# BCIA PRACTICE AREAS

## A Summary for BCIA Registrants and Applicants

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**DISCLAIMER:** At the time of publication of this document on its website, BCIA remains in discussions with the other professions regulated under the Professional Governance Act, respecting the breadth of reserved practice for the professions of agrology and applied biology. As such, this document may be amended in part, with notice of such amendments to be published on the BCIA website.

For further information (including but not limited to assistance in determining which professional regulator has jurisdiction over a certain activity), Registrants, Applicants, and members of the public are encouraged to contact BCIA at the following address or one of the other respective Regulators under the jurisdiction of the Professional Governance Act.

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## TABLE of CONTENTS

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75TH ANNIVERSARY

# TABLE of CONTENTS

## Practice Areas

BC INSTITUTE OF AGROLOGISTS
Cultivating Natural Resource Professionals

75TH ANNIVERSARY

# TABLE of CONTENTS

## Practice Areas

BC INSTITUTE OF AGROLOGISTS
Cultivating Natural Resource Professionals

75TH ANNIVERSARY

# TABLE of CONTENTS

## Practice Areas

## Definitions

**Agroforestry:** Section 10(a) of the Agricultural Land Reserve Use Regulation [B.C. Reg 190/2021] defines agroforestry as "deliberately retaining, introducing and mixing trees or other plants in crop or animal production systems to provide an economic return...." Thus, throughout this document, the term agroforestry is used in that context and is not meant to imply or refer to the practice of forestry.

**Competence:** The ability to perform specific tasks in a professional practice based on educational training, skills and work experience to meet performance objectives as defined in a practice standard.

**Direct Supervision:** Guidance and direction are provided by a competent professional who accepts responsibility for work conducted by a less experienced professional.

**Expertise:** Special skill or knowledge acquired by training, study, or practice.

**Performance:** The exercise of knowledge in a professional practice that demonstrates the required ethical conduct and wise judgment as specified within a practice standard.

**Practice Area:** A unique functional area of professional practice within the agrology profession requires specialized knowledge based on education, work experience, and skill sets.

**Practice Standard:** A document that outlines requirements and expectations for professional practice within a practice area.

**Professional Practice:** The competent and ethical provision of specialized knowledge, recommendations, and assessments based on education, work experience, and skill sets while being accountable to peers as a regulated Registrant of a professional regulatory organization.

**Regulated Registrant:** A person in good standing with the British Columbia Institute of Agrologists who holds one of the following designations: PAg (Professional Agrologist), TAg (Technical Agrologist), AAg (Articling Agrologist), ATAg (Articling Technical Agrologist), or an LLag (Limited License Agrologist).

**Skill:** An ability developed over multiple years of work experience in a professional practice.

## Regulated Practice of Agrology

On February 5, 2021, after extensive research and consultation, the Government of BC enacted most of the remaining provisions of the Professional Governance Act, S.B.C. 2018, c.47 ("PGA"). Part of that package of enactments was the Agrologist Regulation which contained the legislative definition of the "regulated practice of agrology."

That definition sets the parameters of the profession as follows:

The "practice of agrology," subject to subsection (2), means the provision of any of the following advice or services:

1. (a) Advice or services that
    a. i. Are based on agricultural or natural sciences or agricultural or resource economics, and
    b. ii. Relate to
        i. (A) Cultivation, production, improvement, processing, marketing, or management of aquatic or terrestrial plants or animals,
        ii. (B) Classification, management, use, conservation, protection, or enhancements of aquatic, terrestrial, or atmospheric ecosystems that are affected by, sustain or have the potential to sustain the cultivation or production of aquatic or terrestrial plants or animals or
        iii. (C) Restoration, reclamation, or remediation of aquatic, terrestrial, or atmospheric ecosystems;

    (b) Advice or services that are ancillary to those described in paragraph (a).

## Regulated Practice of Agrology

2. The practice of agrology does not include the provision of advice or services within the reserved practice of a Registrant of another regulatory body.

Within the province of British Columbia, **only** the advice, services, and activities that fall within this definition can properly be called agrology (definitions of agrology differ between Canadian provinces).

This is significant for two reasons:

1. Although many of these regulated activities can be provided by anyone, **only** individuals registered with BCIA can refer to themselves by one of the protected Agrologist designations. This is referred to as the "Right to Title."
2. There is a subset of advice, services, and activities within this regulated practice that can **only** be provided by Registrants of BCIA. This is what is referred to as "Reserved Practice." Any person who provides advice or services or conducts activities within this reserved practice and who is not a Registrant of BCIA is subject to prosecution for unauthorized practice.

What follows are the definitions of the 12 practice areas where Agrologists in British Columbia can provide advice and services. These definitions outline, in practical terms, the advice, services, and activities within the definition of **regulated practice** for the profession of agrology. This will allow BCIA Registrants and the public to understand what activities Agrologists **can** provide and which activities **only** Agrologists can provide. In their entirety, **they are not intended to be, nor should they be interpreted as the reserved practice of the profession.**

## Reserved Practice of Agrology

### 3.1 Definition of Reserved Practice

On September 13, 2021, by order of the Cabinet of British Columbia, Registrants of the BC Institute of Agrologists (BCIA) were granted Reserved Practice rights as follows:

The practice of agrology described in paragraph (a) (ii) of the definition of "practice of agrology" is a reserved practice that may only be carried out by or under the supervision of a Registrant, if the practice relates to providing advice or another service that, *having regard to the protective purposes,* requires the experience or technical knowledge of an Agrologist.

In the case of advice or services described in paragraph (a) (ii) (C) of the definition of "practice of agrology," the reserved practice is limited to the advice or services relating to the state or quality of soil, water, or air, for an agrology purpose.

"Protective purposes" is defined as:

> *"the safety, health, and welfare of the public, including the protection of the environment and the promotion of health and safety in the workplace."*[1]

This means that Registrants of BCIA *(but only for a specific subset of activities within its regulated practice that does not infringe upon the reserved practice of another profession regulated under the PGA*) will have the exclusive right to provide advice and services for agrology in British Columbia.

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[1] as defined under Section 1 of the Agrologists Regulation, B.C. Reg. 10/2021.

## Reserved Practice of Agrology

### 3.2 Restrictions on the Reserved Practice of Agrology

It must be stressed that five significant legislative restrictions limit the scope of the definition of the reserved practice of agrology. The first is that the practice of agrology does **NOT** include *"a normal farm practice, as defined in the Farm Practices Protection (Right to Farm) Act, by a person on the person's own land."*

The second restriction is that the reserved activities conducted during the *"Restoration, reclamation or remediation of aquatic, terrestrial or atmospheric ecosystems are limited to the advice or services relating to the state or quality of soil, water or air, for an agrology purpose."*

The third restriction is that *"The practice of agrology does NOT include the provision of advice or services within the reserved practice of a Registrant of another regulatory body."* Before September 1st, 2022, only the Registrants of Engineers and Geoscientists BC ("EGBC") and the Association of British Columbia Forest Professionals ("ABCFP") have reserved practice that falls within this restriction. After September 1st, other bodies such as, but not limited to, BCIA and the College of Applied Biologists will have reserved practice, each of which must be defined per this restriction.

The fourth restriction, as outlined in Section 55 of the PGA, is that other legislative enactments of the Government of British Columbia can authorize persons other than Registrants under the PGA to conduct specific work. An example is Contaminated Sites Approved Professionals (CSAPs), who are qualified professionals appointed to the Roster of Approved Professionals under Section 42 of the Environmental Management Act to review environmental certification applications made under that Act and the Contaminated Sites Regulation. Another example is the Riparian Areas Protection Regulation which lists multiple professional designations as being qualified to practice in that area.

## Reserved Practice of Agrology

### 3.2 Restrictions on the Reserved Practice of Agrology

The fifth restriction, in accordance with Section 55.1 of the PGA is that the prohibition against non-Registrants providing advice or services within the reserved practice of agrology does not apply to a person exercising the rights of an Indigenous person ( as defined in the *Declaration on the Rights of Indigenous People Act*), including the right to maintain, control, protect or develop any of the following with respect to the Indigenous people:

a) Cultural heritage;
b) Traditional knowledge;
c) Traditional cultural expressions;
d) Manifestations of sciences, technologies, or cultures.

The definitions and descriptions of the Practice Areas within agrology outlined below **must** always be read with these restrictions in mind. Consequently, and to reduce redundancy, the Practice Areas descriptions below will not unnecessarily restate the restrictions outlined in this section.

## Special Knowledge Areas and Experience in the Performance of Activities

The defining characteristic that separates any professional governed under the PGA (and other professional governance legislation within the province of BC) is their special knowledge and experience in its application that comprise their expertise to ensure that the advice and services they provide are protective of the public interest. This knowledge can only be gained through an academic program at an accredited university in Canada or equivalent education or training institute. Professional experience and expertise are gained in the specific application of these knowledge areas to the perspectives of the practice of agrology, such as through an articling period supervised and guided by a suitable mentor.

It should be noted that, at times, knowledge areas may be shared by other professionals. It is the application of that knowledge that may be applied to very different purposes. For example, both Agrologists and engineers may share knowledge in soil physics, but the application of that knowledge by an Agrologist is for a purpose within

## Special Knowledge Areas and Experience in the Performance of Activities, continued

the practice of agrology, such as ensuring the availability of moisture for plant growth, whereas the engineer may be using the same or very similar knowledge to assess potential soil cohesion for structural purposes. **As such, knowledge areas are NOT reserved practice areas but rather refer to foundational knowledge that may be common to more than one profession.**

All Agrologists are expected to maintain knowledge within five particular areas as related to their declared practice area(s).

### 4.1 Policy and Regulation

Each Registrant of BCIA is required to maintain current knowledge of the Agrologist Regulation, its amendments, and any other provincial legislation and or policies relevant to the broader agrology profession in BC and their particular practice areas and activities.

### 4.2 Climate Change

A global consensus now exists that the climate is in an unprecedented state of change and that an overwhelming driver of this change is human activities [2]. Furthermore, this change rate impacts everything from natural ecosystems to agriculture to public infrastructure. These impacts are expected not to be in the public interest, with rare exceptions. To address these challenges and avoid the worst of these impacts, Agrologists are expected to show due care in providing their advice and services by maintaining knowledge and expertise in four specific activities within their practice area:

A. The mitigation of climate change.
B. The mitigation of the impacts of climate change.
C. Adaptation to climate change.
D. The adaptation to climate change impacts.

## Special Knowledge Areas and Experience in the Performance of Activities, continued

### 4.3 Professional Ethics

All Registrants of BCIA are expected to maintain knowledge concerning ethical standards of not just the BCIA but of the expectations of broader society, including legal recourse.

### 4.4 Professional Boundaries and Limits to Practice

BCIA is one of five regulatory bodies currently governed by the PGA. In performing their tasks, Agrologists may find themselves in situations where professionals of regulatory bodies under other legislation may also be engaged. Registrants of the BCIA are expected to have a clear understanding within their practice areas as to where their authority borders that of the Registrant of another regulatory body. It should be clearly understood that there can be no overlap between the reserved practices of two regulatory bodies (unless the overlap is legislatively recognized), but rather that the practices can compliment each other.

### 4.5 Indigenous Reconciliation

Finally, Registrants of all regulatory bodies subject to the PGA are explicitly required to facilitate the provision of knowledge to their Registrants for facilitating reconciliation with Indigenous Peoples in the province of BC as per section 57 (1) (f):

> 57 ([1]) Subject to subsections ([2]) and ([3]), the council of each regulatory body must make bylaws establishing the following:
> (f) continuing education programs or requirements that support reconciliation with Indigenous Peoples in British Columbia;

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[2] International Panel on Climate Change (2022). Climate Change 2022: Impacts, Adaptation, and Vulnerability
Retrieved on April 24, 2022, from: https://www.ipcc.ch/report/ar6/wg2

## Activities Performed by Agrologists and Their Impacts

Within their practice areas, Agrologists may carry out several activities with potential impacts on the public interest.

### 5.1 Activities Performed by Agrologists

Within their declared practice areas, an Agrologist may carry out several activities, including but not limited to:

**Investigation:** Agrologists may be required to investigate many situations. Examples might include a weed infestation, a contaminated site, or a conflict between a farmer and neighbour's overspray drift.

**Assessment:** Agrologists may use their expertise to provide a judgment or assessment of situations that cannot be perfectly quantified. For example, a weed infestation may be inspected, but it is not possible or doubtful to make a perfect assessment of the current statement of the infestation. Similarly, boreholes may be drilled to retrieve soil and water samples to assess a contaminated site, but there are limits to the accuracy and precision of the assessment that can be gained. Damage to crops for insurance purposes may also be assessed by an Agrologist.

**Classification:** An example is the classification of soils and land for agricultural capability. Again, the expertise and judgment of an Agrologist are necessary to capture the nuances at the boundaries between classes.

**Diagnosis:** Agrologists investigating an insect infestation in a crop may perform an audit of the practices used by a farmer to determine the potential source of the infestation. An objective of Agrologists investigating a contaminated site may also be to determine the source of the contaminants.

**Prognosis:** An Agrologist assessing damage to a crop for insurance purposes may also provide a prognosis of what the final yield and quality of the crop might be.

## Activities Performed by Agrologists and Their Impacts

### 5.1 Activities Performed by Agrologists, continued

**Prescriptions:** In dealing with a specific problem or challenge on a site, Agrologists may provide a specific set of instructions to be carried out to address the challenge. In the case of an invasive species, it might include a plan designed around using a particular pesticide. An Agrologist might formulate a detailed plan for reclamation or remediation of a contaminated site. Formal nutrient management plans are also an example of a prescription provided by Agrologists to protect the public interest.

**Authorizations:** Agrologists are often in positions within government agencies or contracted by the private sector to authorize activities or determine regulatory compliance at sites or in situations where work has or is to be done that might adversely impact the public if not correctly assessed or performed.

**Policy and Regulation:** Agrologists may also provide expertise to inform policy and regulation development. Examples include land management within the Agricultural Land Reserve and developing policies and regulations regarding nutrient management to mitigate soil and water contamination.

**Enforcement:** In addition to informing the development of policy and regulation, Agrologists' expertise may be called upon to check on compliance and assist with enforcement.

**Review:** The special expertise of Agrologists may be called upon at times to provide critical reviews of research, reports, procedures, and policies to assure the public interest is protected.

**Supervision:** Agrologists may be called upon for their expertise to supervise projects, processes, and procedures to ensure that they are executed in a manner protective of the public interest.

**Research:** Agrologists' expertise may be required to research to protect the public interest. Examples include the development of new crop varieties, treatments for invasive species, and market research for new enterprises.

**Teach:** Agrologists' expertise is also necessary to transfer knowledge to potential new Registrants and the broader public at times via extension.

## Activities Performed by Agrologists and Their Impacts

### 5.1 Activities Performed by Agrologists, continued

**Manage:** Agrologists' expertise may be called upon to inform several management decisions, from scheduling farming activities, including the hiring of personnel bookkeeping, and accounting to finances, sales, and marketing of products.

These are only examples of activities that may be carried out by BCIA Registrants within their practice areas and are not to be confused with an exhaustive list of the activities performed by Agrologists. Each of these examples, however, illustrates the practice of agrology as instances where the special expertise of an Agrologist is required to ensure that the activity is performed in a manner protective of the public interest.

### 5.2 Professional Activities and Their Impacts

Activities that Agrologists engage in within their practice areas may have various impacts. In some instances, the impacts of activities carried out by professionals may be acute with a high degree of immediate severity. In other instances, the impacts might be less severe in the short term but with significant long-term cumulative impacts.

Examples of activities with potentially less acute but more cumulative impacts might include primary research or teaching activities. Failure to take due care in primary research might lead to recommendations by Agrologists, other professionals, and regulators that might not have immediate adverse impacts but, over time, result in a deterioration of resources valuable to the public interest. Not exercising due care in teaching or passing on knowledge can also adversely impact the public interest as misinformation is applied to resource use and/or management.

## Activities Performed by Agrologists and Their Impacts

**5.2 Professional Activities and Their Impacts, continued**

Please note that research and teaching activities are NOT within the regulated practice of agrology as defined under the PGA. BCIA strongly recommends, however, that individuals engaged in those activities become and remain Registrants of BCIA to ensure that they have access to the most current professional development information.

In some instances, the short-term impacts might be relatively benign. Still, long-term cumulative impacts might be quite severe. The management and application of nutrients on agricultural land is a prime example. In the short term, the impacts of poor management might be buffered by the natural environment, but cumulative impacts can have severe adverse impacts on soil and water resources in the long term.

Note again that these are only examples, and the degree to which the impacts of any given activity result in acute or cumulative impacts on the public interest lies on a continuum between the two extremes, both in time and magnitude.

## Interplay Between Regulated Professionals

At times, Registrants of different regulated professions may find themselves working together, in collaboration, or alongside each other, as part of the same project, enterprise, or in some other capacity. Their practices and the activities they engage in during their provision of advice and services as professionals may relate to each other in three different ways:

### Overlap of Practice

Is work by two or more Registrants that have **the same objective and advice/services**, same competencies (knowledge, skills, and abilities) to perform the tasks but with the Registrants governed by different regulators. Overlaps of reserved practice are not allowed unless the specific overlaps are legislatively authorized.

# Interplay Between Regulated Professionals

## Alignment of Practice

Professionals are in alignment when they provide advice or services **using similar competencies and technical knowledge but with a <u>different objective</u> and are governed by different regulators.** An example, as outlined above, is that Agrologists and engineers may share knowledge in soil physics. However, applying that knowledge by an Agrologist includes ensuring the availability for plant growth. In contrast, the engineer may use similar knowledge to assess potential soil cohesion for structural purposes.

## Intersecting Practice

Occurs when professionals **work in compliment to each other toward the completion of a task or a project but provide different advice and services, have different competencies (knowledge, skills, and abilities), and are governed by different regulators.**

## Resolving Conflict between Regulated Professionals

Determining the boundaries between professionals can be challenging not only due to the history of being called on at times to provide similar advice and services in addition to providing complimentary services and advice but also because of evolving policy environments and technology.

The implementation of the PGA itself is an example of the evolving policy and regulatory environment forcing professionals under its governance to rethink the advice and services they provide. On the technical side, three examples of emerging technologies in the past 25 years affecting almost all the professions under the PGA include:

1. Remote sensing with uncrewed aerial vehicles.
2. Molecular genetics (DNA sequencing and synthesis techniques).
3. Nanotechnology and microfluidic sensors.

## Interplay between Regulated Professionals

### Resolving Conflict Between Regulated Professionals, continued

Undoubtedly, other technologies and techniques will emerge over time.

To provide further clarity as to the activities within the reserved practice of agrology, BCIA will create standing committees for each BCIA Practice Area. These committees will establish and continually update written practice standards for each practice area and liaise with appropriate individuals within other regulatory bodies to ensure appropriate boundaries and limitations are set and respected by the Registrants of each body.

## Practice Sectors

Registrants of professional regulatory bodies define themselves by their specific expertise in the advice and services they render. Historically, Registrants of BCIA self-identified as practicing in up to 3 of 38 distinct practice areas across six different practice sectors. A 'practice area' was defined as

> *'a unique functional area of professional practice within the agrology profession that requires specialized knowledge, based on education, work experience, and skill sets.'.*

The enactment of both the definition of regulated and reserved practice required the definition of 'practice area' to be updated to

> *'a unique functional area of professional practice within the regulated practice of the profession that requires specialized knowledge, based on education, work experience, and skill sets. If the activities are performed for protective purposes as defined within the Agrologists Regulation, that work is within the reserved practice of the profession.*

## Practice Sectors

Before practice areas, activities, and standards can be defined, the broad sectors of agrology must be consolidated into five sectors redefined as follows:

### 7.1 Economics Sector

The first sector is agriculture and natural resources economics. The overall objective of practitioners within this sector is to provide advice and services to inform the efficient use of agricultural and natural resources for maximum benefit to the public. Agriculture and natural resources and their utilization provide unique challenges to economists in their work. Both productions have natural environmental risks, including weather, pests, and diseases. Humans can intervene with additional inputs such as water (e.g., irrigation) or nutrients (e.g., fertilizer) for crops or feed for livestock to mitigate some of these natural risks. Still, their availability, in turn, may also be affected by competition for other uses.

The products of agricultural and natural resources are also often highly perishable through natural processes. For example, raw milk and wild blueberries have a minimal shelf life, adversely affecting their value with each passing moment from harvest as they pass through complex processing and distribution chains to consumers. These challenges differentiate economic analysis in agriculture and natural resources from analysis in other sectors where production is more predictable and goods more durable. Practitioners in the agricultural and resources economics sector must have a working knowledge of the relevant applied sciences to analyze their work's systems.

## Practice Sectors

### 7.2 Growing and Production Sector

Historically, the first purpose of Agrologists was to inform the growth and production of biological products for human use with the best knowledge available. Biological products can take the form of plants, animals, or fungi. In British Columbia, these biological products specifically include, but are not limited to, products resulting from the practice of aquaculture. Agriculture predominantly occurs on or in privately controlled premises or environments with human intervention and modification to minimize natural risks posed by weather, pests, and diseases. It involves optimizing soil, water, and air resources to maximize growth and production and, where necessary, supplement natural resources such as nutrients with fertilizers or water. It may also require human intervention to mitigate the impacts of pests and disease by physical, chemical, and biological means. Caution must be exercised through these interventions. Supplementing plant nutrition or using agricultural chemicals indiscriminately can result in adverse effects on the natural environment contrary to the public good.

The expertise gained and used in agriculture to produce biological products for human use can benefit other production practices, notably rangeland and agroforestry. In both instances, these environments are also typically multi-use, where production is shared for recreational, wildlife, and natural ecosystem benefits. The knowledge and expertise in due care gained through agriculture are particularly invaluable because of the multi-use nature of these environments.

### 7.3 Processing Sector

The agricultural, range, aquaculture, and agroforestry production products often require processing to render them suitable for human use. Furthermore, agricultural, range, aquaculture, and agroforestry activities often generate by-products and wastes in their production and processing. If not handled correctly, they can adversely affect the natural environment and public good and represent a forfeiture of valuable nutrients and by-products. Managing these products, by-products, and wastes involves physical, chemical, and biological processes. Usually, these are carried out on or in privately owned contained facilities.

## Practice Sectors

### 7.3 Processing Sector, continued

In the case of agricultural production, Agrologists bring knowledge and expertise in ensuring the production of agriculture, aquaculture, and agroforestry products with the optimal attributes for processing into food and other products and in informing the processing activities themselves for optimal benefits. In the instance of by-products and waste products, Agrologists have a history of applying their specialized knowledge to processing biological by-products and wastes for the public benefit. Composting and anaerobic digestion to manage livestock and food processing wastes are two examples. This knowledge can also be applied to other waste processing activities, including municipal waste and sewage.

### 7.4 Land and Water Resources Sector

The conservation and management of both land and water are of paramount interest to the public good. The potential use of land for humans and natural ecosystems is often a function of the quantity and quality of the water. In addition to the water available, land use is also a function of the ecological systems that reside on the land, the soils beneath it, and the climate to which it is subject.

Agrologists have extensive knowledge and expertise in assessing and classifying land resources in terms of their soil resources, vegetation, and water impacts. Agrologists use that knowledge to mitigate the potential effects of activities on neighbours, water, and Indigenous practices.

### 7.5 Environmental Resources Sector

As noted above, the regulated practice of agrology specifically cites that it entails the *"classification, management, use, conservation, protection or enhancement of aquatic, terrestrial or atmospheric ecosystems that are affected by, sustain or have the potential to sustain the cultivation or production of aquatic or terrestrial plants or animals,"* and in addition, independent of an agricultural connection, constitutes activities related to the "*restoration, reclamation or remediation of aquatic, terrestrial or atmospheric ecosystems*."

## Practice Sectors

### 7.5 Environmental Resources Sector, continued

Aquatic, terrestrial, and atmospheric ecosystems constitute the environment's soil, water, and air resources. These environmental resources are subject to degradation from both human activities and natural phenomena. Degradation might result from physical activity such as a landslide or erosion and sedimentation, chemical contamination of water resources from agricultural activities, or leakage from the tanks of a service station, or it might be the unrestrained propagation of an alien species. Agrologists, often in alignment with other regulated professionals, work to address the effects of such degradation.

# Reserved Practice of Agrology

## Summary Chart of Practice Areas, Reserved Practice, Interactions, and Alignments Between Regulated Professions

Per these five updated practice sector definitions, the 12 practice areas within the definition of agrology within British Columbia after September 1st, 2022, together with confirmation of reserve practice areas and the interplay between regulated professions are stipulated in the following chart and are further defined below. **(Underlined content within this chart is hyperlinked.)**

| Sector | Practice Areas | Reserved Practice of Agrology | Interaction or alignment with other regulated professions | Page References |
|---|---|---|---|---|
| **Economics** | 1. Agricultural & Resource Economics and Rural Development | 1. Yes | 1. No | 1. Pg 27-29 |
| **Growing & Production** | 2. Crop Development, Production, and Management<br>3. Livestock Development, Production and Management<br>4. Rangeland and Grazing Management<br>5. Agroforestry | 2. Yes<br>3.,4.,5. Certain, but not all activities | 2. No<br>3. Yes: Veterinarians<br>4. Yes: Foresters, Applied Biology Professionals, and Veterinarians<br>5. Yes: Foresters and Applied Biology Professionals | 2. Pg 30-34<br>3. Pg 35-37<br>4. Pg 37-38<br>5. Pg 39-41 |
| **Processing** | 6. Food and Agricultural Products Development and Processing | 6. Certain, but not all activities | 6. Yes: Engineers | 6. Pg 41-42 |

| Sector | Practice Areas | Reserved Practice of Agrology | Interaction or alignment with other regulated professions | Page References |
|---|---|---|---|---|
| | 7. Waste Management, Bio-renewables, and Bioprocessing | 7. Certain, but not all activities | 7. Yes: Engineers and Applied Biology Professionals, dependent on the type of waste | 7. Pg 43-44 |
| **Land & Water Resources** | 8. Land Evaluation, Classification, Mapping, Conservation, and Management<br>9. Water Resources Planning and Management | 8. & 9. Certain, but not all activities | 8. Engineers, Geoscientists, Foresters, and Applied Biology Professionals<br>9. Engineers and Applied Biology Professionals | 8. Pg 44-48<br>9. Pg 48-49 |
| **Environmental Resources** | 10. Protection and Management of Environmental Resources<br>11. Land Reclamation and Restoration<br>12. Invasive Species and Pest Management | 10.,11.,12. Certain, but not all activities | 10 & 11. Yes: Engineers, Geoscientists, Foresters, Applied Biology Professionals, ASTTBC Technicians, and Technologists; dependent upon the specific type of resources being protected or managed<br>12. Yes: Applied Biology Professionals | 10. Pg 49-54<br>11. Pg 54-56<br>12. Pg 56-57 |

Below are specific definitions of the 12 practice areas, including some examples of projects that regulated professionals under the Professional Governance Act (PGA) may be engaged in to provide their advice and services. These examples are for discussion and not to define the entire scope of practice for agrology or any of the other professions in this document.

# Practice Areas

## A. Agricultural and Resources Economics and Rural Development

### A.1.1 Definition

The practice of providing services and advice: *Using scientific and economic principles, knowledge, and expertise to inform the efficient and sustainable use of agricultural and natural resources for optimal benefit.*

### A.1.2 Rationale

Both agricultural and natural resources (such as land, soil, water, and atmosphere) are subject to risks arising from their production environments, particularly weather, pests, and disease. Supply may be affected by the availability of inputs such as fertilizer for crops or feed for livestock. Agricultural and natural resources are often channeled through complex supply chains from source to end consumer, which may include issues such as competition and consumer demand for the products produced from these resources.

Providing information and services to optimize the production and use of agricultural and natural resource products is challenging. Failure to adequately address the challenge can result in several adverse outcomes for the public good. For example, failure to produce adequate agricultural products can lead to food insecurity. At the same time, overproduction can result in waste and adverse environmental impacts, including unmitigated greenhouse gas emissions. Private individuals and companies may also incur financial risks that result in their demise with other economic impacts. Further, communities, especially rural communities, can be adversely impacted to the detriment of their economic and social well-being.

Agricultural and natural resource economists synthesize their knowledge and expertise in sciences and economics to inform governments, rural communities, companies, and private individuals to optimize the production and use of agricultural and natural resources. These activities under the Agricultural and Resource Economics sector are within the reserved practice of agrology. The following examples illustrate some of those activities.

## Practice Areas

# A. Agricultural and Resources Economics and Rural Development

### A.1.3 Illustrative Examples

#### A.1.3.1 Determining Compensation for Supply Managed Commodities

In Canada, the production and marketing of milk, egg, and poultry products are strictly regulated by marketing boards under a system of supply management. Ultimately, supply management represents a social contract between Canadian farmers and consumers. Farmers receive a set price for producing a specified amount (quota) of each commodity instead of competing on an open market. In exchange, consumers get a guaranteed commodity supply at a predictable price and lower cost than time progressives.

The expertise of agricultural economists is indispensable in determining this price. In their work, agricultural economists must consider each commodity's production systems and associated costs and risks. They conduct cost-of-production surveys in their work to determine the direct costs involved in production. They must also consider the opportunity costs on capital resources and a fair return to farmers producing these commodities. Furthermore, they must also consider the costs associated with managing waste to ensure responsible environmental stewardship and that animal welfare is not compromised.

At the same time, agricultural economists must be fair to consumers. Open markets tend to reduce consumer costs over time because of efficiencies from new production technologies and processes. Building on the analysis of cost-of-production survey data, agricultural economists advise on price and related policies that encourage productivity and efficiency improvements that ultimately benefit consumers over time.

Finally, Canada's supply-managed commodities exist within a broader framework of domestic and international trade policy that must be respected to perform this activity. Agricultural economists depend on a suite of core knowledge, including

- Agricultural production systems, mainly related to the challenges and risks associated with livestock commodity production and crop production systems that provide livestock feed.

## Practice Areas

# A. Agricultural and Resources Economics, and Rural Development

### A.1.3.1 Determining Compensation for Supply Managed Commodities, continued

- Research and statistical methods to survey and determine production costs while recognizing the potential for sampling, bias, and other sources of error.
- Econometrics to quantitatively model economic relationships and systems.
- Finance theory recognizes and mitigates feedback loops that might result in the capitalization of returns into quota acquisition costs.
- Agricultural and international trade policy ensures that international agreements are respected while ensuring the objectives of Canada's supply management system in agricultural commodities.

### A.1.3.2 Managing Risks in Agricultural Commodities Marketing

Farming is a complex business subject to many risks, including market risks. Inputs such as fertilizer and chemicals for crop production and feeds and forages for livestock enterprises can significantly fluctuate in response to factors affecting global supply and demand. A failure to address these risks can have several adverse effects on the public good. Examples include the failure of agricultural enterprises with different adverse effects, including stranded assets which may adversely affect the natural environment, and finally, a loss of food production capacity with implications for food security.

### A.1.3.2 Managing Risks in Agricultural Commodities Marketing

Agricultural economists are uniquely qualified to protect the public from these outcomes by advising agricultural producers with strategies to market their products better. Agricultural economists possess knowledge and expertise in Agricultural production systems, including crops and livestock.

- Research and statistical methods to analyze production over time.
- Econometrics to quantitatively model economic relationships and systems.

## Practice Areas

# A. Agricultural and Resources Economics, and Rural Development

### A.1.3.2 Managing Risks in Agricultural Commodities Marketing, continued

- Commodities marketing, including spot, futures, options, and synthetic derivatives to manage risk.

### A.1.4 Other Example Activities

In addition to the examples provided, Agricultural and Resource Economists may be engaged in several other activities where their unique expertise may provide a protective purpose to the public interest. Examples include

1. Assessing, preparing, and analyzing budgets for agricultural and natural resource enterprises, excluding forest-based enterprises within the jurisdiction of the reserved practice of forestry.
2. Conducting feasibility studies for new agricultural enterprises.
3. Assessing the economic damage of pest and or invasive species infestations, excluding forests within the jurisdiction of the reserved practice of forestry.
4. Advising agricultural and, or resource enterprises on insurance strategies.
5. Assessing the value of agricultural and or natural resource enterprises, excluding forests within the jurisdiction of the reserved practice of forestry.
6. Advising on agricultural and or resource policy and regulation.
7. Facilitating succession plans for agricultural enterprises.

In each instance, the common thread is the application of economics to the production and use of resources and products subject to natural risks, including climate, pests, and wildfires, as understood by science with the addition of market risks. In each instance, the failure to properly assess and manage these risks can lead to failures with consequences to the public.

## Practice Areas

# B. Crop Development, Production, and Management

### B.2.1 Definition

The practice of providing services and advice: *using scientific principles to inform the efficient and sustainable use of limited resources in the production and consumption of plants or fungi for human use.*

### B.2.2 Rationale

Crops can generally be defined as plants or fungi grown and harvested annually or periodically for human use. Crops can be categorized into seven categories:

1. terrestrial and aquatic food crops for human consumption;
2. feed crops for livestock consumption;
3. fibre crops for cordage and textiles;
4. oil crops for consumption or industrial uses;
5. ornamental crops for landscape gardening;
6. industrial and secondary crops for various personal and industrial uses, including pharmaceuticals and fuel production;
7. cover crops and green manures; and
8. native plant species for landscaping and reclamation.

Crop production management references multiple processes and systems geared to improve crops' growth, yield, and development. Crops may be grown in open environments such as farm fields, orchards, and vineyards, or in contained environments such as greenhouses. Growing environments, whether farm fields or greenhouses, are almost exclusively privately owned, and neighbouring private property is owned by other members of the public.

## Practice Areas

# B. Crop Development, Production, and Management

### B.2.2 Rationale, continued

In almost all instances, crops require primary resources, soil, water, and air, in suitable quantity and with suitable qualities to promote growth and production for optimal use. These are also often supplemented with nutrients to promote growth and or chemicals to inhibit competition from competing plants (weeds), consumption by insects, wildlife, and other predators, and disease.

Optimizing production and ensuring its sustainability is challenging. Failure to adequately address the challenge can result in several adverse outcomes for the public good. For example, failure to produce adequate agricultural products because of inadequate fertilization or inadequate control of pests can lead to failure of the farming enterprise and contribute to food insecurity. At the same time, excess fertilizer application can damage groundwater resources with adverse effects on drinking water supplies. Using agricultural chemicals for weed, insect, or pest control without due care can damage crops on neighbouring properties. Mechanical methods such as tillage can also be used to control weeds. Still, if done with inappropriate practices, tillage can unnecessarily dry out the soil, robbing crops of necessary moisture, oxidize and deplete organic matter, and render soils more susceptible to soil erosion and sedimentation problems. Agrologists with crop production expertise can provide services and advice to protect the public from these and other adverse outcomes. Unless authorized under another enactment (as recognized by Section 55 of the PGA), activities under the Crop Development, Production, and Management practice area are within the reserved practice of agrology.

### B.2.3 Illustrative Examples

Agrologists whose practice area is Crop Production may engage in a number of specialized activities.

## B. Crop Development, Production, and Management

### B.2.3.1 Nutrient Management Plans

Inadequate provision or over-application of nutrients (chemical fertilizers, green manures, livestock manures, biosolids, composts, etc.) on crops can result in crops not performing to their potential leading to several adverse outcomes. Phosphate is a necessary nutrient to produce all crops, but if it becomes too concentrated in the soil, it can become toxic to the plants it is meant to nourish. Excess nitrogen in the form of nitrates can also be highly problematic. Though nitrogen is essential for many crops, excess nitrogen can contaminate groundwater aquifers and adversely affect the health of those dependent on them as a drinking water source. Contamination of the Hullcar Aquifer in BC is a prime example of the adverse consequences that can occur to the public good when there is a failure to manage nutrient applications to crops with due care [3]. Other challenges can arise depending on the source of nutrients.

Agrologists who provide services and advise on nutrient management rely on their knowledge and expertise to develop plans that balance the nutrients applied for crop production with those removed by the crop and natural processes, usually over several growing seasons. They require a combination of knowledge and expertise, including

- Crop production systems, the nutritional needs of the specific crops, and crop rotations they advise or provide services to produce.
- Soil chemistry and fertility are affected by cropping systems, crops, and natural processes.
- Soil sampling, analysis techniques, and spatial statistics to interpret the resulting data.
- Soil physics, hydrology, and hydrogeology.
- Specific training in the development of nutrient management plans.

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[3] Government of BC. (n.d.) Hullcar Aquifer Information
https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-permitting-compliance/hullcar-aquifer

## Practice Areas

# B. Crop Development, Production, and Management

### B.2.3.2 Weed Management

Weeds are another potential challenge to crop production. Weeds can be simply defined as any plant growing where it is not desired. When weeds grow within the desired crop, they compete with that crop for resources, including nutrients, soil moisture, and sunlight. The result can, in the extreme, be a failure in the crop to the point there is a failure in the farm enterprise and adverse effects on food security.

- Weeds can be managed to varying degrees via three approaches:
- agronomic practices such as the strategic placement of seed to favour the desired crop (banded fertilizer);
- tillage; and
- chemicals (herbicides) that allow the crop to grow while acting to suppress the weeds.

Tillage is limited in its application to either the preparation of the soil before the seeding of the crop or during the growth of the crop itself. Tillage can also dry out the soil, robbing a crop of essential moisture, and facilitating soil erosion, oxidation of organic matter, and the formation of 'plough pan' adversely affecting soil drainage. Banding and similar practices, though advantageous, can require investments in very costly machinery.

Chemicals, especially when used indiscriminately, can develop herbicide-resistant strains that affect the current crop, subsequent crops, and crops on neighbouring properties. If not applied responsibly, they may also affect crops growing on neighbouring lands that are incompatible with the specific chemical being used and potentially the health of humans that are inadvertently exposed.

Agrologists have the specific combination of knowledge and expertise to provide services and advice to effectively manage weeds to achieve optimal crop performance for public benefit while mitigating the potential adverse impacts. Weed management requires knowledge and expertise in

- Crop production systems, including the weed challenges posed by specific crops and crop rotations;

## B. Crop Development, Production, and Management

### B.2.3.2 Weed Management, continued

- Soil composition, chemistry, fertility, and hydrology, primarily how these might address specific weed challenges;
- Agronomic and tillage practices and their impacts on weed development and management;
- Agricultural chemicals, specifically herbicides, how they act to suppress weeds, the crops they are compatible with, and the recommended application rates and procedures;
- The policy and regulatory environment governing crop production and inputs.

### B.2.4 Other Example Activities

In addition to the examples provided, Agrologists practicing in crop production may be engaged in several other activities where their knowledge and expertise protect the public interest. Additional examples include

1. Development of new crop varieties suited to specific agronomic conditions and devoid of undesirable characteristics (for example, non-toxic to human health) [4].
2. Advising on crop varieties suited to specific growing conditions.
3. Identifying and treating crop diseases.
4. Managing pests.
5. Developing and advising on crop harvest strategies and methods for optimal benefits to society.
6. Developing and advising on crop grading and post-harvest handling, storage, and distribution systems.

In each instance, the common thread is the application of specific knowledge and expertise in crop development, production, and marketing to maximize public benefits while mitigating adverse effects.

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[4] Koerth-Baker, Maggie (2013). "The case of the poison potato"
URL: https://boingboing.net/2013/03/25/the-case-of-the-poison-potato.html

## Practice Areas

# C. Livestock Development, Production, and Management

### C.3.1 Definition

The practice of providing services and advice: *using scientific principles, knowledge, and expertise to inform the efficient and sustainable use of limited resources in the production and consumption of animal and animal products for human use.*

### C.3.2 Rationale

Livestock can be defined, with exceptions, as privately owned animals that are bred, kept, nourished, grown, cultured, and harvested directly or indirectly for human use. Prominent examples of livestock species include cattle, sheep, goats, swine, poultry, bees, insects, seafood, and fish. Livestock is predominantly produced for food, fibre, fur, hides, recreational, and medical uses. Livestock production management references multiple processes and systems geared to improve livestock growth, yield, and development. Livestock production can take place on either land or in aquatic environments. Livestock production may occur in open environments such as farm fields, pastures, and aquatic environments or in contained environments such as barns, pens, and hives. Production environments are generally privately owned on private property and can border on private and publicly owned properties.

In almost all instances, livestock production requires primary resources; soil, water, air, and products thereof (e.g., crops for feed) with suitable qualities to promote growth and production that must be managed for optimal use. These are also often supplemented with nutritional supplements and pharmaceutical products to promote growth, but more often to ensure livestock health and mitigate disease.

## Practice Areas

# C. Livestock Development, Production, and Management

### C.3.2 Rationale, continued

In addition to providing other products, livestock production is a means of converting crops unsuitable for direct human consumption into high-quality food sources ensuring food security. However, optimizing livestock production and ensuring its sustainability is challenging. Failure to adequately address the challenge can result in several adverse outcomes to the public good, including

- Poor production methods can result in the inefficient use of primary resources, including the unmitigated production of greenhouse gases;
- Livestock can act as disease reservoirs, potentially adversely affecting humans and wildlife;
- Livestock waste can contaminate public resources, including soil, water, and air;
- Livestock production can also have other adverse effects such as dust, odour, and noise to both public and private properties neighbouring production facilities.

The public has expectations concerning animal health and welfare that must be respected.

Activities under the Livestock Development, Production, and Management practice area are within the reserved practice of agrology. One exception to this (as authorized by Section 55 of the PGA) is the practice of registered veterinarians treating diseased livestock.

Agrologists with expertise in livestock production can provide services and advice to protect the public good. This knowledge and expertise are typically species and purpose-specific.

Some examples include

- Livestock production systems, including housing, handling practices, and standards;
- Animal nutrition, prevention of disease caused by invasive species, and animal welfare management;
- Animal behaviour.

## C. Livestock Development, Production, and Management

### C.3.2 Rationale, continued

- Regulatory environment and policy including licensing and supply management where applicable;
- Statistical and research methods to inform livestock development and production;
- Livestock production ecology and environmental impacts.

## D. Rangeland and Grazing Management

### D.4.1 Definition

The practice of providing services and advice: *using scientific principles, knowledge, and expertise to inform the efficient and sustainable use of rangeland resources in the production and consumption of plants and animals on rangeland while respecting the public interest.*

### D.4.2 Rationale

Rangelands are typically unsuitable for intensive crop production and are generally not attractive for private ownership. In British Columbia, rangelands are almost always publicly owned. Though marginal for intensive crop production, they do provide several public and private benefits and uses. Rangelands can be used to graze livestock, such as cattle and sheep, be harvested for timber and fibre, provide recreational opportunities, serve as wildlife habitat, sequester carbon in their soils, and purify water for community drinking systems.

Whether the beneficiary is public or private, rangelands must be managed without compromise for the public good. One example includes where cattle are pastured on rangeland in a community watershed. Whether that rangeland is public or private, due care must be taken to mitigate the potential contamination of the surface water sources in the watershed upon which the community relies.

Given the diverse uses of rangelands, management to maximize benefit and protect the public is complex and challenging.

## Practice Areas

# D. Rangeland and Grazing Management

### D.4.2 Rationale, continued

Certain activities under the Rangeland and Grazing Management practice area are within the reserved practice of agrology. There are alignments and interactions with Foresters and the managing of forest resources within the jurisdiction of the reserved practice of forestry. There are also alignments and interactions with Applied Biology Professionals regarding and determination of the effects of rangeland management practices (actual or proposed) on wild flora and fauna. There are other exceptions, such as the practice of registered veterinarians treating diseased livestock.

Agrologists within this practice area may engage in such activities as:

- The management of forage resources to maximize yield while minimizing adverse impacts on the landscape;
- Identifying and managing invasive species;
- Mitigating adverse impacts on soil, water, and wildlife resources by livestock;
- Facilitating multiple uses on rangeland to maximize public benefit;
- Assessing fair compensation to the public for the use of rangeland resources by private interests.

Agrologists in this practice area may have a combination of knowledge and expertise in

- Grazing livestock production systems, including handling practices, management, and standards;
- Pasture and forage management;
- Animal nutrition, prevention of disease caused by invasive species, behaviour, and welfare management;
- Invasive species identification and management;
- Rangeland management;
- Hydrology and watershed management;
- Statistical and research methods to inform range resource management;
- Natural resource and environmental economics.

## Practice Areas

# E. Agroforestry

### E.5.1 Definition

As outlined above, agroforestry is statutorily defined in BC as the practice of "deliberately retaining, introducing and mixing of trees or other plants in crop and animal production systems to provide an economic return…" Thus, throughout this document, the term *agroforestry* is used in that context and is not meant to imply or refer to the practice of forestry.

### E.5.2 Rationale

Agroforestry encompasses a group of agriculture land management practices involving the intentional integration of crops or livestock with trees or shrubs.

Alley cropping involves cultivating annual or perennial agriculture crops between tree or shrub rows, spaced to allow close to the full sun between the rows. Alley cropping is utilized to make efficient use of space and natural resources.

Agricultural riparian buffers utilize tree and shrub plantings along water bodies on or adjacent to agricultural land for protective purposes of soil and water resources. Riparian buffers can be designed and managed to include trees and shrubs that produce harvestable crops without impairing their protective functions. Alignments with Foresters regarding harvestable timber resources and Applied Biology Professionals regarding the protection and conservation of wild flora and fauna in riparian areas are common due to several other enactments which, per Section 55 of the PGA, authorize other professions to provide services in those areas.

Shelterbelts (including hedgerows and vegetative buffers) encompass a range of linear tree and or shrub plantings adjacent to agricultural production areas for one or more of the following intents:

- protective purposes of soil and soil moisture;
- to minimize energy loss from agricultural structures;

## Practice Areas

# E. Agroforestry

### E.5.2 Rationale

- to trap or mitigate chemical drift, greenhouse gas emissions, dust, odour, light and noise from agricultural activities;
- to create visual barriers for adjacent non-agricultural areas;
- to improve animal welfare (through shade or thermal cover); or,
- to provide habitat components or travel corridors on farmland for wildlife.

Shelterbelts can be designed and managed to include trees and shrubs that produce harvestable crops, without impairing their protective functions. Although not common in British Columbia, if trees within a shelterbelt are managed for value, are to be sold or valued as a timber resource, then those specific activities within a shelter belt are within the reserved practice of forest professionals.

Forest farming (including food forests) involves cultivating and managing horticultural crops or non-timber forest products under a tree or shrub canopy. On public lands, these methods may be deployed to facilitate multiple uses where berries, mushrooms, or floral greenery are produced concurrently within a managed forest. In this activity, alignments occur as the forest management within which the forest farming occurs is within the reserved practice of forestry professionals.

Silvopasture is the intentional combination of trees, forages, and livestock. On public lands in BC, these methods may be deployed in multiple uses where range management and managed forests occur on the same land unit.

Poor management of agroforestry practices can result in several potential adverse effects to the public good, including situations that:

- result in soil erosion;
- contaminate water resources;
- create unintentional reservoirs for invasive species;
- impair other natural resources in multiple use settings; or
- threaten private property owners with landslides and slope failure.

## Practice Areas

# E. Agroforestry

### E.5.2 Rationale

In addressing the challenges to the public good, Agrologists provide a combination of knowledge and expertise, including

- Understanding the range of components that comprise individual agroforestry locations and how to manage interactions to achieve specific goals;
- Managing and advising on soil management and conservation in agriculture;
- Horticultural and or agronomic principles related to microclimate, plant canopy, and root architecture;
- Livestock behaviour and preferences;
- Identifying and managing invasive weeds and plants in agriculture;
- Statistical and research methods to inform the science of agriculture in the presence of trees and forests.

Activities under the Agroforestry practice area are within the reserved practice of agrology with the exceptions respecting Forest Professionals and Applied Biology Professionals as outlined above.

# F. Food and Agricultural Products Development, Production and Processing

### F.6.1 Definition

The practice of providing services and advice: *using scientific principles, knowledge, and expertise to inform the efficient and sustainable use of limited resources in the production of safe, quality food and processed agricultural products for human and animal consumption or use.*

### F.6.2 Rationale

Food is any substance that can be consumed by humans or animals to provide for nutritional needs. Foods can consist of plant, animal, insect, and fungi products consumed directly or with minimal processing, or they can be the result of complex processing, production, and distribution systems. Food production management refers to

## Practice Areas

# F. Food and Agricultural Products Development, Production and Processing

### F.6.2 Rationale, continued

the multiple processes and systems that are geared to delivering and/or processing and delivering animal, insect, plant, and fungi-derived products to end consumers. Food processing and production can be physical, chemical, and/or biological forms.

The development, processing, production, and distribution of food products are almost exclusively carried out by private companies on private properties and primarily within contained facilities. Post-harvest, foods are in a state of deterioration from natural physical, chemical, and biological processes. Failure to manage and control these processes can adversely impact the public good, including food safety, unmitigated wastage, shrinkage, and greenhouse gasses. Production, processing, and distribution activities can also adversely affect the public good through the generation of dust, noise, odours, and contamination of soil, water, and air resources.

In addition to food, plants, animals, insects, and fungi can also be processed into other products for human uses, including fibre, fuel, pharmaceutical, and industrial products. Agrologists, working in association with other professionals, provide expertise to address challenges posed by the development, processing, production, and distribution of food products. Agrologists possess knowledge and expertise in

- The crop and livestock production systems that provide the primary inputs for developing, processing, producing, and distributing these products;
- Food safety systems such as the Hazard Analysis and Critical Control Points (HACCP);
- Statistical and research methods to inform quality control in the processing and production of these products;
- Regulations and policy related to these products' development, production, and distribution.

Activities under the Food and Agricultural Products Development, Production, and Processing practice area are within the reserved practice of agrology. There are alignments and interactions with Engineers respecting the design and construction of processing facilities.

## Practice Areas

# G. Waste Management, Bio-Renewables, and Bioprocessing

### G.7.1 Definition

The practice of providing services and advice: *using scientific principles, knowledge, and expertise to inform the efficient and sustainable storage and processing of wastes and feedstocks for human uses respectful of the public interest.*

### G.7.2 Rationale

If stored and processed properly, agricultural and agri-food operations often produce rich waste and by-products in valuable nutrients, which, if managed properly, can serve many uses. If not properly handled, however, this value is forfeited. These wastes and by-products can also become a source of contaminants with disease implications for humans, livestock, and wildlife, a contaminant to the soil, water, and air resources, and a source of unmitigated greenhouse gases contributing to climate change.

Facilities to manage these wastes and by-products can be found on both private and public property. They are typically contained in or on engineered structures to prevent leakage to the natural environment while in process and ensure optimal processing conditions. Besides agricultural wastes, Agrologists have expertise in handling other industrial, commercial, and municipal wastes. These potentially include solid (landfill) and sludge (sewage) wastes from municipalities and by-products from forestry (unless the wastes are within the jurisdiction of the reserved practice of forestry), commercial, and industrial operations. Agrologists provide expertise in process control and management, monitoring and quality assurance of both inputs and the resulting products, and selecting sites used for waste and by-product storage and handling facilities. Optimizing the processing, storage, and handling of wastes and by-products to maximize the value of these resources while mitigating risks is challenging. Agrologists, working in association with other professionals, provide expertise to address these challenges to serve the public good. To engage in the activities under this practice area, Agrologists possess a combination of knowledge and expertise in

- Agricultural waste management;
- Waste treatment processing;

## Practice Areas

## G. Waste Management, Bio-Renewables, and Bioprocessing

### G.7.2 Rationale

- Environmental risk management;
- Statistical process control;
- Regulations and policies with respect to agricultural, food processing, biosolids, and other similar wastes.

Activities under the Waste Management, Bio-renewables, and Bioprocessing practice area of agricultural-related waste and processing are within the reserved practice of agrology. Dependent on the source and final product of other types of waste, interactions with other regulated professionals due to several other enactments which, in accordance with Section 55 of the PGA, authorize other professions to provide services in this area may occur.

## H. Land Evaluation, Classification, Mapping, Conservation, and Management

### H.8.1 Definition

The practice of providing services and advice: *using scientific principles, knowledge, and expertise to inform the evaluation, classification, conservation, and management of land resources in respect of the public interest.*

### H.8.2 Rationale

The conservation and sustainable management of land resources is of primary interest to the public good. Conservation and management of land is a complex challenge. Land resources serve many purposes; agricultural, ecological, range, forestry, wetlands, recreational, commercial, industrial, and residential uses. Conservation and management of land begin with accurately and precisely evaluating and classifying what is taking place; the characteristics of soils and landforms, the impacts of hydrology and geomorphology, the fauna and flora, and current use, including urban, agricultural, range, forestry, recreational, wetland, or natural.

## Practice Areas

# H. Land Evaluation, Classification, Mapping, Conservation, and Management

### H.8.2 Rationale

In collaboration with other professionals, Agrologists in this practice area have a combination of knowledge and expertise to address this challenge in

- Soil classification and nutrients;
- Geomorphology;
- Landscape ecology;
- Terrestrial ecosystem mapping;
- Geomatics;
- Geographic Information Systems.

Planning and sustainable management constitute a separate group of activities within this practice area. Good planning considers the cumulative effects of past, present, and foreseeable future activities. It also involves identifying and addressing incompatibilities in the uses of neighbouring land resources and, in many instances, the consideration of the perspectives of First Nations. Finally, it involves monitoring and assessing the results of land use decisions and adjusting and adapting to ensure the public interest is respected.

Agrologists working in this practice area develop, lead, and/or support integrated land and land resource management decisions within overarching policy and legislative tools. This practice requires collaboration, communication, and the ability to synthesize and systematically interpret information for decision-making purposes.

Agrologists have a combination of knowledge and expertise to address these requirements, including

- Landscape ecology;
- Hydrology and hydrogeology;
- Watershed management;
- Land use planning;
- Indigenous perspectives;
- Public engagement, and outreach.

## Practice Areas

# H. Land Evaluation, Classification, Mapping, Conservation, and Management

### H.8.2 Rationale, continued

Any work in this practice area that is done with respect to agricultural or potential agricultural land that is not forested is within the reserved practice of agrology. There are, however, many alignments and interactions with other professions, mainly but not limited to engineers and geoscientists, which, in accordance with Section 55 of the PGA, authorizes other professions to provide services in this area.

### H.8.3 Illustrative Examples

#### H.8.3.1 Agricultural Land Conservation

The preservation of agricultural land is of strategic importance to the public interest from a food security perspective. Land deemed suitable for agricultural production is classified as arable. Only about 5% of the land base of British Columbia is suitable for agricultural purposes. In 1973, the provincial government created the Agricultural Land Reserve (ALR) to protect the majority of arable land from being lost to other purposes. In some instances, small parcels of land suitable for agriculture were not included in the ALR, while there are a small number of instances of land in the ALR not suited to agriculture.

Even when land is in the ALR, that does not mean that it will be used for agricultural purposes. Viable agricultural operations are a function of more than just the land itself. Suitable drainage systems must be available where excess moisture might inhibit agriculture. In other instances, water resources may be required for irrigation. In many instances in BC, arable land is in very close proximity to urban environments that might be concerned with dust, odour, noise, and spray drift resulting from agricultural operations. The movement of farm equipment on public roads can also be an issue. Failure to address these issues and challenges can lead to the loss of arable farmland for agricultural use and other adverse outcomes for the public good.

Agrologists with a specific combination of knowledge and expertise help to ensure that land for agricultural purposes is properly evaluated and classified and advise on appropriate buffering, zoning, and other procedures and policies to mitigate potential conflicts to conserve arable land in the present and for future generations.

## Practice Areas

# H. Land Evaluation, Classification, Mapping, Conservation, and Management

### H.8.3.1 Agricultural Land Conservation

These Agrologists may possess knowledge and expertise in

- Soil and land capability assessment and classification specifically for agriculture;
- Agricultural production systems and their impacts on the environment;
- Agricultural policy and regulation in BC, including legislation covering agricultural land and farm practices protection.

In doing their work, these Agrologists may call on Agrologists in other practice areas who have specific knowledge and expertise in crop and livestock production.

The work outlined in this example is within the reserved practice of agrology.

### H.8.3.2 Wetlands Conservation and Management

The management and conservation of wetlands and riparian areas also represent a practice activity requiring specific knowledge and expertise. These areas provide incalculable value to the public good in renewing water resources, providing wildlife and fish habitat, controlling erosion and sedimentation, and mitigating downstream flooding, among other benefits. Agrologists bring their knowledge and expertise to address challenges such as

- Soils classification;
- Sedimentation and erosion control.

They may also call on the expertise of Agrologists in other practice areas to inform the better management of these resources, including

- Range management Agrologists with expertise in livestock behaviour;
- Crop production specialists for their expertise in weeds and weed management.

## H. Land Evaluation, Classification, Mapping, Conservation, and Management

### H.8.3.2 Wetlands Conservation and Management, continued

Work involving soil classification for agrology purposes, livestock behaviour, and weed control in this practice area are within the reserved practice of agrology. In accordance with the *Riparian Areas Protection Regulation and the Environmental Protection and Management Regulation,* there are often numerous alignments and intersections with other professionals, especially Applied Biology Professionals and Foresters, when working within wetland management.

## I. Water Resources, Planning, and Management

### I.9.1 Definition

The practice of providing services and advice: "*using scientific principles, knowledge, and expertise to inform the governance, planning, and management of water in respect of the public interest."*

### I.9.2 Rationale

The conservation and sustainable management of water resources is essential to the public good. The utility of land is directly related to the quantity and quality of water available to it. Drought conditions can be problematic for forests and rangelands, increasing the occurrence of wildfires. Too little or too much water limits crops' ability to grow. Water of poor quality can also render land unusable for crop production. For example, water high in soluble salts can if used to irrigate crops, result in the salinization of soils, with detrimental effects on vegetation, including food crops. Depending on how water might be chemically or biologically contaminated, its use also might result in situations that risk human, livestock, and wildlife health and/or adversely affect crops and vegetation.

## Practice Areas

# I. Water Resources, Planning, and Management

### I.9.2 Rationale, continued

To inform the planning, assessment, and management of water resources to ensure the public interest is respected, Agrologists have a combination of knowledge and expertise in

- Soil science;
- Landscape ecology;
- Crop science and production systems;
- Hydrology and hydrogeology;
- Watershed management;
- Water and environmental chemistry;
- Land use planning.

Any activities under this practice area that are performed concerning ecosystems that are affected by, sustain, or have the potential to sustain the cultivation or production of aquatic or terrestrial plants or animals (and are not forested lands within the jurisdiction of the reserved practice of forestry) are within the reserved practice of agrology. There are, however, many services within the regulated practice of agrology that are often performed by other professions dependent on the intended uses of the water resources. As such, there are many interactions and alignments, especially with Engineers, Geoscientists, and Applied Biology Professionals.

# J. Protection and Management of Environmental Resources

### J.10.1 Definition

The practice of providing services and advice: *using scientific principles, knowledge, and expertise to protect and sustainably manage environmental resources in respect of the public interest.*

## Practice Areas

# J. Protection and Management of Environmental Resources

### J.10.2 Rationale

The protection and sustainable management of environmental resources, including soil, water, air (vapour), and biological resources, is essential to the natural environment and the public interest. Failure to mitigate contamination of these precious resources can result in high costs, including adverse effects on the health and safety of humans, livestock, wildlife, and natural ecosystems, rendering resources unproductive. Contaminants and adverse impacts on these resources can be physical, chemical, or biological. They can be the result of either human activity or natural phenomena.

Protection and prevention of adverse impacts on these resources are ideal. Recognizing and assessing impacts is paramount when they have occurred. Remediating their impacts provides the opportunity for these resources to be productive. Monitoring environmental resources provide the opportunity to identify when they are adversely impacted and to ensure their state advances toward compliance with desired outcomes.

Working within the definitions of regulated and reserve practice outlined earlier in this document, seven major work activities can classify this practice area:

1. Assessing the state of environmental resources;
2. Prevention and protection of environmental resources;
3. Remediation of contaminated or adversely impacted environmental resources;
4. Monitoring the state of environmental resources;
5. Reviewing and developing recommendations for waste discharges from municipal, commercial and industrial sites;
6. Authorizing waste discharges subject to provincial regulatory policy;
7. Conducting audits, ensuring compliance, and certifying processes and facilities.

As stated in the definitions of agrology's regulated and reserved practice outlined above, reserved practice under this practice area is limited to advice or services relating to the state or quality of soil, water, or air, for an agrology purpose concerning the restoration, reclamation, or remediation of aquatic, terrestrial or atmospheric

## Practice Areas

# J. Protection and Management of Environmental Resources

### J.10.2 Rationale, continued

ecosystems. Given the complexity of this area, there are many other legislative enactments authorizing other professions to provide services within their respective reserved practice.

As such, there are many professions whose reserved practice work complements each other, the exact combination of which depends on the specific environmental situation being addressed.

### J.10.3 Example Activities

#### J.10.3.1 Assessing the State of Environmental Resources

This involves investigating soil, sediment, water, air, and other resources at a site or location to determine their current state. It may involve performing field tests to determine characteristics of the resources in situ (for example, hydraulic conductivity) and collecting soil, sediment, water, air, and biological samples to assess their current physical, chemical, and biological state. For example, a site may be classified as chemically or biologically contaminated, resulting in the site being restricted in its uses or the activities that may be conducted on it. In other instances, physical disturbances from human activity or natural phenomena may have adversely affected the state of resources, limiting their potential use.

#### J.10.3.2 Prevention and Protection

This involves being proactive, informing, and developing strategies to prevent contamination. Examples include formal environmental impact assessments in advance of human activities to help identify and inform decision-makers. This includes assessing the current state of the environmental resources on a site and then assessing the potential impacts of proposed human activities on the resources, including assessing and evaluating the potential physical, chemical, and biological hazards human activities represent to the resources and their potential risks. Finally, it includes the identification, development, and implementation of strategies to

# J. Protection and Management of Environmental Resources

### J.10.3.2 Prevention and Protection

protect environmental resources by preventing or mitigating contamination or physical impacts from human activities.

### J.10.3.3 Remediating Contaminated of Adversely Impacted Resources

When a site has been classified as contaminated, disturbed, or deemed of limited use due to its current state, efforts might be made to remediate it. Remediation is the containment, removal, or stabilization of contaminants from soil, water, and air resources. Physical, chemical, and/or biological processes may be used to achieve remediation objectives.

### J.10.3.4 Monitoring the State of Environmental Resources

Monitoring is the ongoing assessment of environmental resources at a site. It includes physical, chemical, and biological sampling, analyses, and data interpretation of water, air, soil, waste discharges, vegetation, and other natural resources. The objective is to determine if ongoing human activities adversely impact these resources and if remediation, reclamation, or restoration activities are achieving their objectives.

### J.10.3.5 Reviewing and Developing Recommendations for Waste Discharges From Municipal, Commercial, and Industrial Sites

Most municipal, commercial, and industrial processing facilities must be licensed by provincial ministries of environment for building and operation. To ensure that any discharges or emissions from these facilities do not pose a risk to human health or the natural environment, guidelines and limits are required. Agrologists can provide expertise in the recommendations on these limits.

## Practice Areas

# J. Protection and Management of Environmental Resources

### J.10.3.6 Authorizing Waste Discharges Subject to Provincial Regulatory Policy

When municipal, commercial, and industrial processing facilities are being proposed, before being authorized under the legislation, they must be reviewed for their emissions and discharges to ensure they meet current recommendations, guidelines, and limits. Agrologists can provide expertise for this review and authorization process.

### J.10.3.7 Conducting Audits, Ensuring Compliance, and Certifying Processes and Facilities

Most commercial and industrial processing facilities must be licensed by provincial ministries of environment for building and operation. Each license is usually subject to specified conditions to mitigate adverse impacts on environmental resources. This usually entails auditing and certifying processes to ensure that they comply with the license terms and any relevant regulations.

To perform these activities to serve the public interest, Agrologists in this practice area have a combination of knowledge and experience, including

- Soil, water, and environmental chemistry;
- Soil sampling and analysis techniques and spatial statistics to interpret the resulting data;
- Soil physics, hydrology, and hydrogeology;
- Statistics and research methods;
- Geomatics;
- Geographic information systems and spatial statistics;
- Environmental risk assessment;
- Environmental regulations and policies.

Given the complexity of environmental protection, numerous professions are involved in this work. There are extensive alignments and intersections between those professions, which are very difficult to define. The nature

## J. Protection and Management of Environmental Resources

### J.10.3.7 Conducting Audits, Ensuring Compliance, and Certifying Processes and Facilities, continued

of environmental work is that each incident, project, or review can call for a different set of skill sets. Using the same data, different professions will have different recommendations based on the purpose of the analysis. The same contaminated water can affect the ability to sustain agricultural production downstream, destroy natural habitat, poison rangeland, and damage built structures.

Consequently, the reserved practices of several professions, including agrology, work in concert to address a specific problem, as very few, if any, environmental compliance issues can be addressed by only one profession. This complimentary work, however, cannot result in the infringement of another profession's reserved practice by the activities of agrologists. There are, however, numerous legislative enactments that specifically authorize work to be done by more than one profession, and thus, that work would not constitute an infringement. Examples of this can be found in the Riparian Areas Protection Regulation and the Environmental Protection Regulations.

## K. Land Restoration, Reclamation and Remediation

### K.11.1 Definition

The practice of providing services and advice: "*using scientific principles, knowledge, and expertise to reclaim and restore land resources in respect of the public interest.*"

### K.11.2 Rationale

Land resources can be severely degraded or impaired due to human activities such as mining, drilling, or industrial activities, or natural phenomena such as landslides, wildfires, or saltwater inundation. Leaving valuable land resources in a degraded or impaired state is not in the public interest. In addition to the direct loss of land resources for human use or to serve natural ecosystems, neighbouring properties may also be impacted, surface and groundwater resources may be contaminated, and atmospheric resources adversely

## K. Land Restoration, Reclamation and Remediation

### K.11.2 Rationale, continued

affected. Reclamation, remediation, and restoration may be employed as methodologies to put land resources back into service.

Land reclamation involves developing and implementing a plan that considers and integrates logistical, management, and biophysical considerations to recover land for a specified use. This multidisciplinary activity involves site characterization, stakeholder input, and identifying and developing achievable, functional, desired end land use(s). Executing a reclamation plan may include site contouring for landscape drainage and stability; soil replacement and or treatment; re-vegetation; weed and herbivore management; and contractor supervision and management. Reclaiming agricultural land that has been flooded with brackish water to a state where it once again can grow crops is an example of a land reclamation project. Land restoration assists the recovery of an ecosystem that has been degraded, damaged, or destroyed. Ecosystem restoration is sometimes used interchangeably with ecological restoration. Still, ecological restoration always addresses biodiversity conservation and ecological integrity, whereas some approaches to ecosystem restoration may focus solely on delivering ecosystem services.

Agrologists in this practice area have a combination of knowledge and expertise in

- Soil, water, and environmental chemistry;
- Soil sampling, analysis techniques, and spatial statistics to interpret the resulting data;
- Soil physics, hydrology, and hydrogeology;
- Environmental ecology;
- Statistics and research methods;
- Geomatics;
- Geographic Information Systems and Spatial Statistics.

## Practice Areas

### K. Land Restoration, Reclamation and Remediation

#### K.11.2 Rationale, continued

Activities under this practice diverse and varied Registrants of EGBC will advise on slope stability and compaction strength of the land. At the same time, Agrologists will provide advice on the ability of soil, land, and water to recover viability. Applied Biology Professionals will advise on restoring disturbed or displaced species, while Foresters advise on the ability of restored land to sustain forests as understood within the reserved practice of forestry. ASTTBC Registrants often collect and supply data to the other professions on the same project. These alignments and interactions complement each other so that environmental damage can be mitigated without infringing on the reserved practice of other professions. In addition, persons with the recognized CSAP designation can provide services in this area according to a legislative enactment protected under Section 55 of the PGA.

### L. Invasive Species and Pest Management

#### L.12.1 Definition

The practice of providing services and advice: "*using scientific principles, knowledge, and expertise to prevent and manage invasive species and pests in the public interest.*"

#### L.12.2 Rationale

Unconstrained propagation and or reproduction of any living organism can result in that organism becoming a threat to food production in agriculture, the functioning of natural ecosystems, human health and safety, and potentially damaging to private property and public infrastructure. Often these organisms are not native to the province of British Columbia (BC), nor are they being grown for a specific purpose under controlled conditions for human benefit or use. These organisms are often considered invasive and can be problematic for the public interest. Invasive species can take the form of vegetation (e.g., Scotch Thistle and Himalayan Blackberry), wildlife (e.g., European Starling, Feral Pigs), aquatic (e.g., Zebra Mussel, Asian Carp), insects

## Practice Areas

# L. Invasive Species and Pest Management

### L.12.2 Rationale, continued

(e.g., Asian Giant Hornet, European Fire Ant), or fungi (e.g., White-Nose Syndrome on bats). They can be found on either private or public property. Climate change is expected to aggravate the presence of these organisms in BC.

Agrologists, in their traditional role of informing the production of agricultural products and rangeland management, have a combination of knowledge and expertise to manage problematic and undesired species. Their history of managing undesired species that might adversely affect crops, livestock, and range ecosystems has provided extensive experience using physical, chemical, and biological control methods to deal with invasive species in agriculture, agroforestry, and ecosystems. Agrologists have gained knowledge and expertise through formal education and training in

- Environmental Sciences;
- Plant and Animal Sciences;
- Weed Science;
- Entomology;
- Pest Identification and Management;
- Crop Protection products and methods;
- Wildlife Control within agricultural or agroforestry environments only;
- Regulatory policy;
- Range Management;
- Ecosystem Restoration.

The management of invasive species and pests in agriculture, range, and agroforestry ecosystems is within the reserved practice of agrology. However, the potential damage caused by these species is not limited to just these ecosystems; there are extensive alignments and interactions with other professions, especially Applied Biology Professionals.