right-to-practice*” jurisdiction, entrance into professional forest practice (certification) in Canada is governed by a number of well-defined criteria central to the statutory mandate of each of the regulatory members of the Federation. Although they may have various modes of implementation, these entrance criteria have common component groupings, as follows:

- Educational requirements;
- Practical experience requirements (in forestry);
- Sponsorship by Registered Professional Foresters in good standing; and
- In most provinces, one or more registration examinations (often called a “professional” or “jurisprudence” exam, depending on the provincial jurisdiction).

This standards document sets out the academic and experiential requirements that are common to, and have been adopted by, all CFPFA regulatory members with the exception of the Ordre des ingénieurs forestiers du Québec (OIFQ).¹ While the “normal” circumstance is described herein, equivalence for various parts of the requirements may be established by a ruling of the appropriate committee of a CFPFA regulatory body.

The formal adoption of these Certification Standards by the CFPFA in 2008 facilitated inter-jurisdictional mobility for certified professionals and has enabled the CFPFA member agencies to be in compliance with the labour mobility requirements of Chapter 7 of the Canadian Agreement on Internal Trade (AIT) under which the credentials of a Registered Professional Forester/ingénieur forestier (RPF/ing.f.) in any Canadian jurisdiction are recognized by, and accepted for professional practice in, any other CFPFA jurisdiction, OIFQ included.

¹ *L’Ordre des ingénieurs forestiers du Québec has adopted complementary entrance requirements accepted by its fellow CFPFA member agencies for labour mobility purposes.*

In focusing on the four essential elements for certification described later in this document, the CFPFA member agencies provide a blueprint for professional certification and, as a consequence, accreditation practices that they expect will:

- allow for greater inclusivity which recognizes a broader range of professional forestry practitioners;
- provide increased fairness, standardization and consistency for entry into the profession;
- make the most of greater labour mobility potentials; and
- encourage innovation in education and training of forestry professionals as well as in the practice of professional forestry itself.

Because of differences in regulatory formats across Canada, the CFPFA regulatory members have adopted the standards in a variety of forms. Notwithstanding, all have equivalent effect in implementation.

Important Definitions

Throughout this document words and terms are used that have specific meaning. Some of these are found in the section titled “the Right Words”, others are defined within the text of the document itself. In particular, it is important to know, at the outset, what we mean by “certification”, “registration”, “accreditation”, and “science-based degree”. They are therefore defined separately below.

Accreditation is a process of quality assurance through which an education program is assessed by an authorized authority for compliance with the academic requirements for entrance into practice in a regulated profession. In professional forestry in Canada, the Canadian Forestry Accreditation Board has been mandated by the CFPFA to assess university level forestry programs on its behalf. The CFPFA member agencies have agreed, collectively, to abide by the accreditation determinations of the CFAB.

Certification is the documented recognition by a governing body that a person has attained occupational proficiency for practice within its jurisdiction. In the professional forestry context, certification is granted by the provincial regulatory members of the CFPFA.

Registration is the act of acceptance into a governing body an individual who is in compliance with its entrance requirements. While the definition is consistent across the CFPFA jurisdictions, the point at which registration occurs may differ.

A **science-based degree** is a program of study, in which the majority of time is spent exploring the natural, physical, or social sciences.

Essential Elements for Certification

In forestry, there are four essential elements for certification required by, and common to, all CFPFA regulatory members. The four, as follows, are described below.

- (I) *Academic credentials;*
- (II) *Core competency standards (of which there are 7);*
- (III) *Experience; and*
- (IV) *Commitment to professionalism.*

Although the breadth of content of the elements present at application may vary from one candidate to another, all elements must be demonstrably in evidence such that, in combination, the whole satisfies fully the requirements for professional practice at the entrance level.

I Academic credentials and assessments

This essential element describes the characteristics (rather than content) of the educational foundation a registrant **must** have upon entry into practice. The characteristics include:

- At a minimum, a four-year, science-based baccalaureate degree, or its combined academic and practice equivalent,
- Complementary studies which demonstrably and cogently broaden understanding of at least one aspect of the practice of professional forestry. These often take the form of electives or options in baccalaureate programs.
- Foundational studies which demonstrably and cogently support exploration of one or more of the core forestry studies of these standards. Such studies are generally considered to be pre-or co-requisite instruction that provides foundational knowledge for more advanced study.

As a statement of general intent, it is understood that, for graduates of programs accredited by the CFAB, a majority of academic time will have been dedicated to exploration of the subject matter set out in the CFAB's *Academic standards for the accreditation of degree forestry programs in Canada*. (The academic standards for certification and for accreditation are fully harmonized with no difference in intent or meaning.) Meeting the core competency requirements can be achieved directly, i.e., within the program itself, in the way students are granted entrance into the program from feeder institutions, or by completion of the Credential Assessment Process (CAP). In the second case, the school receiving students must be able to demonstrate that the competency requirements for which advanced standing is being granted have been covered appropriately in the time spent at feeder institutions.

These standards apply also to candidates for certification who have not graduated from an accredited program. In such cases, however, applicants are required to enter the CFPFA's Credential Assessment Process (CAP). A description of the CAP and its requirements may be found on the CFPFA website at <http://www.cfpfa-fcafp.ca>

In all cases, it is crucial to keep in mind that the knowledge and skills described in the Certification Standards will not have been obtained in a vacuum. In addition to the requirements of the seven standards, candidates for certification must be able to demonstrate that, however obtained, they have had appropriate exposure to the foundational studies elements upon which the academic standards rest and to appropriate additional, and related, complementary studies to round out the educational experience. These two elements are discussed further below.

Complementary studies of a curriculum are comprised of those academic studies offered by the subject program which are over and above foundational studies and the core forestry studies aimed at addressing the requirements of the academic standards. They may occur individually as ‘electives’ or in structured curriculum groupings, generally identified as options, minors and majors. Complementary sciences and studies are to be used to provide an integrated, comprehensive academic experience which allows students to enhance and advance their forestry career interests. There is no minimum exposure requirement for this component. However, exposure must have been sufficient to enable the candidate to fully complete the graduation requirements of the subject degree program, or equivalent study.

The foundational studies element of a curriculum will include aspects of the arts, sciences, the humanities and societal topics as described in Attachment 3, at a basic or introductory knowledge level. There is no minimum exposure requirement for this component. However, exposure must have been sufficient to obtain an understanding of natural relationships and to ensure that students are able to undertake the work of the academic requirements for certification.

II Core forestry competency standards

The seven core forestry certification standards of this document were developed by the CFPFA through joint discussion with the member schools of the Association of University Forestry Schools of Canada (AUFSC) and the largest part of it is devoted to them. That said, it is crucial to keep in mind that the standards form only one part (of four) of the overall set of certification requirements and that they must be read in conjunction with each of the other three elements described.

Each standard is composed of a principle statement and a relevant components (areas of study) section as well as, hierarchically, its demonstrable competency requirements and indicators of performance arranged in a progression of understanding. For further description of these standards elements, see the section below titled *Core Competency Standards*. Standard “0”, following, provides a more detailed, contextual example of this structure.

A separate, and discrete, standard is provided for each of the following subject areas:

1. Tree and stand dynamics;
2. Forest to landscape, structure and function;
3. Forest management;
4. Economics and administration of forestry;
5. Communication, critical reasoning;
6. Information acquisition and analysis; and
7. Professionalism and ethics.

The practice of professional forestry, as defined in legislations across Canada, is far broader than may be inferred by these seven standards. It covers numerous focus areas including natural resource management; land reclamation; urban forestry; forest operations; forest management; fish and wildlife habitat conservation; water quality preservation; forest recreation; forest protection and enhancement of cultural values; forest products marketing; and forest economics, business and management, to name but a few.

III Experience requirements

Every applicant must have sufficient work experience to demonstrate competence in the practice of professional forestry at the entrance level. It is left to the registering body, and in some cases the provincial legislation, to specify how or when the requirement is demonstrated and assessed. A formal period of articling or internship before writing an examination is one model for demonstration.

IV Commitment to professionalism

Applicants must have a demonstrable understanding of, and commitment to, professionalism and ethics. While some of this essential element can be delivered through formal education (business and environmental ethics courses, lectures on professionalism and regulation of professions), much of it will be demonstrated through the following:

- articling/internship and or post-enrolment, pre-certification work experience,
- a commitment to continued competency (continuing education)
- a certification examination.

Understanding the core forestry competency standards

The seven standards are organized in a progression from Standards 1 and 2, which describe required knowledge of “how the system works”, to Standard 3 which describes an ability to use and apply acquired knowledge in order to design and implement forest interventions and to develop and exercise forest

stewardship, to Standards 4, 5, 6 and 7, which describe the need to apply acquired knowledge in the delivery of a range of expected professional services.

Each standard is composed of a principle statement and relevant components (relevant knowledge areas) as well as, demonstrable competency requirements, and indicators of performance. The last two are, themselves, arranged in a progression of understanding. Each component is considered further in Standard “0” below.

The Right Words

Specific words have been employed to guide the interpretation of the requirements of the standards. When an “action verb” such as “describe,” “prepare,” “list,” “defend,” “apply” are used in the Demonstrable Competencies and Performance Indicators, it is expected that the competency will be completed to the indicated level of understanding and ability. The levels used follow Bloom (1956) (Attachment 1) who identified a set of verbs that characterize ability to demonstrate an outcome in a certain manner to a specified level of sophistication (Attachment 2).

On occasion the term “regionally specific” is used in a performance indicator. Regionally specific will mean one of two things: a) geographically represented by the provincial jurisdiction, or b) specific elements of the region that must be covered (prescriptive or permissive).

Standard 0: [Descriptive]

Principle

The principle is a self-evident and enduring statement of the context of the standard.

The relevant components, demonstrable competency requirements and performance indicators of the standard must be considered within the context of the principle statement.

Relevant Components

Relevant Components are indicative of the scope of a standard and of the range of subject matter for which an applicant may be expected to demonstrate competency in order to satisfy the full intent of the Demonstrable Competencies of the overlying Standard.

It is not expected that all the listed subject matter within the relevant components be obtained in order to satisfy the requirements of the standard.

Demonstrable Competencies

A Demonstrable Competency is an essential measurement point.

A candidate shall be able to demonstrate entry-level competence in each of the Demonstrable Competencies of a standard and shall be able to do so in a manner that corresponds accurately with the “learning outcomes” levels prescribed by a Competency’s action verb(s). (See Attachment 2.)

Competency statements are presented in sequential order from less to more complex. Each statement builds on its predecessor, until the final statement, which is seen as a “capstone” competency and which is intended to capture the completeness of the standard itself.

Each Demonstrable Competency of a standard is accompanied by a sub-set of Performance Indicators.

Performance Indicators

*Performance Indicators are measurables, based on Bloom’s Taxonomy (adapted), describing activities typical of those a candidate will be able to undertake. They provide context and guidance as to the abilities which would, *in toto*, lead to satisfying the requirements of the overlying Demonstrable Competency. They function as reference points to evaluate whether a candidate for certification has met the evidentiary tests for a competency’s requirements.*

It is not mandatory that each Performance Indicator in a sub-set be addressed. However, when a Performance Indicator is not addressed by a candidate, the candidate must then demonstrate, by means of other relevant indicators, that they have qualifications which fulfill the requirements of the Demonstrable Competency.

An Evidentiary Basis for Demonstrable Competencies

All claims for having met a Demonstrable Competency (or a Performance Indicator in support of having met a Demonstrable Competency) must be accompanied by substantiated evidence. The following lists a number of possibilities for a candidate to use as evidence that a Competency or Indicator has been adequately addressed. The list is not all-inclusive nor is it in any particular order of priority:

1. Practical field tests, written tests or lab tests (e.g. plant collection and explanation of the fundamental components of plants and communities.) Alternatively, testing can take place in a practice review that incorporates interviews of candidate and employer, field reconnaissance, etc.
2. Case examples and completion of a field examination of the result
3. For knowledge - classroom description at a simple level that is tested in an examination setting.
4. For comprehension - set a case study problem and observe solution.
5. Submission of a plan at the stand level to meet a variety of relevant objectives.
6. Course outlines
7. Portfolios of work or educational products such as field projects.

Standard 1: Tree and Stand Dynamics

Principle

Trees and stands are an important part of the Canadian landscape. Knowledge of tree and stand establishment, growth and mortality, forms the basis of understanding how the forest ecosystem functions.

Relevant Components

- Basic understanding of growth and yield projections; the applications and limitations of growth and yield on forest management.
- Concept of silvics, life cycle, growth, genetics of trees.
- Ecological amplitude of plant species and communities.
- Factors that influence trees and stands in order to predict future conditions.
- Identify, classify and analyze trees and stands.
- Influence of tree and stand establishment (natural or artificial), density control, planting, spacing, tree improvement, vegetation control, fertilization, drainage and pruning on stand growth, quality, and ecosystem diversity.
- Influence that landforms, landscapes, and surface materials have on trees and groups of trees over time.
- Life history of regional tree species.
- Plant and tree physiology.

Demonstrable Competency Requirements

A candidate for certification shall be able to:

- 1. Identify plants and describe their physiology, growth, morphology, autecology, and synecology.**
 - a. Identify indicator plants in a regional context.
 - b. Describe anatomy, morphology and physiology of plants.
 - c. Explain the interaction between plants and environment.
 - d. Describe plant communities.
 - e. Explain the relationships between and within plant communities.
- 2. Describe current tree and stand conditions, past conditions' and processes that lead to them as well as articulate possible future conditions.**
 - a. Measure attributes of interest (e.g. age, form, size, leaf index).
 - b. Determine quality (e.g. health, wood quality, snag potential, visual quality)
 - c. Explain resource potential (e.g. habitat, shade, wood fibre)

Tree

- Stand
- d. Explain the processes that have influenced the size, health and vigour of the tree.
 - e. Measure and describe species composition, size distributions, age and spatial arrangement of plants.
 - f. Determine stand origin.
 - g. Recognize the range of values found in a stand.
 - h. Define succession and stand dynamics.
 - i. Describe and analyse the biotic/abiotic agents driving stand dynamics.
 - j. For a range of different stands, be able to describe the dynamics that have led to the current stand structure and be able to predict future stand structures.
- 3. Describe and apply models to articulate the present and predict future stand conditions.**
- a. Identify, use and explain predictive tools/models.
 - b. Explain the strengths and weaknesses of the tools/models.
- 4. Demonstrate the integration of the individual competencies within Standard 1.**
- a. Prepare a defensible stand management prescription²/intervention for a given set of management objectives.

² *The word prescription does not mean a specific professional document (referenced in some legislation) but refers to a broad document that describes a current condition and prescribes a course of action toward a future condition.*

Standard 2: Forest to Landscape, Structure and Function

Principle

Canada's forested ecosystems are diverse and complex systems arising out of the interaction between living and non-living components over time. Knowledge of composition, structure and function of forested ecosystems at scales ranging from aggregates of stands to landscapes is essential to describe and evaluate current conditions, predict the effects of environmental change, and practice conservation and management.

Relevant Components

- Appreciation of the forest health agents (fire, insects, disease, harvest etc.) and the effects of such agents to silviculture.
- Biological diversity, genetic diversity.
- Components and processes of ecosystems.
- Climate patterns and processes, causes and effects of climate change.
- Ecological concepts and principles.
- Habitats and living organisms related to the forested ecosystem.
- Interdependency and interaction between biotic and abiotic, forest and non-forest components of ecosystems.
- Natural disturbance processes and agents.
- Principles and applications of ecological classification.
- Role of agents of forest change in forest ecosystems.
- Resource cycles and their storage (e.g. Carbon, water, biogeochemical, etc.).
- Soil properties, productivity, and applications for forest management.
- Watershed patterns, processes and classifications.

Demonstrable Competency Requirements

A candidate for certification shall be able to:

- 1. Describe the components, characteristics and processes of forest ecosystems and how they interact.**
 - a. Describe living and non-living components.
 - b. Identify and describe major ecosystem conditions, cycles and processes within forests and landscapes.
 - c. Explain how the ecosystem conditions can be characterized across a variety of scales.
 - d. Discuss ecosystem dynamics and ecological sustainability.
 - e. Explain forest productivity and how it is determined.

2. Describe and apply classification schemes using vegetative, climatic and edaphic characteristics.

- a. Describe how a classification scheme is developed and applied.
- b. Be able to identify soils and vegetation to the degree necessary to be used in an ecological classification scheme.
- c. Describe and apply an ecological site classification system.

3. Explain the influences and outcomes of agents of change on forests and landscapes.

- a. Recognize and explain the dynamics and roles of insects and disease on forests and landscapes.
- b. Explain how integrated pest management can modify change on forests and landscapes
- c. Explain the role of fire and weather factors on forests and landscapes.
- d. Recognize the impact of changing climate on forests and landscapes.
- e. Discuss the influence of human activities on forests and landscapes.

4. Explain and apply the concept and measures of diversity.

- a. Describe the relationship between diversity and ecosystem structure and function.
- b. Describe the interaction between forests, fish and wildlife.
- c. Describe the various measures of diversity at different spatial scales.

5. Demonstrate the integration of the individual elements of Standard 2.

- a. Apply the knowledge of forest composition, structure and function to predict forest and landscape conditions under natural and human-caused disturbances.
- b. Identify and discuss the strengths and weaknesses of predictive tools/models at the landscape level and the implications of each in application.

Standard 3: Forest Management

Principle

Forest ecosystem management balances ecological, social, and economic demands with the capacity of forest resources to provide for present and future values.

Relevant Components

- Aboriginal Peoples' rights, claims and/or interests.
- Conservation biology concepts and principles.
- Criteria and indicators for sustainable resource management.
- Concepts of resource scarcity and trade-offs or offsets.
- Forest regulation and policy (provincial, national).
- Forest measurements, forest inventories, mensuration, and non-timber inventories.
- Forest operations and safety.
- Forest resource forecasting and supporting information technology/information management (quantitative and qualitative).
- Global perspective of forestry issues and challenges.
- Harvesting operations and planning.
- History and patterns of human activity in forests.
- Integrated forest management planning and relationships among natural resources and the range of forest values.
- Management (harvesting, roads, silviculture, etc.) operations and planning.
- Objectives of private and public forest owners.
- Principles of silviculture, silvicultural systems and spatial distributions of management activities.
- Pollution, erosion, forest fragmentation, forest landscape patterns.
- Public and stakeholder opinions and involvement: economic, social, ecological and other values.
- Requirement and characteristics of effective monitoring/adaptive management regimes.
- Stand, forest and landscape level perspectives.
- Sustained yield and sustainability.

Demonstrable Competency Requirements

A candidate for certification shall be able to:

- 1. Describe the variety of values and competing interests in a forest.**
 - a. Identify and describe the range of values (timber and non-timber) in a forest.
 - b. Identify the interests and rights present in a forest including Aboriginal Peoples' rights, claims and interests in forests and the importance of implementing processes to determine and address them.

- c. Describe the requirements of and interaction among these values
 - d. Describe the effect and implications of decisions aimed at a given set of objectives
 - e. Describe how values and competing interests are or can be weighed/balanced in decision-making
- 2. Explain forest strategic and operational planning principles.**
- a. Explain why forest planning is required.
 - b. Discuss basic principles of planning.
 - c. Discuss planning tools.
 - d. Differentiate among levels of planning.
 - e. Describe the specific operational elements that should be included in a plan.
- 3. Analyze and apply a range of forest cover manipulation strategies that effectively achieve a given set of objectives while minimizing negative impacts on other values from a perspective emphasizing:**
- a. Commercial extraction as the management objective; and
 - b. Management objectives that are non-extractive.
- 4. Explain the legal and policy framework.**
- a. Describe forest regulation/legislation /policies and procedures (nationally and regionally specific) and the importance to forest management.
- 5. Discuss forest management concepts.**
- a. Explain various management approaches and situations where they might be used.
 - b. Describe risk and uncertainty in forest management options.
 - c. Describe the application, design and function of adaptive management.
 - d. Discuss the cumulative impacts of forestry and other land use practices (e.g. oil and gas, urban development) on various forest resources.
 - e. Describe the role and application of monitoring in forestry.
- 6. Describe how global drive trends and influence forest management.**
- a. Identify global trends.
 - b. Explain the influence of global trends on regionally specific forest management.

7. Develop a resource planning document that incorporates current economic, environmental and social values into actions that lead to achieving the planning objectives and to future desired conditions and goals.

- a. Identify and describe resource abundance through time and space and determine the management activities required to provide for a sustainable supply of consumptive and non-consumptive goods and services.
- b. Plan resource use decisions and determine the harvest of resources (including timber) within the context of larger, socially-defined goals.
- c. Discuss the concept of sustainability and sustained yield and how they might be applied in a management context.

Note: Standard 3 Forest Management contains sociological information that is subject overlap with Standard 6. The overlap demonstrates the flow between the standards and the completion of capstone competencies.

Standard 4: Economics and Administration of Forestry

Principle

Canada's forest resources provide a wide variety of goods and services. Utilizing forest resources requires knowledge of the principles of allocation of limited resources among competing interests and the economic, policy and administrative forces that cause change.

Relevant Components

- Competition for resources and resource values.
- Economic tools and processes (e.g. cost/benefit).
- Economic factors affecting the forest resources.
- Forest and forest use valuation.
- Forest product value-chain and markets; non-timber values.
- Global market economy; effects of international affairs.
- Market structure and influences.
- Principles of project management.
- Production, costs, demand, supply and price of resource products.
- Production management, human resources, principles of leadership and supervision, organizational characteristics.
- Regional requirements.
- Timber/wood and non-timber/wood products/processing and their uses.
- Third party certification systems.

Demonstrable Competency Requirements

A candidate for certification shall be able to:

- 1. Describe the content and importance of business and project plans.**
 - a. Explain the importance of business plans and project plans.
 - b. Identify the components of a business plan.
 - c. Prepare a project plan.
- 2. Describe risk management relative to forest resources.**
 - a. Describe the limitations, including risk and uncertainty, in managing forests and forest operations.
 - b. Perform a sensitivity analysis for a management action or strategy.
 - c. Recognize the impact of natural disturbance on the availability of forest resources.

3. Describe organizational structure and function.

- a. Discuss social, environmental and economic effects of policies and strategies that impact forestry as developed by various organizations.
- b. Describe Aboriginal peoples' interactions with relevant organizations.
- c. Describe effects of labour relations on forestry.
- d. Explain the effects of certification programs on forestry.
- e. Describe the role of government in society as a process for establishing legislation and policy.

4. Discuss business concepts that apply to a management plan.

- a. Describe the business objectives that must be considered in resource management planning.
- b. Discuss the concept of balancing environmental, social, and economical considerations in resource management planning.
- c. Identify various products produced from forests and the markets they serve.
- d. Discuss concepts of best end-use and value-added products as related to forest resources.

5. Recognize the effects of national and global trends on supply and demand, and flow of forest-based products including price and production.

- a. Describe basic principles of macroeconomics and their application to forest resources.
- b. Discuss the effects of international policies on Canada's ability to compete.
- c. Explain Canada's evolving position in global markets.
- d. Recognize full cost analysis for multiple-use where information is available.

6. Prepare and defend a basic operational plan for a project to achieve resource management objectives within available resources.

- a. Plan and implement a project with emphasis on human resources, production schedules and budgeting
- b. Explain the role of performance measures (e.g. human resources, financial, timelines and production).
- c. Defend a plan of action.

Standard 5: Leadership Skills: Communication and Critical Reasoning

Principle

Professional foresters must possess critical reasoning skills to analyze and communicate complex ideas clearly and provide advice to a range of clients.

Clear and concise communication is essential for Canada's professional foresters to be able to articulate goals, objectives, information and decisions to a wide range of audiences and stakeholders.

Canada's professional foresters are required to work individually and to participate in and lead multi-disciplinary teams to address multifaceted problems.

Leadership requires the ability to effectively use communication and reasoning skills to inspire higher standards of practice and to contribute positively to society through initiative and collaborative problem solving.

Relevant Components

- Analyze problems, interpret and integrate information logically, apply judgment in making decisions.
- Business and professional and technical report writing.
- Conflict resolution, appropriate dispute resolution.
- Construct, criticize and present arguments.
- Develop a rationale, options and solutions.
- Display persistence, diligence and care in solving problems.
- Effective oral and written communication skills.
- Evaluate data in terms of relevance and sufficiency.
- Know how to debate and evaluate positions.
- Meeting facilitation, presentations, and committee participation.
- Negotiation in a variety of forms.
- Promote curiosity, creativity and innovation.
- Research techniques, scientific report writing.
- Shared ownership and collaboration.

Demonstrable Competency Requirements:

A candidate for certification shall be able to:

- 1. Communicate effectively with a variety of audiences regarding forest resource issues.**
 - a.** Demonstrate an ability to communicate resource information to a diverse range of audiences.
 - b.** Demonstrate a range of effective listening skills.
 - c.** Use formal reports to present data, information and opinions.
 - d.** Prepare and deliver a presentation that incorporates concepts and terminology of natural resources.

2. Demonstrate critical reasoning in the application of professional judgement.

- a. Evaluate documents and computer models that pertain to complex plans.
- b. Analyse a problem or issue that includes qualitative/quantitative data collection, evaluation and analysis.
- c. Develop logical arguments and apply judgement in providing solutions in a formal written report.
- d. Construct a logical argument through group participation and discussion.

3. Demonstrate leadership skills through collaborative decision-making, consultation and conflict resolution.

- a. Describe how social, cultural and geographical differences apply to this topic.
- b. Facilitate collaborative decision-making.
- c. Apply conflict resolution skills.
- d. Organize a group to achieve a goal.
- e. Defend a resulting plan of action.

Standard 6: Information Acquisition and Analysis

Principle

The management of Canada's natural resources requires the acquisition and analysis of quantitative and qualitative data. Developing comprehensive measurement and sampling skills provides professional foresters with an ability to collect information and understand sources of uncertainty that affect data reliability.

Relevant Components

- Computer modeling and analysis.
- Construction and use of databases and spatial information/analytical tools.
- Field measurement tools, techniques and procedures for the suite of forest values.
- Mapping technology, drafting techniques, photogrammetry, remote sensing.
- Orienteering, field navigation.
- Principles of surveys.
- Public inclusion process.
- Sampling design, and methods.
- Social surveys, questionnaires, public opinion, media.
- Survival and safety skills.

Demonstrable Competency Requirements

A candidate for certification shall be able to:

- 1. Demonstrate an ability to apply basic orienteering and surveying techniques.**
 - a. Read and follow a map, use aerial photographs, use a compass and global positioning technology to navigate in the forest.
 - b. Demonstrate an ability to measure distances and angles.
- 2. Use measurement tools for collecting forest resource data.**
 - a. Describe the commonly used tools and procedures, appropriate application and associated accuracy.
 - b. Employ a variety of measurement and identification tools.
- 3. Design and implement sampling strategies.**
 - a. Demonstrate knowledge of fundamentals of statistics.
 - b. Differentiate among sampling strategies.
 - c. Analyze data collected using simple sampling strategies.

4. Analyze simple mathematical models.

- a. Express the relationship between variables using mathematical models.
- b. Interpret output provided by statistical packages.

5. Analyze and display both qualitative and quantitative data.

- a. Describe techniques for synthesizing data.
- b. Demonstrate the use of a range of analytical techniques.
- c. Develop displays, such as maps, relational data bases, graphs, or GIS that are appropriate to a particular use.

6. Demonstrate the integration of the competencies identified in this standard, to achieve a given set of objectives.

- a. Design and implement a rudimentary sampling plan.
- b. Analyze and interpret the results.
- c. Assess whether objectives were achieved.

Standard 7: Professionalism and Ethics

Principle

Canada's professional forester serves the public interest and understands the role of the profession. Professional foresters have integrity, are competent, independent and accountable for their actions and decisions. They maintain professional standards and conduct based on ethical principles including life-long learning and continuing competency requirements.

Relevant Components

- Commitment to life long learning and career development.
- Contact with the professional forestry regulatory body.
- Conflict of interest.
- Knowledge of professional regulation and history.
- Moral and ethical questions in forest resource use.
- Professional character includes independence, integrity, competence, respect and accountability.
- Professional ethics, obligations and codes of conduct.
- Standards of professional practice.
- Understanding of due diligence, limits to competence, law of professional negligence, duty of care, accountability and professional liability.

Demonstrable Competency Requirements

A candidate for certification shall be able to:

- 1. Describe the role of self-regulating professions in society.**
 - a. Identify the primary functions of professions.
 - b. Explain the structure and functions of the forestry profession
 - c. Describe the role of the forestry profession within the context of other professions.
- 2. Describe a range of duties and obligations imposed on, and by, professional regulatory bodies.**
 - a. Identify the purpose and function of a professional regulatory body.
 - b. Describe the obligations expected of a professional forester.
 - c. Describe the reasons for discipline and complaint resolution processes.
 - d. Describe and explain the importance of entry and quality assurance standards for professions.
- 3. Explain competency limitations.**
 - a. Describe how to determine personal competence.
 - b. Describe ones own particular areas of competence.
 - c. Recognize situations when outside expertise is required.

4. Describe the characteristics and attitudes of a professional forester.

- a. Explain the purpose of a code of conduct.
- b. Illustrate personal accountability for decisions.
- c. Recognize the potential differences between technical, social, professional, ethical and scientifically sound practice.
- d. Recognize similarities and differences between approaches (e.g. cultural, scientific, legislative).
- e. Differentiate between service to the public, profession, employer and resource.
- f. Describe the importance of and demonstrate the application of professional documentation.
- g. Explain what is meant to work in the public's interest.
- h. Explain the variety of ethics that are applied in the profession of forestry.

Bloom’s Taxonomy¹ for Learning Outcomes (adapted)

Bloom’s levels of educational learning provide a framework to consider what applicants know and where the educational effort should be targeted in order to further promote additional, and more sophisticated, learning. For these standards, Bloom’s hierarchical taxonomy has been adapted as given below:

Category	Keywords
<p>Knowledge: remembering information <i>(The learner first must be made aware of the situation)</i></p>	<p>Define identify label state list match <i>(Rote memory)</i></p>
<p>Comprehension: explaining the meaning of information <i>(The learner must then comprehend the value of situation)</i></p>	<p>Describe paraphrase summarize estimate <i>(Translate to your words)</i></p>
<p>Application: using abstracts in concrete situations <i>(The learned must be able to consider what they have learned in one situation and use it in an other different situation)</i></p>	<p>Determine chart implement prepare solve use develop <i>(Apply general principle)</i></p>
<p>Analysis: breaking down a whole into component parts <i>(The learner acquires additional information about the situation, and begins to look at the different pieces of information that comprise the whole story)</i></p>	<p>Point out differentiate distinguish discriminate compare <i>(Break down into parts)</i></p>
<p>Synthesis: putting parts together to form a new and integrated whole <i>(The learner then develops the skills to assemble that information in new ways, rather than simply reflecting back what they have learned)</i></p>	<p>Create design plan organize generate write <i>(Create a whole from parts)</i></p>
<p>Evaluation: making judgements about the merits of ideals, materials or phenomena <i>(The learner is able to judge the information and make decision for him/herself about its (good or bad) value based on criteria)</i></p>	<p>Appraise critique evaluate judge weigh select <i>(Judge according to standards)</i></p>

¹ Bloom B.S. 1956. *Taxonomy of educational objectives: the classification of educational goals. Handbook 1: Cognitive Domain*. Longman. White Plains, NY.

Verbs² to Specify Demonstrable Competencies and Performance Indicators

The action verbs listed below are as found in the *Academic Standards for the Accreditation of Degree Forestry Programs in Canada* of the Canadian Forestry Accreditation Board.

For Knowledge

arrange	define	duplicate	label	list
measure	memorize	name	order	read
recall	recognize	relate	repeat	reproduce
state				

For Comprehension

classify	describe	determine	discuss	explain
express	identify	indicate	locate	report
restate	review	select	translate	

For Application

apply	choose	communicate	demonstrate	dramatize
employ	facilitate	illustrate	implement	operate
perform	practice	schedule	sketch	solve
use	write			

For Analysis

analyse	appraise	calculate	categorize	compare
contrast	criticize	differentiate	discriminate	distinguish
examine	experiment	interpret	question	test

For Synthesis

arrange	assemble	collect	compose	construct
create	design	develop	display	formulate
manage	organize	plan	prepare	propose
write				

For Evaluation

appraise	argue	assess	attach	choose
compare	defend	estimate	evaluate	judge
predict	rate	score	select	support

2 Jenkins, A. and D. Unwin. 2001. *How to write learning outcomes*.
<http://www.ncgia.ucsb.edu/education/curricula/giscc/units/format/outcomes.html>

Foundational Studies

Art, Science and Humanities

Knowledge of arts, science (social, biological and physical) and the humanities is foundational to a university bachelor's degree and provides the necessary exposure to principles that underpin the practice of professional forestry.

A candidate for certification as an RPF or ing.f. must have had exposure at the basic/introductory undergraduate level to a variety of disciplines such as:

- Anthropology
- Art
- Biology
- Chemistry (organic, inorganic)
- Economics
- Geography
- Geology
- History
- Languages
- Literature
- Mathematics
- Philosophy
- Physics
- Political Science
- Sociology
- Statistics

Societal Context

Forests in Canada form part of the life and culture of Canadian society. Society has a right and obligation to identify what it values and how it wishes to benefit from the forest resources. Professional foresters need sufficient grounding in social sciences and humanities to discharge their duties as forest stewards mandated to act in interest of the public.

Knowledge from the arts, science and humanities are essential to understanding and contributing to the societal context within which foresters work, as described by:

- Aboriginal rights, values, interests
- Civics (legislative development, governance systems)
- Development of forest policy

- Global environments, economic structures, human population centres and industry services
- Public and stakeholder interests and methods for determining public forest resource values/interests
- Social systems and change, concepts of property, cultural resources and social forces
- Social impact analysis and planning

A candidate for certification³ shall be able to:

1. Describe local, regional, national and international values, social forces and political systems.
2. Acquire a sufficient level of humanities and social science knowledge to support forestry core learning and professional forestry practice.
3. Describe the components, patterns and processes of biological systems, and the properties, structures and states of matter.
4. Acquire, and be able to defend and demonstrate the use of, a sufficient level of scientific knowledge to support core forestry learning and professional forestry practice.
5. Describe concepts of social and economic structures, processes, and institutions of importance across a broad range of societies.

³ Pre-or co-requisite studies that provide foundational knowledge for the core competency standards are acquired either within the degree (in the case of accredited programs) or through other qualification (in the case of applicants from non-accredited, recognized programs). When it comes to accredited programs, the CFAB will determine whether the program itself provides sufficient exposure to the foundation knowledge. When it comes to applicants from non-accredited, recognized programs, the onus is on the candidate to demonstrate achievement of the numbered requirements as stated above.

The Role of Standards in Professional Licensure

The diagram is meant to illustrate the relationship between the standards developed for certification, enrolment and university accreditation.

A candidate that applies to a regulatory body for entry into the forestry profession must meet a standard of enrolment. Candidates apply from accredited and non-accredited programs.

