



# SUSTAINABLE VINEYARDS SWBC STANDARD



# SWBC Program Certification 2020

Sustainable Winegrowing British Columbia

Sustainable Vineyards Standard – V1

2020

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## I. SUSTAINABILITY CERTIFICATION

Sustainability happens when the use of resources, the direction of investments, the aims of technological advances and the drivers of institutional change are all in harmony and enhance both current and future potential to meet human needs and expectations. For the wine production industry, sustainability is caring for the health of the surrounding environment and all the people involved in the production processes, maintaining and improving the longevity and profitability of the business and, of course, caring for the quality of the grapes that go into the bottles of wine; planet, people, and profits.

Sustainability efforts include a broad and proactive approach towards production management and enhancement, environmental stewardship, and social equity. It focuses on rational use of natural resources, conservation of biodiversity and ecosystem services, reduction of negative impacts, restoration of natural ecosystems, minimization of carbon footprints, and more resilient vineyard agroecosystems.

As resource and labour efficiency are improved, the use of inputs is reduced, and ecosystem services are improved, so production costs are lower and profit margins improve. In the more than 20 years that have passed since sustainable winegrowing standards began their development, vineyards have proven that sustainability is synonymous with business success.

With the current shifts and emerging trends of international trade, sustainability is no longer a “nice to have” but a “must” to be competitive in the global marketplace. Numerous export markets from Europe to Asia and the U.S. now require farms and traders some type of sustainability certification or independent sustainability verification to access markets. Retail markets that focus specifically on sustainable and responsible produced wines are expanding, and research and evidence show that consumers want to support conscientious businesses that are doing well by doing good caring for nature and communities.

Vineyards certification through the Sustainable Winegrowing British Columbia (SWBC) Program validates the implementation of meaningful and rigorous grape growing standards that encompass the best of sustainable winegrowing programs around the world. SWBC can help vineyards to grow their vines, their family livelihoods, their businesses, and their communities sustainably, offering the British Columbia wine industry the opportunity to set the standard for quality, sustainable winegrowing in Canada.

The *SWBC Sustainable Vineyards Standard* is created on the premise that sustainability is a path, not a destination. In this light, the foundation of sustainable production is Continuous improvement, constant identification and pursuit of new opportunities, mainstreaming what works, and adjusting what does not work. As goals are achieved and broader accomplishments are shared, there will be waves of impact beyond the winegrowing industry.

## II. INTRODUCTION TO SUSTAINABLE VINEYARD STANDARDS

The SWBC Program Certification is a voluntary scheme based on accepted best practices and customized to accommodate to characteristics and needs of the wine industry of British Columbia. The Program offers two different certification standards: the *SWBC Sustainable Vineyards Standard*, applicable for grape growing operations; and the *SWBC Sustainable Wineries Standard*, applicable for wine making operations.

To be granted an SWBC Program Certificate, vineyards and wineries must demonstrate that they:

- a. Comply with applicable local, regional, provincial and national laws related to the topics of this standard, or with the requirements of this standard, whichever is stricter.
- b. Adhere to the requirements described in *SWBC Assurance Framework*.
- c. Comply with all other requirements and regulations of the SWBC Program Certification.

### III. THE SWBC STANDARDS PERFORMANCE SYSTEM

#### 1. SWBC STANDARDS CRITERIA

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There are two different types of criteria in the *SWBC Sustainable Vineyards Standard* and the *SWBC Sustainable Wineries Standard*, essential criteria and continuous improvement criteria, described in detail below.

Throughout the SWBC Standards, **highlighted** terms have an specific definition provided in the Terms and Definitions Section of each document. These definitions are considered as binding elements of the criteria.

##### 1.1. Essential criteria

Essential criteria (EC) cover all the highest priority and highest-risk environmental, social, and labor issues. EC are evaluated during the first certification audit and checked again during every following certification audit. Vineyards and wineries are required to comply with all applicable essential criteria (100% compliance) to be granted a certificate by SWBC, or to maintain their existing certification.

- EC-0: to be evaluated in the initial certification audit with a required 100% compliance to be granted an SWBC certificate, and 100% compliance in all following certification audits to maintain the certificate.
- EC-2: to be evaluated in the year two - certification audit with a required 100% compliance in Year 2 and all following certification audits to maintain an existing SWBC certificate.

##### 1.2. Continuous improvement criteria

Continuous improvement criteria (CIC) require vineyards and wineries to gradually increase their commitment towards sustainability and best practices over time. Starting with the year-three Certification audit, operations must achieve 30% compliance with the CIC in each section and 50% overall CIC compliance. This compliance increases to 50% for each section and 80% overall CIC compliance by the third certification audit in Year 6.

#### 2. SWBC STANDARDS COMPLIANCE REQUIREMENTS

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##### 2.1.1. Criteria compliance

SWBC evaluates essential and continuous improvement criteria as follows:

- a. **Compliant.** The audited operation meets all the provisions of each evaluated criteria.
- b. **Non-compliant.** The audited operation does not meet or only partially meets the provisions of each evaluated criteria.

- c. **Non-applicable.** The subject of the criterion is not present within the audit scope and cannot be evaluated.

### 2.1.2. Audit and self-assessment compliance

The certification cycle, audits, and self-assessments are described in Section VI of the *SWBC Assurance Framework*.

The table below indicates when these assessments occur during the first certification cycles and the criteria that certified vineyards must comply with during the assessments in that cycle.

First certification cycle	Assessment type	Criteria		
		Essential   Year 0 (EC0)	Essential   Year 2 (EC2)	Continuous improvement (CIC)
Year 0	Certification Audit	100%	-	-
Year 1	Self-assessment	100%	-	-
Year 2	Self-assessment	100%	-	-
Year 3/0	Certification Audit	100%	100%	Minimum 30% for each section and 50% overall
Year 4/1	Self-assessment	100%	100%	Maintain or increase compliance (as per the last certification audit results)
Year 5/2	Self-assessment	100%	100%	Maintain or increase compliance (as per the last certification audit results)
Year 6/0	Certification Audit	100%	100%	Minimum 50% for each section and 80% overall

Operations that continue with the certification must undergo a certification audit three years after the original certification decision. This starts a new certification cycle, and certification audits will be conducted every three years thereafter. Self-assessments must be completed each year between certification audits.

## 3. CERTIFICATION AUDITS

Certification audits are conducted in Year 0 and Year 3 of each certification cycle. They are conducted by an approved third-party and the SWBC Sustainability Committee reviews the results of these audits to decide on the certification status of the audited operation.

- Certification audits will always be conducted on site, during a period of activity where workers, grapevines and/or processing are present.
- During the first certification audit, compliance with all standard criteria will be evaluated to provide baseline information for the sustainability status of the operation. Vineyards and wineries must comply with all Year 0 Essential Criteria.
- The second certification audit (Year 3) will evaluate compliance with all Essential and Continuous Improvement Criteria requirements for continued certification as described in Section 2.1.2 for wineries and

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2.1.3 for vineyards. Operations can request the evaluation of compliance with additional criteria. After this audit and with SWBC feedback, certified operations will develop an improvement plan to comply with continuous improvement criteria to help ensure that the operations continue their certification and achieve SWBC Program objectives and goals.



- d. During the third certification audit in Year 6, and in all subsequent certification audits, compliance with all standard criteria will be evaluated to measure of progress compared with the baseline determined during the first certification audit. Vineyards and wineries must comply with all essential criteria as described in sections 2.1.2 and 2.1.3. After this audit and with SWBC feedback, certified operations will develop refined improvement plans to comply with continuous improvement criteria to help ensure that the operations continue their certification and achieve SWBC Program objectives and goals.
- e. All following certification audits will evaluate progress on improvement plans and continual improvement criteria as well as continual compliance with all essential criteria.

### 3.1.1. Certification Audit Scope

- a. Certification audits cover the applicable criteria of the *SWBC Sustainable Vineyards Standard* according to the compliance requirements set forth in Sections 2.1.2 and 2.1.3. of the *SWBC Assurance Framework*.
- b. Vineyard certification audits cover all properties and processes indicated by a vineyard in its certification application or in subsequent scope expansion or modification requests, including leased lands and facilities. These include but are not limited to vineyards and related production areas; natural ecosystems, waterbodies, and other conservation areas and their respective buffer and protection zones; storage facilities; workshops and other repairation and maintenance facilities; worker housing and sanitary and eating facilities; internal roads and transportation routes; irrigation and drainage equipment and infrastructure; waste processing and disposal areas and infrastructure; and administrative offices and similar areas where documents relevant to certification are maintained.
- c. During the audit, vineyards may be required to provide access to employees, both permanent and temporary workers including administrative staff, without the presence of operation management, supervisory personnel, or owners and their representatives. Should this occur, the audit team is under no obligation to reveal the names of interviewees or the content of the interviews in any way that would reveal their identity.

## **IV. THE SWBC SUSTAINABLE VINEYARDS STANDARD**

### **A. SETTING THE SUSTAINABILITY FOUNDATION**

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Transition towards a sustainable system for winegrowing depends on the implementation of an integrated approach as part of a **vineyard management plan**. This approach includes an analysis of all factors influencing sustainability and integrating them into a long-term plan, then assess and adjust the activities and practices to be implemented in the vineyards.

To carry out the analysis of all sustainability dimensions in a given production system, it is first necessary that growers acknowledge the importance of sustainability efforts, on-board their collaborators and count on reliable, up-to-date data that can be transformed into information and specific actions.

#### **Expected outcomes of this chapter**

1. Applicable federal, provincial, regional and local law and regulations that are relevant to this standard are complied with.
2. Time and resources are allocated to support and enable the transformation of their vineyards into sustainable production systems.
3. Growers have current data about their operations and lands to use for vineyard planning and the implementation of the sustainable practices defined by this standard.
4. A vineyard management plan is implemented to reduce the negative impacts of activities, optimize the use of resources and inputs, and improve the profitability and accountability within operations.

## A.1. Compliance with applicable law and regulations

Vineyards assessed under the *SWBC Sustainable Vineyards Standard* are less likely to create environmental risks that could lead to regulatory enforcement. All vineyards are required to comply with applicable local, provincial and national laws relevant to the requirements of this standard.

**Expected outcome A.1.** Applicable federal, provincial, regional and local law and regulations that are relevant to this standard are complied with.

Type of criteria	Compliance criteria
Essential   Year 0	<b>A.1. <u>Growers</u></b> identify all applicable laws and regulations to their operations and their region and understand how they apply to production activities.
	<b>A.2. <u>Growers</u></b> ensure that <u>vineyard</u> and <u>farm</u> operations are not in violation of national, provincial, regional or local environmental laws or associated administrative rules or requirements, as determined by any regulatory agency through an enforcement action.
	<b>A.3. <u>Growers</u></b> demonstrate that surface water and groundwater use follow applicable law and regulations. Stored volumes, withdrawal rates, and annual water consumption are within the parameters specified in the use license/approval held.

## A.2. Commitment to sustainability

Growers must make a commitment towards the compliance of this standard's criteria and the continuous improvement of their sustainability efforts.

**Expected outcome A.2.** Time and resources are allocated to support and enable the transformation of their vineyards into sustainable production systems.

Type of criteria	Compliance criteria
Essential   Year 0	<b>A.4. <u>Growers</u></b> have formally integrated sustainability into the business strategy (e.g. company mission, vision, and values) and have included the sustainability commitment/policy in employee orientation and handbook (if applicable). (Example: <a href="https://tantalus.ca/pages/sustainability">https://tantalus.ca/pages/sustainability</a> ).
	<b>A.5. <u>Growers</u></b> have one or more persons responsible for continuously maintaining certification management efforts.
Continuous improvement	<b>A.6. <u>Growers</u></b> develop and implement a training <u>plan</u> for all their staff members that: <ul style="list-style-type: none"> <li>a. includes information about sustainability practices, environmental safeguards, and requirements for different tasks, functions and areas;</li> </ul>

Type of criteria	Compliance criteria
	<ul style="list-style-type: none"> <li>b. ensure that sales and other front-facing staff correctly understands and efficiently communicates what it means to be a certified sustainable, and how it contributes to resource conservation and efficiency management; and</li> <li>c. includes task-related procedures and instructions, and general and task-related occupational health and safety information.</li> </ul> <p>The plan approaches training on a continual basis to refresh staff knowledge and check for learning and to update content and include new topics as needed.</p>

### A.3. Baseline information and record keeping

Growers collect data that allow them to analyze their system and all the improvement opportunities that are within their reach, assess the results and impact of the improvement actions they are implementing, and adjust their activities and actions to leverage their efforts and resources. The effectiveness of sustainability management system actions depends on the quality of the data analyzed on which the system is based.

**Expected outcome A.3.** Growers have current data about their operations and lands to use for vineyard planning and the implementation of the sustainable practices defined by this standard.

Type of criteria	Compliance criteria
<b>Essential   Year 0</b>	<p><b>A.7. <u>Growers</u></b> have a description of baseline information that includes:</p> <ul style="list-style-type: none"> <li>a. Total area of the property, total production area, and total area of <b><u>natural ecosystems</u></b>.</li> <li>b. Crop variety, crop density, and crop management practices.</li> <li>c. Harvest and yield records for the last three years or since the <b><u>vineyard</u></b> was established if that was less than three years.</li> <li>d. Estimated production and yield volumes per production unit for the current or upcoming season.</li> <li>e. Input use per production unit or per product produced (Examples of inputs include synthetic and organic fertilizers and pesticides, water, energy (electrical and fuels for machinery), labour, and other materials).</li> </ul>
<b>Essential   Year 2</b>	<p><b>A.8. <u>Growers</u></b> prepare a map of their <b><u>farm</u></b> using an aerial photograph, topographic map, a photocopy of a road map or a tax map as a base. The map must include the following elements and information:</p> <ul style="list-style-type: none"> <li>a. Parcel boundaries and <b><u>vineyard</u></b> blocks.</li> <li>b. Waterways on or adjacent to the property, including manmade ditches and irrigation ponds.</li> <li>c. Riparian areas and their associated buffer areas, including areas impacted by production activities or otherwise degraded.</li> <li>d. Primary and internal roads and any stream crossings.</li> </ul>

Type of criteria	Compliance criteria
	<ul style="list-style-type: none"><li>e. Buildings, well heads, pumps and other infrastructure.</li><li>f. Ecosystems and other conservation areas that are or may be habitat for any endemic, endangered or vulnerable species.</li></ul>
<b>Continuous improvement</b>	<b>A.09. <u>Growers</u></b> calculate their approximate annual GHG emissions and identify opportunities to reduce them. Calculation methods can be defined and documented by the growers or depend on computer-based modeling tools (such as COMET Farm Voluntary Carbon Reporting Tool and Cool Farm Tool).



## A.4. Vineyard management plan

Sustainability is multidimensional, and as so it involves a wide range of activities and topics that must be accounted for. To achieve a holistic approach towards sustainability, is necessary that the implementation of best practices is integrated in and adapted to the conditions of each specific vineyard. Vineyard planning is essential to ensure the optimization of efforts and inputs, and the accomplishment of the expected results.

**Expected outcome A.4.:** A vineyard management plan is implemented to reduce the negative impacts of activities, optimize the use of resources and inputs, and improve the profitability and accountability within operations.

Type of criteria	Compliance criteria
<b>Essential   Year 0</b>	<p><b>A.10. <u>Growers</u></b> design and implement a <b><u>vineyard</u></b> management <b><u>plan</u></b> to organize all actions and measures designed to improve the sustainability of their <b><u>farms</u></b> and its compliance with the SWBC standards including general guidelines, expected results, deadlines and responsible parties, progress milestones for multiple-year implementation, policies, work calendars, and other specific plans as required by this standard. The vineyard management plan must include information for the following topics:</p> <ul style="list-style-type: none"> <li>a. protection of natural ecosystems, biodiversity and natural resources (Conservation plan – Criterion B.33);</li> <li>b. soil management (Erosion control plan – Criterion B.4 and Soil management plan – Criterion C.3).</li> <li>c. nutrient management (Nutrient management plan – Criterion C.9).</li> <li>d. integrated pest management (IPM) and agrochemical management (IPM plan – Criterion D.1).</li> <li>e. occupational health and safety (Health and safety plan – Criterion F.13).</li> <li>f. succession issues (Succession plan – Criterion F20).</li> </ul>
<b>Essential   Year 2</b>	<p><b>A.11. <u>Growers</u></b> update their <b><u>vineyard</u></b> management <b><u>plan</u></b> at least once every three years, or when there are changes in production operations or infrastructure that affect compliance with this standard, to improve its results and accurately reflect the reality of their operations, workforce and productive systems.</p>

## **B. WATERSHED MANAGEMENT AND CONSERVATION**

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The depletion of watersheds and the subsequent degradation of the environment and livelihoods around the world have resulted in the growing recognition of upstream–downstream linkages, the socioeconomic effects of watershed management activities, and the need for integrated land and water resource planning.

Farmlands play a critical role in maintaining and enhancing the overall health of the watershed in which they are located. By considering, in a comprehensive way, all the natural resources in a watershed, especially water, terrain, and soil, watershed management provides a framework for assessing the ways in which farms are using those resources, what affects them, and how they can best be used and protected.

Within this approach, vineyard operations commit to fish friendly and animal friendly farming, take preventive actions to avoid erosion, minimize runoff that could impair water quality and aquatic habitat, preserve and restore riparian lands and waterways, and maintain and increase biodiversity within and around the vineyards to enhance broader landscape conditions.

### **Expected outcomes of this chapter**

1. All water sources and bodies within the vineyard or adjacent to it are identified to enable the implementation of protection measures.
2. Measures are taken to control erosion and the volume and velocity of water runoff to keep the soil in place, reduce soil transport, and avoid sediments accumulating in water bodies.
3. Waterways, wetlands and riparian buffers that are within the property or adjacent to it are protected and restored.
4. Biodiversity within vineyards and in the surrounding landscape is conserved and enhanced to ensure the preservation of existing natural ecosystems, the restoration of depleted habitats, and the continuity of services that ecosystems and biodiversity provide for agricultural production.
5. A conservation plan is developed and implemented to address all challenges regarding the conservation of the watershed and the biodiversity and natural resources within it.

## B.1. Protection of water sources

Agriculture accounts for roughly 70% of total freshwater consumption globally, and production activities are very dependent on water availability to ensure optimal yields and profitability. Accounting for all water bodies and sources within the property and adjacent to the vineyard is the first step towards defining and enabling actions that allow the protection of available water resources.

**Expected outcome B.1.** All water sources and bodies within the vineyard or adjacent to it are identified to enable the implementation of measures for their protection.

Type of criteria	Compliance criteria
Essential   Year 0	<b>B.1. <u>Growers</u></b> identify all water sources used and all permanent and seasonal water courses, wetlands, and other aquatic ecosystems, and their related protection zones on property maps of conservation features (including surface and groundwater).
	<b>B.2. <u>Growers</u></b> identify the water bodies affected by their activities either directly (within property boundaries) or indirectly (the next downstream waterbody that would receive any waters running off the vineyard).
	<b>B.3. <u>Growers</u></b> ensure that productive activities do not contaminate, degrade or destroy water sources.

## B.2. Control of erosion

The main cause of agricultural water pollution is the soil that is washed off production areas. Excess rainwater that does not infiltrate the soil runs over the soil surface, carrying away soil particles (sediments) that are deposited into nearby water bodies.

The accumulation of sediments has negative impacts in the quality of the water and the organisms that live in it. Suspended sediments cloud the water and modify the sunlight that reaches different parts of the water body, smother larvae living in the water, and clog the gills of fish. Sediments often have other pollutants attached to them, such as fertilizers, pesticides, and heavy metals, and when deposited in water bodies they can cause algal blooms and deplete oxygen, harming or even killing most aquatic life.

Avoiding soil erosion is not only good for production—minimizing fertilizer and soil nutrient losses—but crucial to ensure the conservation of aquatic ecosystems.

**Expected outcome B.2.** Measures are taken to control erosion and the volume and velocity of water runoff to keep the soil in place, reduce soil transport, and avoid sediments accumulating in water bodies.

Type of criteria	Compliance criteria
Essential   Year 0	<p><b>B.4. <u>Growers</u></b> develop an erosion control <b>plan</b> to organize and implement all the actions and best practices to minimize soil erosion and control runoff water. The plan includes general guidelines, expected results, deadlines and responsible parties, and progress milestones for multiple-year implementation.</p> <p><i>This plan must be included as part of the Vineyard Management Plan (see criterion A.10).</i></p> <p><b>B.5. <u>Growers</u></b> implement measures to minimize erosion and runoff from roads, such as:</p> <ul style="list-style-type: none"> <li>- avoiding steep slopes and out-slope when necessary;</li> <li>- paving steep and/or heavy use roads;</li> <li>- grassing dirt roads when feasible;</li> <li>- posting speed limit signs on main vineyard access roads; and/or</li> <li>- implementing appropriate structures such as culverts, turnouts, drop boxes, etc.</li> </ul> <p><b>B.6. <u>Growers</u></b> implement measures to minimize erosion and runoff from vineyard blocks and avenues, such as:</p> <ul style="list-style-type: none"> <li>- inspecting vineyard blocks and avenues before and after major storm events;</li> <li>- re-vegetating steep areas;</li> <li>- terracing, contour farming, and strip-cropping;</li> <li>- installing runoff diversion ditches and canals, with drop boxes and other structures to control water velocity and capture sediment;</li> <li>- implementing sediment control basins;</li> <li>- filter strips; and/or</li> <li>- minimization of herbicide use.</li> </ul>

Type of criteria	Compliance criteria
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<p><b>Essential   Year 0</b></p>	<p><b>B.7. <u>Growers</u></b> implement measures to minimize soil compaction, such as:</p> <ul style="list-style-type: none"> <li>- avoiding the use of heavy farm machinery when soils are susceptible to erosion, compaction, or other damage;</li> <li>- planting deep-rooted crops or cover crops in high traffic area;</li> <li>- minimizing mechanical cultivation; and/or</li> <li>- preventing the entrance of heavy equipment into the vineyard during wet soil conditions.</li> </ul>
<p><b>Continuous improvement</b></p>	<p><b>B.8.</b> Where applicable, <b><u>growers</u></b> install and maintain water bars or other runoff control structures during the fall season to divert water away from vulnerable areas and reduce runoff water velocity downslope in avenues.</p> <p><b>B.9.</b> In headlands where applicable, <b><u>growers</u></b> plant non-tilled vegetative cover to protect soils from erosion and disturbance. Cover crops can be permanent or annually disked and seeded.</p> <p><b>B.10. <u>Growers</u></b> maintain native vegetative cover on ditch banks and bottoms. Herbicides are not used to control such covers at any time.</p> <p><b>B.11. <u>Growers</u></b> maintain highly erodible areas, such as steep slopes or locations with unstable soils, with a continuous vegetative cover or covered with straw, crop residues, mulch, or geotextile fabric.</p> <p><b>B.12. <u>Growers</u></b> implement measures to protect, maintain, and assure that spillways, pipes, open channels, and other drainages are stable (not eroding) and/or are properly lined/armored to prevent erosion, and disperse water and protect and maintain outlets, such as:</p> <ul style="list-style-type: none"> <li>- installing energy dissipaters prior to water streams re-entering the downstream waterway;</li> <li>- installing properly sized culverts to accommodate high flows; and/or</li> <li>- harden water inlets and outlets.</li> </ul> <p><b>B.13. <u>Growers</u></b> implement measures to ensure that drainage does not directly enter the waterways for all road lengths that potentially drain to a water body crossing.</p>



### B.3. Protection and restoration of Waterways, Wetlands and Riparian Buffers

Aquatic ecosystems are permanent water bodies of fresh, brackish, or saltwater inland from the coastal zone, and areas whose ecology and use are dominated by the permanent, seasonal, or intermittent occurrence of flooded conditions (see definition under **Natural Ecosystems**). These types of ecosystem also encompass the natural vegetation that surround them that acts as a buffer between them and production areas and activities, as well as a source of biodiversity and habitat for beneficial insects and wildlife.

The protection of aquatic ecosystems and their buffer zones is essential both to preserve biodiversity and ecosystems services, and the water supply necessary to sustain agricultural production.

**Expected outcome B.3.** Waterways, wetlands and riparian buffers that are within the property or adjacent to it are protected and restored.

Type of criteria	Compliance criteria
Essential   Year 0	<p><b>B.14. <u>Growers</u></b> avoid the following activities in water courses, wetlands, and other <b><u>aquatic ecosystems</u></b>, or within 30 meters of them:</p> <ul style="list-style-type: none"> <li>a. Mining or soil removal.</li> <li>b. Deforestation and elimination of vegetative cover, and removal of snags and trunks that are habitat for fish and other aquatic life.</li> <li>c. Dumping solid waste or untreated wastewater, including water for washing agricultural facilities and stables.</li> <li>d. Dumping of <b><u>hazardous waste</u></b> (according to Annexes I and II of the 1992 Basel Convention) in soils and water bodies.</li> <li>e. Construction of impoundments, stream channelization, adding fill, extraction of aggregates for construction industry, or in any other way changing the depth or direction of flow of a water body.</li> <li>f. Draining or drying of water bodies or wetlands through filling, excessive water withdrawal or other means.</li> <li>g. Pollution of aquatic ecosystems that significantly alters their chemistry or species composition.</li> <li>h. Application of agrochemicals or fire, except for the control of invasive plant species or restoration purposes, and then only if governed by a <b><u>plan</u></b> developed by a <b><u>competent professional</u></b>.</li> <li>i. Installation of filling/washing stations.</li> </ul>

Type of criteria	Compliance criteria
Essential   Year 0	<p><b>B.15. Growers</b> establish and maintain vegetated protection zones next to all permanent water bodies, springs, wetlands and other <u>aquatic ecosystems</u>. The buffer strips and protection zones have the following characteristics:</p> <ul style="list-style-type: none"> <li>a. They are 10 meters wide (measured from the edge of the water body or wetland to the outer edge of the strip or zone) on slopes less than eight percent, and 15 meters wide on slopes greater than or equal to eight percent, or around all naturally occurring springs.</li> <li>b. They are primarily native mix of herbaceous vegetation, shrubs, trees, at least as high as the nearby crop.</li> <li>c. Pesticides (including herbicides) and fertilizers are not applied within or on the buffer strips and protection areas.</li> <li>d. Vegetation in these areas are not cut, removed, or otherwise disturbed unless it proves to be a threat to human health, biodiversity, or the environment, or is proven to harbor a pest or disease that threatens grape production.</li> </ul>
	<p><b>B.16. Growers</b> keep roads, trails and other infrastructure that crosses or abuts water courses, wetlands, and other aquatic ecosystems and their protection zones to the minimum necessary for production activities.</p>
	<p><b>B.17. Growers</b> obtain all the necessary legal permits for infrastructure, and it is designed to avoid impacts to aquatic life and water quality.</p>
Essential   Year 2	<p><b>B.18. Growers</b> are aware of how water extraction from streams can impact fish and other aquatic life and implement measures to minimize such impact.</p>
Continuous improvement	<p><b>B.19. Growers</b> ensure that work on diversions, including installing and servicing pumps and intakes, is only done when salmon are not present in streams, during approved in-stream work periods and in accordance with federal, provincial, state and local government regulations and permits.</p>
	<p><b>B.20. Growers</b> keep riparian zones or cultivation setbacks of perennial waterways (year-round flow) and seasonal waterways potentially harboring salmonids that are an average of 20-30 meters wide.</p>
	<p><b>B.21. Growers</b> have removed unnatural in-stream barriers to fish and wildlife. If barriers still exist, <u>plans</u> are in place to remove these barriers where feasible.</p>

Type of criteria	Compliance criteria
Continuous improvement	<b>B.22. <u>Growers</u></b> implement specific actions to eliminate non-native vegetation species from existing protection zones, replacing them with native species through planting or natural regeneration. The amount of effort is commensurate with the level of non-native invasion and the feasibility of eliminating certain species. Non-native species are never used to re-vegetate or establish protection zones.
	<b>B.23.</b> Where riparian buffer zones are already established, <b><u>growers</u></b> give high priority to establishing tree canopy cover over salmonid-bearing and potentially salmonid bearing streams in ways comparable to undisturbed local reference conditions.
	<b>B.24. <u>Growers</u></b> install and maintain fish screens to avoid fish losses. Maintaining activities take into account the presence of debris and sediment, temperature changes and other damaging factors.

#### B.4. Conservation of landscape-level biodiversity

The agriculture sector is highly dependent on the services generated by biodiversity and neighboring natural ecosystems. These provide the sector with a wide range of services that include pollination, pest control, genetic diversity for future agricultural and livestock use, soil retention and structure, regulation of soil fertility, nutrient cycling, and water supply. Soil micro fauna from neighboring ecosystems, such as bacteria and fungi, break down organic matter, help maintain the quality of soils, and recycle nutrients. Insects, spiders, birds, and bats pollinate crop plants and fruit trees and prey on agricultural pests. At the ecosystem level, farm hedgerows and woodlots can attract beneficial insects or predators that feed on agricultural pests.

Sustainable vineyards must focus on ensuring that farm practices do not negatively affect, but rather support and enhance biodiversity for fish, wildlife and vegetation throughout the farm and its surrounding landscape.

**Expected outcome B.4.** Biodiversity within vineyards and in the surrounding landscape is conserved and enhanced to ensure the preservation of existing natural ecosystems, the restoration of depleted habitats, and the continuity of services that ecosystems and biodiversity provide for agricultural production.

Type of criteria	Compliance criteria
Essential   Year 0	<b>B.25. <u>Growers</u></b> identify all-natural <u>ecosystems</u> (map A.9.) and protected areas (as designated by local authorities) within or adjacent to the operation.
	<b>B.26. <u>Growers</u></b> do not destroy any natural ecosystems as of the initial engagement date for certification with the SWBC Program.

Type of criteria	Compliance criteria
	<b>B.27.</b> Where feasible, <b>growers</b> maintain and protect large non-crop trees, unless they pose a direct threat to human and infrastructure safety.
<b>Essential   Year 2</b>	<p><b>B.28. <u>Growers</u></b> establish hedgerows or vegetated buffer strips, or both, around natural ecosystems and aquatic ecosystems (See also C.15), protected areas within or adjacent to the vineyard, and around any other sensitive habitat areas or strategic places previously identified (including frost pockets within the vineyard). These areas are designed to:</p> <ul style="list-style-type: none"> <li>a. include flowering plants that encourage beneficial insect populations near crops and fields;</li> <li>b. provide critical wildlife habitat;</li> <li>c. improve or expand existing riparian buffers;</li> <li>d. reduce soil erosion and provide slope stabilization; and</li> <li>e. uptake nutrients and intercept sediment and other pollutants that may emanate from fields, developed areas, or roadways.</li> </ul>
<b>Continuous improvement</b>	<p><b>B.29. <u>Growers</u></b> incorporate non-crop vegetation that is composed of native or xeriscape plants around housing and infrastructure, such as: border plantings and barriers, live fences, shade trees, and permanent agroforestry systems.</p> <p><b>B.30. <u>Growers</u></b> incorporate and maintain <b><u>insectary hedgerows</u></b> every five to ten rows.</p> <p><b>B.31.</b> Where feasible, <b>growers</b> maintain existing non-crop vegetation and keep at least 10% of the total property as biodiversity areas, for example, native and naturalized grasslands, small forest patches, and flowering plants, shrubs and trees in corners, and along vineyard edges and property boundaries.</p> <p><b>B.32. <u>Growers</u></b> establish and protect biological infrastructure that offer habitat, refuge and food for bats, birds, pollinators or other wildlife, such as:</p> <ul style="list-style-type: none"> <li>- wild native bird nest boxes, nesting platforms and nest perches.</li> <li>- bee blocks; and/or</li> <li>- ponds.</li> </ul>

## B.5. Vineyard Conservation Plan

All criteria in Chapter C (Watershed Management and conservation) should be used to develop a vineyard conservation plan to organize and document all activities related to the conservation and management of the watershed and its biodiversity and natural resources, both for the benefit of the vineyard and for the preservation and restoration of its surrounding landscape.

The plan's goal shall be to have most actions progressively completed within three years. Some actions may require more time to complete or represent a significant financial investment (e.g. road improvements), or both. For these items SWBC may allow up to five years for implementation if they are written into the plan.

**Expected outcome B.5.** A conservation plan is developed and implemented to address all challenges regarding the conservation of the watershed and the biodiversity and natural resources within it.

Type of criteria	Compliance criteria
<b>Essential   Year 2</b>	<p><b>B.33. <u>Growers</u></b> develop and implement a conservation <b><u>plan</u></b> to organize and detail all the actions necessary to comply with all the essential criteria of this standard related to the conservation of <b><u>natural ecosystems</u></b> and resources and make progress towards achievement of the Continuous Improvement Criteria in that area (see Criterion A.12). The plan must include:</p> <ul style="list-style-type: none"> <li>a. Objectives of the actions to be implemented.</li> <li>b. Quantitative targets and parameters.</li> <li>c. Time-bound management actions.</li> <li>d. Resources and responsible personnel to be assigned.</li> <li>e. Actions for: <ul style="list-style-type: none"> <li>i. No intervention and conversion of forests and ecosystems.</li> <li>ii. Conservation of non-pest or non-invasive plants or animals.</li> <li>iii. No contamination.</li> <li>iv. Natural restoration and succession of native vegetation and ecosystems, if applicable.</li> </ul> </li> </ul> <p><i>This plan must be included as part of the Vineyard Management Plan (see criterion A.10).</i></p>



## C. SOIL NUTRITION MANAGEMENT

Soil management is crucial to enhancing vineyard productivity, and to reduce the use of inputs and the risks of negative impacts on the surrounding landscapes. As the ready supply of healthy and productive land decreases and the population grows, competition for land and soil resources is also intensifying.

Within the framework of the *SWBC Sustainable Vineyards Standard*, the main goals are to implement best practices for soil management and to ensure that nutrient requirements of crops are met, thus increasing the soil regeneration capacities and the resilience of the productive ecosystem. Producers are encouraged to maintain and improve soils; use cover crops to improve soil structure and consistency, water penetration and infiltration; and enhance the nutrient cycle and its benefits.

### Expected outcomes of this chapter

1. Soil conditions are conserved and enhanced through best agricultural practices.
2. A nutrient management system is implemented to minimize the risks of environmental degradation and contamination, meet crop needs, and optimize production yields.

### C.1. Soil management

Soil degradation and fertility loss, mainly caused by poor land use and unsustainable agriculture practices, are the major problems encountered in areas already under cultivation.

Traditionally, soil conservation was equated only with the prevention of erosion and rehabilitating eroded areas, but the modern approaches require a more comprehensive and proactive role in knowing the characteristics to the soil, adjusting agricultural practices to conserve it, and incorporating specific measures that restore and enhance soil health.

**Expected outcome C.1.** Soil conditions are conserved and enhanced through best agricultural practices.

Type of criteria	Compliance criteria
<b>Essential   Year 0</b>	<b>C.1. <u>Growers</u></b> send soil samples to a lab for analysis at least once every three years. Laboratory analysis should include at a minimum include organic matter content, soil organic carbon, bulk density, pH, cation exchange capacity, electrical conductivity, soil water holding capacity, chlorides, and macronutrients and principal micronutrients as recommended.

Type of criteria	Compliance criteria
<b>Essential   Year 0</b>	<b>C.2. <u>Growers</u></b> send irrigation water samples for laboratory analysis at least once every five years if they have their own water system (well water); otherwise they request the water

	<p>analysis results to their local purveyor. Analysis include electrical conductivity (soluble salts), pH, alkalinity, and presence of heavy metals.</p> <p><b>C.3. <u>Growers</u></b> develop and implement a soil management <b>plan</b> to identify specific practices for conserving soils, preventing soil loss and degradation, and maintaining and enhancing soil fertility.</p> <p>Growers should seek the support of experts to help develop any of the elements of this plan. The plan includes:</p> <ul style="list-style-type: none"> <li>a. the identification of areas susceptible to erosion, compaction, or other types of soil degradation (see Criterion B.4);</li> <li>b. the identification of naturally low-fertility or other types soils that require special management to maintain or improve crop health;</li> <li>c. soil conservation actions to minimize soil degradation and restore soil health for the areas identified in points a and b, and for the vineyard in general;</li> <li>d. a soil sampling plan for laboratory analysis based on soil types and production goals, and the correct sampling techniques for the desired analysis;</li> <li>e. records of soil and water analysis within the last three years;</li> </ul> <p><i>This plan must be included as part of the Vineyard Management Plan (see criterion A.10).</i></p>
<b>Essential   Year 2</b>	<p><b>C.4. <u>Growers</u></b> select cover crops and vegetation (see criterion C.9) according to soil properties and characteristics, nutrient and water requirements, climate, and erosion and runoff concerns.</p> <p><b>C.5.</b> In areas with nutrients deficiencies, <b><u>growers</u></b> implement practices to increase soil nutrients, for example:</p> <ul style="list-style-type: none"> <li>- plant nutrient enhancing species as cover vegetation, such as nitrogen fixating plants;</li> <li>- minimize tillage;</li> <li>- incorporate organic matter; and</li> <li>- implement a differentiated fertilization plan.</li> </ul>
<b>Type of criteria</b>	<b>Compliance criteria</b>
<b>Continuous improvement</b>	<p><b>C.6. <u>Growers</u></b> use soil and water analysis results to update their soil management <b>plan</b> at least once every five years, adjusting and incorporating further measures as necessary.</p> <p><b>C.7. <u>Growers</u></b> incorporate organic matter into vineyard soils if required and as per their nutrient management plan (see Criterion C.9.). If organic matter is applied:</p> <ul style="list-style-type: none"> <li>a. it is managed to prevent pests, pathogens, weed species propagation and nutrient leaching.</li> <li>b. it is not made of or contains untreated human sewage.</li> </ul>

	<ul style="list-style-type: none"> <li>c. it is not applied as a top dressing during high-precipitation periods when the chance of run-off is higher; and</li> <li>d. the carbon-nitrogen ratio is considered to avoid over-vigorous soils.</li> </ul>
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## C.2. Nutrient management

Nutrient management is all about supplying grapevines with the amount and form of nutrients in the right place at the right time to optimize crop growth. Proper application of manure, synthetic fertilizer, or other any other nutrient source minimizes risks to water and air quality and reduces the emission of greenhouse gases.

**Expected outcome C.2.:** A nutrient management system is implemented to minimize the risks of environmental degradation and contamination, meet crop needs, and optimize production yields

Type of criteria	Compliance criteria
Essential   Year 0	<p><b>C.8. <u>Growers</u></b> minimize the environmental risks of fertilizer use by implementing best practices, such as:</p> <ul style="list-style-type: none"> <li>- using optimum fertilizer rates and sources to reduce losses by leaching and volatilization;</li> <li>- selecting optimum fertilizer application equipment and application techniques;</li> <li>- calibrating equipment for mixing and applying fertilizers;</li> <li>- properly storing organic and/or synthetic fertilizers; and/or</li> <li>- using local fertilizer sources as much as possible.</li> </ul>
Essential   Year 0	<p><b>C.9. <u>Growers</u></b> develop a nutrient management <b>plan</b> and incorporate it into their soil and fertility management <b>plan</b>, that:</p> <ul style="list-style-type: none"> <li>a. identifies nutrient needs and fertilization timing;</li> <li>b. keep records of tissue and fruit quality analysis;</li> <li>c. includes actions to enhance fertilization management and nutrient availability for vines;</li> <li>d. documents for all nutrient applications and any changes and/or deviances from the plan; and</li> <li>e. is in accordance with the requirements of the Minister's Regulation – Code of Practice for Agricultural Environmental Management.</li> </ul> <p><i>This plan must be included as part of the Vineyard Management Plan (see criterion A.10).</i></p>
	<p><b>C.10.</b> Growers use tissue analysis as a tool at bloom-time and/or veraison to obtain a fuller-picture of the vine nutrient status, as necessary.</p>

Type of criteria	Compliance criteria
<b>Essential   Year 2</b>	<b>C.11.</b> Growers collaborate with the winery to conduct test fruit quality parameters (including at least Brix, pH, TA and YANC).
	<b>C.12.</b> Growers demonstrate overall and progressive reductions in the use of synthetic nitrogen fertilizers by applying organic fertilizers and establishing of cover crops (See Criterion D.11)
<b>Continuous improvement</b>	<b>C.13.</b> If feasible, growers increase progressively the organic matter content of their vineyard soils through practices such as: <ul style="list-style-type: none"> <li>- incorporation of crop residues (materials pruned and thinned) into the vineyard soil; and/or</li> <li>- application of compost.</li> </ul>

## D. INTEGRATED PEST MANAGEMENT

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Weed and pest incidence directly affect grape yields and quality. A vineyard's health is a key factor for reaching optimum levels of productivity and profitability, but there are negative economic and environmental trade-offs to over-protecting and over-reacting to pest and disease outbreaks.

Integrated pest management (IPM) approaches aim to protect crop health by combining different pest control methods, thus reducing the use of synthetic pesticides, the costs related to their application, and the toxic footprint of production systems. These approaches contribute to biodiversity protection within the scope of the vineyard and its area of influence because intervention focuses only on those weeds and pests that can cause significant damage to the crop. IPM minimizes negative effects on those organisms that are not causing significant damage, and that may even be beneficial.

Sustainable vineyards implement IPM approaches that encourage the conservation of beneficial pollinator populations and other biodiversity and ecosystem services and maintain the natural balance of surrounding natural habitats. They also implement practices to reduce the use of potentially harmful substances, minimize the toxicity footprint of production, and ensure the proper handling, storage and disposal of potentially hazardous materials.

### **Expected outcomes of this chapter**

1. Integrated pest management strategies are implemented within the vineyard and avoid the negative effects of pest, weeds and disease control measures on environmental and human health.

Proper IPM approaches are based on five essential components:

- 1) **Pest identification** to positively identify the pest and learn about its biology.
- 2) **Field monitoring** to track pest problems and beneficial insects over time.
- 3) **Setting action thresholds** to determine at what point treatment is necessary.
- 4) **Reviewing and selecting intervention options** using “least toxic” products when necessary, but also biological and physical controls, and other non-chemical methods.
- 5) **Results evaluation** to determine whether the treatment was effective, what else needs to be done, and what should be changed in the future.

**Expected outcome D.1.** Integrated pest management strategies are implemented within the vineyard and avoid the negative effects of pest and disease control measures on environmental and human health.



Type of criteria	Compliance criteria
Essential   Year 0	<p><b>D.1. Growers</b> develop, implement, and document an integrated pest management <b>plan</b> as the first resource to manage weed and phytosanitary conditions of <b>vineyards</b>, to ensure optimal productivity and quality. The IPM plan includes:</p> <ul style="list-style-type: none"> <li>a. The identification of the weeds, pests and diseases that occur in the vineyard based on observations, historical records, technical documents, and expert advice. Each pest and disease should be described in terms of their interaction with grapevines, life cycles, natural predators, preferred food and environment requirements; and any other information as considered relevant.</li> <li>b. A description of the physical, biological, chemical and other prevention and control mechanisms for each weed, pest and disease.</li> <li>c. The identification of intervention <b>[pest] thresholds</b>, those levels of pest and disease outbreaks that trigger different control mechanisms for each pest and disease.</li> <li>d. A weed, pest and disease monitoring plan, as described in criterion E.2.</li> <li>e. The mechanisms to be employed for capturing information about weed, pest and disease prevention and control and analyzing it to determine the results and future actions.</li> <li>f. A training plan that defines the training that vineyard management and workers will need to correctly implement the IPM program and sets out how and when training will be carried out.</li> <li>g. A system to track the beneficial effects of biodiversity—insects, plants, and animals—so that these can be protected and increased, and that the negative effects of production activities on them can be avoided.</li> </ul> <p><i>This plan must be included as part of the Vineyard Management Plan (see criterion A.10).</i></p>

Type of criteria	Compliance criteria
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<p><b>Essential   Year 0</b></p>	<p><b>D.2. <u>Growers</u></b> implement a weed and pest monitoring system as part of their IPM <b>plan</b> that includes:</p> <ul style="list-style-type: none"> <li>a. the different methods for observing and, where necessary, calculating the size of pest populations and disease outbreaks, and the damage they are causing in vineyards;</li> <li>b. the frequency of vineyard pest and disease monitoring activities;</li> <li>c. the tools and systems for recording monitoring data and later analyzing them to determine if pests and diseases are exceeding thresholds;</li> <li>d. mechanisms to carry out follow-up monitoring after pest prevention and control techniques are implemented to determine their effectiveness;</li> <li>e. include a field inspection to monitor insect, mite, weeds, disease and vertebrate pests during growing season and according to the stage of vine growth; and</li> <li>f. written records of IPM activities, results, and pest and disease incidents for at least three years.</li> </ul> <p><b>D.3. When synthetic pesticides are used, <u>growers</u> ensure to:</b></p> <ul style="list-style-type: none"> <li>a. use the substances with the lower toxicity and persistence as possible;</li> <li>b. apply the treatments to the smallest possible area to achieve control (localized applications);</li> <li>c. implement measures and/or physical barriers to avoid spray drift; and</li> <li>d. respect all buffer zones next to water bodies and ecosystems.</li> </ul> <p><b>D.4. <u>Growers</u></b> keep records of all pesticide applications (including natural and organic substances) that include at least the following information:</p> <ul style="list-style-type: none"> <li>a. application place (vineyard blocks) and area (acres or ha);</li> <li>b. application date and time of day;</li> <li>c. commercial name and active ingredient;</li> <li>d. total quantity applied and amount of water or other mix ingredient, if applicable;</li> <li>e. application method, and equipment identification if available;</li> <li>f. target pest;</li> <li>g. crop stage and harvest date;</li> <li>h. weather conditions; and</li> <li>i. person that recommended the application.</li> </ul>
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Type of criteria	Compliance criteria
	<p><b>D.5. <u>Growers</u></b> protect bees and other beneficial insects during pesticide applications by:</p>

<p><b>Essential   Year 0</b></p>	<ul style="list-style-type: none"> <li>a. not spraying on or close to beehives and other potential forage and habitat resources for beneficial organisms.</li> <li>b. not applying pesticides harmful to pollinators when plants (including weeds) are in bloom; and</li> <li>c. applying pesticides at times when pollinators are not as active, for example, at dusk and dawn.</li> </ul> <p><b>D.6. <u>Growers</u></b> have a system in place to manage or eliminate offsite spray drift from pesticide operations, or both. The system includes:</p> <ul style="list-style-type: none"> <li>a. training of pesticide application teams on drift minimization or avoidance techniques;</li> <li>b. using the proper equipment, especially nozzles, for the types of substances applied; and</li> <li>c. monitoring conditions such as wind speed, humidity, radiation, and rainfall, and applying when these are optimum to avoid spray drift.</li> </ul> <p><b>D.7. <u>Growers</u></b> comply with buffer zone and no-application zone requirements as indicated in pesticide labels, and in this standard.</p> <p><b>D.8. <u>Growers</u></b> maintain and calibrate mixing and application equipment at the beginning of each season and where relevant whenever water output/ha changes based on height of canopy being sprayed.</p> <p><i>See Chapter 7 of the BCWGC Best Practices Guide for a guidance on how to calibrate sprayers.</i></p> <p><b>D.9. <u>Growers</u></b> ensure that mixing, loading, transporting, and cleaning pesticide and fertilizer application equipment do not contaminate the environment through spillage or the discharge of leftover pesticide mix, or equipment wash water to the environment. Vineyards have infrastructure in place to capture, and if necessary, treat all equipment wash water and retain and clean up chemical spills.</p>
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Type of criteria	Compliance criteria
Essential   Year 0	<b>D.10. <u>Growers</u></b> store pesticides safely in a locked building, with ready access to safety and fire protection equipment. Storage areas are constructed to prevent liquid products from flowing directly into streams or rivers in the case of spills, a fire or an explosion. <i>Follow B.C. Min of Agriculture provincial rules.</i>
	<b>D.11. <u>Growers</u></b> store pesticides in their original containers. If containers are damaged, pesticides are stored in another suitable container and a replacement label is obtained from the supplier. <i>Follow B.C. Min of Agriculture provincial rules.</i>
	<b>D.12. <u>Growers</u></b> triple wash all empty pesticide containers and use wash water as part of the pesticide mix to be applied. Empty pesticide containers are returned to vendors for recycling. If vendors do not accept empty containers for products they have sold, vineyards store containers in a locked area until such time they can be disposed of at authorized collection sites or according to legally sanctioned methods.
	<b>D.13. <u>Growers</u></b> ensure that liquid and dry materials are stored separately, and that dry materials cannot be contaminated by spilled products.
	<b>D.14. <u>Growers</u></b> ensure that a spill clean-up kit is available in each pesticide or <b><u>hazardous substances</u></b> storage.
	<b>D.15. <u>Growers</u></b> ensure that emergency response numbers are readily available to all workers in the operation.
	<b>D.16. <u>Growers</u></b> implement a safety training policy and program for field workers handling pesticides that: <ul style="list-style-type: none"> <li>a. focuses on reducing the risks to <b><u>farm</u></b> worker safety;</li> <li>b. is designed and carried out by <b><u>competent professionals</u></b> in the field;</li> <li>c. includes information about applicable law and regulations, the substances being used and all applicable emergency procedures; and</li> <li>d. includes records of all training activities, their contents, and their participants.</li> </ul>
	<b>D.17. <u>Growers</u></b> and their staff participate in regular training activities to keep up to date about integrated pest management approaches and techniques.
	<b>D.18. <u>Growers</u></b> demonstrate that they implement biological, mechanical and physical pest control measures based on pest monitoring results and <b><u>[pest] thresholds</u></b> before considering pesticides use.
Type of criteria	Compliance criteria

<p><b>Essential   Year 2</b></p>	<p><b>D.19. <u>Growers</u></b> rotate pesticide mode of action by target pest, excluding herbicides, sulfur, oil, and bio fungicides, to avoid increasing pest resistance to pesticides.</p> <p><b>D.20. <u>Growers</u></b> evaluate the results of the IPM program and pest control activities after every growing season. The evaluation includes a review and analysis of:</p> <ul style="list-style-type: none"> <li>a. Pest monitoring activities.</li> <li>b. Pest or disease damage.</li> <li>c. Weather conditions when the pest or disease outbreak occurred.</li> <li>d. Prevention and control measures applied, including pesticide application data.</li> <li>e. Crop yield and grapes quality.</li> <li>f. Any other relevant information as necessary.</li> </ul> <p>See the <i>BCWGC Best Practices Guide</i> for guidance on how to conduct evaluation activities for pest management.</p>
<p><b>Continuous improvement</b></p>	<p><b>D.21. <u>Growers</u></b> use low-smoke agricultural burning to burn diseased vines and/or other wood if necessary. Burning permits may be required based on venting index.</p>

## E. IRRIGATION OPTIMIZATION

Water is a vital and necessary resource for life and grape production, and the implementation of irrigation strategies to optimize both the acquisition and use of water resources is critical to ensure and maximize vineyards profitability. With the increasing demand of water resources in British Columbia, reducing overall water consumption should be one of the main goals of vineyards to contribute to the sustainability of their vineyards and their communities.

The SWBC Standard focuses on understanding how water is used within the farms and optimizing irrigation mechanisms to ensure optimal fruit quality, efficient use of labour and maximum savings in water use.

**Expected outcome E.1.** Irrigation systems are managed to meet the grapevines needs, ensure fruit quality, optimize the use of labour and reduce the overall use of water within the vineyard.

Type of criteria	Compliance criteria
Essential   Year 0	<b>E.1. <u>Growers</u></b> install backflow prevention devices in line before any injection equipment.
	<b>E.2. <u>Growers</u></b> test the <b><u>irrigation distribution uniformity</u></b> and the overall application efficiency of the irrigation system at least once every three years, keep records of the test results, and analyze those records to implement changes in or adjustments to the irrigation systems.
	<b>E.3. <u>Growers</u></b> identify and delineate irrigation management zones in the vineyard.
	<b>E.4. <u>Growers</u></b> test irrigation water at least once annually or obtain data on water quality from their water purveyor. Vineyards send irrigation water samples for laboratory analysis at least once every five years if they have their own water system (well water); otherwise they request the water analysis results to their local purveyor (see criterion D.3. for water testing).

Type of criteria	Compliance criteria
Essential   Year 0	<b>E.5. <u>Growers</u></b> analyze the results of water testing to identify any potential problems and their respective management solutions and document any decisions as part of their management system.
	<b>E.6. <u>Growers</u></b> implement mechanism to monitor and measure water use. Mechanisms may include but are not limited to installing flow meters on wells and/or other water sources and pumps, either directly or through their water purveyor; getting water use metrics directly from their water purveyor; and/or record keeping of water use within the vineyard.
	<b>E.7. <u>Growers</u></b> use low-volume irrigation (e.g. drip irrigation, micro-sprinklers) or have <b><u>plans</u></b> to transition to low-volume irrigation within three growing seasons after the first assessment date for the SWBC standard.
	<b>E.8. <u>Growers</u></b> perform and document maintenance activities for all irrigation and water distribution systems least once every irrigation season. This includes but is not limited to checking filters, gauges (flow meters and/or pressure gauges), pressure control meters, relief valves, submains, drip lines, and emitters, repairing line leaks and breaks, and fixing any head rotation or emitter problems.
Essential   Year 2	<b>E.9. <u>Growers</u></b> optimize pump efficiency by one or all the following options: <ul style="list-style-type: none"> <li>a. ensuring that the correct impeller is used;</li> <li>b. improving friction loss in fittings at pump discharge; and/or</li> <li>c. Replacing old pumps with more efficient models.</li> </ul>
	<b>E.10. <u>Growers</u></b> implement a system to monitor the irrigation system during irrigation events to identify leaks and other maintenance issues and repair them quickly. Field personnel should be trained on how and what to communicate as soon as possible so any issues affecting the irrigation systems performance can be addressed.
	<b>E.11. <u>Growers</u></b> monitor and keep records irrigation of soil moisture, rainfall, and other soil and weather conditions to make and document decisions about irrigation needs. Soil moisture is at least reviewed via the “shovel test” method, and plant water status by visually assessing shoot tips and tendrils.
Type of criteria	Compliance criteria
Essential   Year 2	<b>E.12. <u>Growers</u></b> document all irrigation events. Records include data for: <ul style="list-style-type: none"> <li>a. date of irrigation event;</li> <li>b. amount of water and total area irrigated;</li> </ul>

	<p>c. type of irrigation mechanisms;</p> <p>d. basis for irrigation decision based on information collected according to Criterion E.6.</p>
<b>Continuous improvement</b>	<p><b>E.13. <u>Growers</u></b> demonstrate that the maximum amount of water applied has not exceeded the soil water holding capacity.</p> <p><b>E.14.</b> If feasible, <b><u>growers</u></b> schedule irrigation events during nighttime to reduce losses by evaporation.</p> <p><b>E.15. <u>Growers</u></b> use support tools for monitoring soil moisture to track soil moisture depletion and adjust irrigation events timing and amounts of water applicator. Support tools include but are not limited to: tensiometer, conductivity block, TDR, soil moisture probe.</p> <p><b>E.16. <u>Growers</u></b> quantify plant moisture stress by using a plant-applied method to determine irrigation event start and timing throughout the growing season. Plant-applied methods include but are not limited to pressure chamber and evapotranspiration.</p> <p><b>E.17. <u>Growers</u></b> use advanced monitoring systems for weather, plant and soil moisture conditions in the vineyard to support their irrigation timing and quantity decisions.</p> <p><b>E.18. <u>Growers</u></b> implement measures to avoid over-irrigation of their blocks.</p> <p><b>E.19. <u>Growers</u></b> ensure their <b><u>vineyard</u></b> pumps are properly sized for the acreage and consider equipping them with variable frequency drives.</p> <p><b>E.20. <u>Growers</u></b> demonstrate that electric pumps in their <b><u>vineyards</u></b> are powered by renewable energy.</p>



## **F. Social Equity - Workforce, Neighbors and Community**

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Social sustainability considers the implementation of policies and practices that benefit all the people that are connected to a business, from workers and their families to the members of neighboring communities.

Ensuring the wellbeing of workers is necessary to guarantee the sustainability and productivity of the vineyardss, and the participation of local communities is essential for the success of all sustainable management and conservation initiatives at the landscape level.

A socially sustainable grape growing business should be driven to encourage and cultivate quality of life, social equity, and diversity.

### **Expected outcomes of this chapter**

1. Workers have the necessary skills and knowledge to carry out their tasks efficiently and safely and contribute to the sustainability of the vineyard operations.
2. Occupational health and safety risks for workers and visitors are identified and addressed to prevent and minimize accidents and associated health problems.
3. Workers are paid decent salaries and receive additional benefits.
4. Measures are implemented to ensure business longevity.
5. Mechanisms are implemented to minimize negative impacts on neighbors and local communities and engage them to leverage potential improvement and sustainability opportunities.

### **F.1. Employee training**

Vineyard employees are essential for the implementation of all the best practices that would allow a farm to advance towards sustainability. Having employees that are not only trained but also committed to advance the vineyard sustainability agenda is the best way to ensure that the use of resources is optimized.

**Expected outcome F.1.** Workers have the necessary skills and knowledge to carry out their tasks efficiently and safely and contribute towards the sustainability of the farm.

Type of criteria	Compliance criteria
<b>Essential   Year 0</b>	<p><b>F.1. <u>Growers</u></b> create a written employee handbook and guarantee that all workers have free access to it. It must include at least the following elements:</p> <ul style="list-style-type: none"> <li>a. company mission, vision, and values, including the commitment to sustainability and sustainable practices;</li> <li>b. job descriptions and company standards and regulations.</li> <li>c. training and development policies;</li> <li>d. employee evaluation processes, grievance policy, and disciplinary actions.</li> <li>e. harassment and discrimination policies;</li> <li>f. policies and processes for communicating concerns and suggestions about workplace or working conditions;</li> <li>g. salary, benefits and incentives;</li> <li>h. health and safety policies and practices; and</li> <li>i. a handbook review and update schedule.</li> </ul> <p>The handbook is part of employee orientation content (see Criterion A.4).</p>
<b>Essential   Year 2</b>	<p><b>F.2. <u>Growers</u></b> develop and implement an emergency response protocol that includes:</p> <ul style="list-style-type: none"> <li>a. written procedures to address emergency situations within the <b><u>farm</u></b> facilities;</li> <li>b. information about handling of <b><u>hazardous substances</u></b> (see Criteria D.14 and D.16); and</li> <li>c. preparedness for disasters and extreme weather events.</li> </ul> <p><b>F.3. <u>Growers</u></b> assign an annual budget line item for to fund their Continual Training <b><u>Plan</u></b>, dollarized or in-kind (see Criterion A.6).</p> <p><b>F.4. <u>Growers</u></b> implement a system to encourage workers to submit suggestions or concerns about workplace conditions, such as safety conditions, job training, employee development opportunities, business performance, and operational efficiencies, without fear of retributions or negative repercussions.</p> <p><b>F.5. <u>Growers</u></b> make trade journals, industry newsletters and other learning and knowledge resources available to the management team and employees.</p>

Type of criteria	Compliance criteria
<b>Continuous improvement</b>	<b>F.6. <u>Growers</u></b> encourage workers to attend training seminars or other educational programs, and the company pays for the training costs or allows workers paid time off from work to attend, or both, in accordance with the continuous training <b>plan</b> (Criterion A.6).
	<b>F.7. <u>Growers</u></b> require their management team to regularly attend regional and provincial meetings, seminars, and symposiums that are related to sustainability, winemaking, or any other topic related to <b>vineyard</b> practices, goals, and objectives and that benefits and improves their work.
	<b>F.8. <u>Growers</u></b> implement at least one formal recognition program for workers, and have some recognitions related to sustainability.
	<b>F.9. <u>Growers</u></b> organize field trips for their staff members at least twice a year, to learn about environmental stewardship and overall sustainability.
	<b>F.10. <u>Growers</u></b> have a current membership in the local growers' associations and the management team attends their meetings and participates in their events

## F.2. Worker health and safety

Agricultural work is by nature physically demanding. It can involve long periods of standing, bending, stooping, carrying and other repetitive movements in awkward body positions, often outside. It involves a wide range of different management practices and types of machinery. Achieving safe work conditions is key to improving productivity and the general wellbeing of vineyard workers.

**Expected outcome F.2.** Occupational health and safety risks for workers and visitors are identified and addressed to prevent and minimize accidents and associated health problems.

Type of criteria	Compliance criteria
Essential   Year 0	<p><b>F.11. <u>Growers</u></b> place warning signs for potential hazards throughout their facilities, and make sure that the signs are in a language that is understood by workers and visitors.</p>
	<p><b>F.12. <u>Growers</u></b> provide <b>personal protection equipment (PPE)</b> free of charge to workers according to the identified health and safety risks for the tasks. Workers are trained in the proper use of PPE and are required to use it while carrying out task with identified risks. Employees that handle <b>hazardous substances</b> and chemicals:</p> <ol style="list-style-type: none"> <li>receive, at no cost, personal protective equipment (EPP) as indicated by the label of the substances applied or handled or the material safety data sheet (MSDS), whichever is stricter.</li> <li>Have access to facilities to bathe and change their clothes after finishing working with these substances and before leaving the workplace at the end of the workday.</li> </ol>
Essential   Year 2	<p><b>F.13. <u>Growers</u></b> develop and implement a health and safety <b>plan</b> that:</p> <ol style="list-style-type: none"> <li>is developed according to industry standard resources and is based on a risk analysis of production activities and tasks;</li> <li>includes all the requirements of applicable law and regulations; and</li> <li>is adjusted to the operations size and type.</li> </ol> <p><i>This plan must be included as part of the Vineyard Management Plan (see criterion A.10).</i></p>
Continuous improvement	<p><b>F.14.</b> The management team conducts employee health and safety meetings at least once a month, and record attendance and document all the issues discussed, and actions agreed. Employees should be able to express concerns about working and safety conditions without fear of repercussions.</p>
	<p><b>F.15. <u>Growers</u></b> have a planned and documented schedule for maintaining all equipment, machinery, and infrastructure.</p>

### F.3. Workers salaries and benefits

For many workers, good salaries and benefit packages are an important way in which businesses can show their appreciation. Together with workplace conditions, they are a powerful tool to attract and retain qualified workers and reduce turnover.

**Expected outcome F.3.** Workers are paid decent wages and receive additional benefits.

Type of criteria	Compliance criteria
<b>Essential   Year 0</b>	<b>F.16. <u>Growers</u></b> ensure that all salaries are at or above the market value for the region according to each type of job and position. Under no circumstance, workers' salaries will be lower than the established minimum wage for the region.
<b>Continuous improvement</b>	<p><b>F.17. <u>Growers</u></b> offer additional benefits to their workers and document such benefits. Additional benefits may include but are not limited to private or supplementary medical insurance, transportation, additional vacation or personal leave, and dental care.</p> <p><b>F.18. <u>Growers</u></b> offer family support services to all their workers. Examples of family support services include but are not limited to the following [at the discretion of the employer]:</p> <ul style="list-style-type: none"> <li>- flexible work schedules;</li> <li>- housing opportunities, referral information, and resources;</li> <li>- community resources information;</li> <li>- childcare or childcare referral program;</li> <li>- nutrition, health and wellness resources and/or referrals;</li> <li>- employer participation in groups dedicated to increasing housing opportunities; and</li> <li>- employer involvement in improving access to housing, health care, and childcare programs.</li> </ul>

## F.4. Business longevity

Implementing sustainability actions and improvements requires long-term vision and commitment. A vineyard that does not perceive the economic benefits of sustainability will soon revert to inefficient practices that waste money and resources. It is also important that vineyards plan, and understand the types of people, and leaders, they will need in the future.

**Expected outcome F.4.** Measures are implemented to ensure business longevity.

Type of criteria	Compliance criteria
Continuous improvement	<p><b>F.19. <u>Growers</u></b> track data about the costs of sustainability actions related to this standard, and any perceived additional income or cost reduction.</p> <p>Vineyards use this information as part of their annual management system review to decide on continued or new actions and improvements and adjust the management system and related policies and procedures accordingly.</p>
	<p><b>F.20. <u>Growers</u></b> have a long-term <b>plan</b> that encompasses the key issues for their future. This plan is periodically reviewed based on their operations' financial, sustainability, and production information. The plan should include or consider, among other issues:</p> <ul style="list-style-type: none"> <li>- future production, sales, and income scenarios and goals;</li> <li>- ideas and plans for <b><u>vineyard</u></b> expansion;</li> <li>- infrastructure and equipment improvements and needs;</li> <li>- a long-term staffing and recruiting strategy based on projected staff needs;</li> <li>- a succession plan for renewing or new leadership, or renewing ownership on smaller properties; and</li> <li>- possible resource—economic, human, and natural resources—constraints and ways to address them, including future sustainability actions and improvements.</li> </ul> <p><i>This plan must be included as part of the Vineyard Management Plan (see criterion A.10).</i></p>

## F.5. Neighbors and community

Vineyards are integral parts of the surrounding landscapes and communities. Communities are sources of goods and services, employees, and need and share many of the same resources as vineyards. Thus, it is important that growers make concerted efforts to engage with communities and neighbors to take into account their concerns about production activities and resource use, and to tell them about vineyard sustainability programs and efforts.

**Expected outcome F.5.** Mechanisms are implemented to minimize negative impacts on neighbors and local communities and engage them to leverage potential improvement and sustainability opportunities.

Type of criteria	Compliance criteria
<b>Essential   Year 0</b>	<b>F.21. <u>Growers</u></b> actively engage with neighbors and local communities, inform them about their operations and about the sustainable practices implemented, and identify and document relevant concerns about their operations.
	<b>F.22. <u>Growers</u></b> manage workplace conditions to avoid noise and visual pollution of their surroundings.
<b>Essential   Year 2</b>	<b>F.23. <u>Growers</u></b> implement a procedure for making information regarding upcoming changes in relevant operations available to neighbors, community members, and other relevant stakeholders in a consistent and timely fashion.
	<b>F.24. <u>Growers</u></b> have a written procedure to follow up on complaints made by neighbors and local communities. Vineyard workers understand how to receive any of these complaints or concerns.
<b>Continuous improvement</b>	<b>F.25. <u>Growers</u></b> analyze the ways that light, noise, fumes, and traffic from operations may impact neighbors and implement mitigation measures.
	<b>F.26. <u>Growers</u></b> seek opportunities to host events at their facilities to showcase their operations and best practices and build better relationships with local people.
	<b>F.27. <u>Growers</u></b> reduce light pollution by minimizing site lighting and incorporating in winery design technologies such as DARK SKY approved lighting, downward facing directional lighting, low-angle spotlights, and low reflectance surfaces.

## **V. TERMS AND DEFINITIONS**

### **C.**

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**Competent professional:** An individual (or group of individuals) with demonstrated professional expertise, skills, experience and credentials in a specific subject area.

### **F.**

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**Farm(s):** The entire property owned by a vineyard or a group of vineyards; and including the vineyards, other existent crops, areas under conservation and/or protection, and all infrastructure and buildings within such property

### **G.**

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**Grower:** An individual or entity that owns a farm and is responsible for all the decisions concerning such farm management.

### **H.**

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**Hazardous substances:** Any item or chemical which can cause harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment, because it has one or more of the following intrinsic 'hazardous properties': explosiveness, flammability, ability to oxidize (accelerate a fire), human toxicity (acute or chronic), corrosiveness (to human tissue or metal), eco-toxicity (with or without bioaccumulation), or the capacity, on contact with air, soil or water, to develop one or more of the above properties.



**Hazardous waste streams:** Hazardous waste streams include all the substances listed by the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (According to Annexes I and II), as follow:

WASTE STREAMS	
Y1	Clinical wastes from medical care in hospitals, medical centers and clinics.
Y2	"Wastes from the production and preparation of pharmaceutical products"
Y3	Waste pharmaceuticals, drugs and medicines
Y4	Wastes from the production, formulation and use of biocides and phytopharmaceuticals
Y5	Wastes from the manufacture, formulation and use of wood preserving chemicals
Y6	Wastes from the production, formulation and use of organic solvents
Y7	Wastes from heat treatment and tempering operations containing cyanides
Y8	Waste mineral oils unfit for their originally intended use
Y9	Waste oils/water, hydrocarbons/water mixtures, emulsions
Y10	Waste substances and articles containing or contaminated with polychlorinated biphenyls (PCBs) and/or polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)
Y11	Waste tarry residues arising from refining, distillation and any pyrolytic treatment
Y12	Wastes from production, formulation and use of inks, dyes, pigments, paints, lacquers, varnish
Y13	Wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives
Y14	Waste chemical substances arising from research and development or teaching activities which are not identified and/or are new and whose effects on man and/or the environment are not known
Y15	Wastes of an explosive nature not subject to other legislation
Y16	Wastes from production, formulation and use of photographic chemicals and processing materials
Y17	Wastes resulting from surface treatment of metals and plastics
Y18	Residues arising from industrial waste disposal operations

WASTES HAVING AS CONSTITUENTS:	
Y19	Metal carbonyls
Y20	Beryllium; beryllium compounds
Y21	Hexavalent chromium compounds
Y22	Copper compounds
Y23	Zinc compounds

<b>WASTES HAVING AS CONSTITUENTS:</b>	
Y24	Arsenic; arsenic compounds
Y25	Selenium; selenium compounds
Y26	Cadmium; cadmium compounds
Y27	Antimony; antimony compounds
Y28	Tellurium; tellurium compounds
Y29	Mercury; mercury compounds
Y30	Thallium; thallium compounds
Y31	Lead; lead compounds
Y32	Inorganic fluorine compounds excluding calcium fluoride
Y33	Inorganic cyanides
Y34	Acidic solutions or acids in solid form
Y35	Basic solutions or bases in solid form
Y36	Asbestos (dust and fibers)
Y37	Organic phosphorus compounds
Y38	Organic cyanides
Y39	Phenols; phenol compounds including chlorophenols
Y40	Ethers
Y41	Halogenated organic solvents
Y42	Organic solvents excluding halogenated solvents
Y43	Any congener of polychlorinated dibenzo-furan
Y44	Any congener of polychlorinated dibenzo-p-dioxin
Y45	Organ halogen compounds other than substances referred to in this Annex (e.g. Y39, Y41, Y42, Y43, Y44)

<b>CATEGORIES OF WASTES REQUIRING SPECIAL CONSIDERATION:</b>	
Y46	Wastes collected from households
Y47	Residues arising from the incineration of household wastes

## I.

**Insectary hedgerows:** Plant hedgerows or strips composed by plant species that attract insects; and as such, are intentionally introduced into an ecosystem to increase pollen resources and nectar resources required by the natural enemies of harmful or unwanted insect pests.

**Irrigation distribution uniformity:** Distribution uniformity (DU) is a measurement of the evenness of water application across a field and is expressed as a percentage. Although 100% DU is theoretically possible, it is virtually impossible to achieve with an irrigation system in the field. The goal is to obtain the best DU possible. For systems that apply chemigation or reclaimed water, the minimum acceptable DU is 80% for sprinkler systems and 90% for trickle/drip systems.

## N.

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**Natural ecosystems:** According to the Convention on Biological Diversity (1992), an ecosystem is “a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit.” (p. 3).

Additionally, SAN (2017) defines natural ecosystems as:

*“Ecosystems that resemble – in terms of species composition, structure, and function – those that are or would be found in a given area in the absence of significant human management impacts”.*

For the purpose of conservation and management objectives, SAN distinguishes between natural terrestrial and aquatic ecosystems.

### 1. Terrestrial ecosystems:

SAN differentiates four different categories of terrestrial ecosystems: tundra, forests, grasslands and deserts.

#### 1.1. Tundra

Tundra vegetation is composed of dwarf shrubs, sedges and grasses, mosses and lichens, and occasionally some scattered trees. Tree growth is hindered by low temperatures and short growing seasons due to permanently or almost permanently frozen soil. There are three types of tundra: arctic tundra, alpine tundra, and Antarctic tundra.

The ecotone (or ecological boundary region) between tundra and forest is known as tree line or timberline; and is also covered by the following definition of forests.

#### 1.2. Forests

Forests are lands dominated by trees with a canopy cover of at least 10% by woody plants taller than 5 meters (FAO, 2015b). To facilitate processes of remote-sensing and detecting possible forest destructions, SAN recognizes three main forest categories:

- 1) Closed forest (canopy density greater than 50%);
- 2) Open forest (canopy density between 25% and 50%); and
- 3) Woodlands (sparse, savanna type forest; canopy density between 10 and 25%) (Hansen, DeFries, Townshend, Carrol, Dimiceli & Sohlberg, 2003).

For the purposes of this definition of natural ecosystems, disturbed places or non-forest natural vegetation located inside forests are still considered a natural terrestrial ecosystem, and therefore are subject to conservation measures as defined within the Sustainable Agriculture Framework.

Forests can be further distinguished according to their biome:

**1.2.1. Taiga**

Characterized by coniferous forests consisting mostly of pines, spruces and larches, also called boreal forest or snow forest. Taiga is found throughout the high northern latitudes, between the tundra, and the temperate forest, from about 50°N to 70°N.

**1.2.2. Temperate forest**

1. Broadleaf (deciduous) and mixed forest is dominated by trees that lose their leaves each year. They are found in areas with warm moist summers and mild winters.
2. Coniferous forest is comprised of evergreen forests in areas with warm summers and cool winters. Common in coastal areas of regions with mild winters and heavy rainfall, or inland in drier climates or montane areas. Tree species include pine, cedar, fir, and redwood.

### 1.3. Grasslands, savannas and shrublands

Grasslands are terrestrial biomes whose predominant vegetation consists of grass or shrubs.

- i. *Tropical and subtropical* grasslands are characterized by annual rainfall levels between 90-150 centimeters with variability in soil moisture throughout the year. Grasses dominate the species composition of these ecoregions, although scattered trees may be common.
- ii. *Temperate grasslands*: also known as prairies, pampas, veld or steppe, are systems that differ from tropical grasslands in the annual temperature regime as well as the types of species found here. Generally speaking, these regions are devoid of trees, except for riparian or gallery forests associated with streams and rivers.
- iii. *Montane grasslands*: are high elevation (montane and alpine) grasslands and shrublands, including the puna and páramo in South America, subalpine heath in New Guinea and East Africa, steppes of the Tibetan plateaus, as well as other similar subalpine habitats. Their plants and animals are adapted to cool, wet conditions and intense sunlight.

### 1.4. Deserts (and Xeric Shrublands)

These are ecosystems where evaporation exceeds rainfall, annual precipitation is less than two thirds of potential evaporation and temperature variability is extremely diverse; and can be classified as hot or cold, semiarid or coastal.

In order to survive the harsh environment, plants and animals living in the desert need special adaptations. Plants tend to be tough and wiry with small or no leaves, water-resistant cuticles and often spines to deter herbivores. Some annual plants germinate, bloom and die in the course of a few weeks after rainfall while other long-lived plants survive for years and have deep root systems able to tap underground moisture. Animals need to keep cool and find enough food and water to survive. Many animals are nocturnal and stay in the shade or underground during the heat of the day, are efficient at conserving water, and remain in a state of dormancy for long periods.

## 2. Aquatic ecosystems

Aquatic ecosystems are permanent water bodies of fresh, brackish or salty waters inland from the coastal zone, and areas whose ecology and use are dominated by the permanent, seasonal, or intermittent occurrence of flooded conditions; including inland water and coastal categories.

SAN distinguishes five types of aquatic ecosystems: lake ecosystems (lentic or still water), river ecosystems (lotic), wetlands, coastal areas, and polar ecosystems. The SAN aquatic ecosystem definition covers the littoral zone, which is part of a sea, lake or river that is close to the shore, and also comprises artificial wetlands created for the specific purpose of providing habitat for terrestrial wildlife or aquatic life.

## 2.1. Lake ecosystems (lentic aquatic ecosystems)

Stationary or relatively still freshwater ecosystems, including ponds and lakes and xeric basin ecosystems.

- ii. *Lakes*. Areas filled with water, localized in a basin that is surrounded by land, apart from any river or other outlet that serves to feed or drain the lakes. Lakes lie on land and are not part of the ocean, and therefore are distinct from lagoons, and are also larger and deeper than ponds.
- iii. *Ponds*. Small bodies of freshwater with shallow and still water, marsh, and aquatic plants.
- iv. *Xeric basin ecosystems*. Aquatic ecosystem with little permanent surface water and a relative abundance of springs and pools in desert regions.

## 2.2. River ecosystems (lotic aquatic ecosystems)

Flowing water bodies with the velocity of the current being determined by the flow bed's gradient. Faster moving turbulent water contains greater concentrations of dissolved oxygen and supports greater biodiversity than the slow-moving water of lake ecosystems. River ecosystems include deltas or floodplains. Springs also form part of these systems, as well as seasonal systems that don't flow continuously throughout the whole year or during all years.

Streams and rivers that have been altered by sedimentation, polluted runoff, bank erosion, thermal pollution, or impoundments are still considered a SAN natural aquatic ecosystem.

## 2.3. Wetlands

Wetlands are dominated by vascular plants that have adapted to saturated soil (Keedy, 2010). SAN considers four main types of wetlands: swamps, marshes, wet grasslands, and bogs (peatlands):

- i. *Swamps*. A forested wetland occurring along large rivers where they are dependent upon natural water level fluctuations or on the shores of large lakes.
- ii. *Marshes*. A wetland dominated by herbaceous species such as grasses, rushes or reeds rather than woody plant species. If woody plants are present, they tend to be low-growing shrubs. Marshes can often be found at the edges of lakes and streams, where they form a transition between the aquatic and terrestrial ecosystems.
- iii. *Wet grasslands*. Grasslands flooded seasonally or year-round, such as flooded savannas and occurring mostly in the tropics and subtropics.
- iv. *Bogs (peatlands)*: A bog is a wetland that accumulates peat, a deposit of dead plant material—often mosses. The gradual accumulation of decayed plant material in a bog functions as a carbon sink.

## **2.4. Coastal areas**

Areas between 50 meters below mean sea level and 50 meters beyond the high tide mark, including coral reefs, intertidal zones, estuaries, coastal aquaculture, and seagrass communities.

## **3. Systems not considered Natural Ecosystems**

For the purpose of this Natural Ecosystems definition, the following ecosystems are not considered “natural ecosystems”, and thus are not subject to the management measures and restrictions that cover such ecosystems.

### **3.1. Terrestrial systems**

- i. Forestry or fruit tree plantations.
- ii. Tree-covered areas that are managed as diversified food production systems, including traditional and modern management systems such as home gardens, orchards, agroforestry systems, and mixed tree-cattle systems (silvopastoral systems).
- iii. Areas that are managed as long-rotation swidden (shifting cultivation) systems under traditional, indigenous people, community, or smallholder land-use systems.
- iv. Former production areas dedicated to soil fertility recovery (fallow lands) and that will return to production activities.

### **3.2. Aquatic systems**

- i. Artificial pools or lagoons for water treatment, water storage for irrigation, or aquaculture.
- ii. Areas that have been made seasonally or perennially wet due to human activity, such as drainage ditches, irrigation ponds, reservoirs, effluent holding ponds, aquaculture ponds, rice paddies, or gravel pits.

## P.

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**Personal protection equipment (PPE):** Personnel Protective Equipment (PPE) refers to equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Personal protective equipment may include items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits.

**Pest thresholds:** Pest or action thresholds refer to the number of pest or the level of pest damage that can be tolerated by the crop before requiring control actions, in order to both assure that yield and productivity are not affected beyond manageable levels and to provide a quantitative basis upon which crop managers can decide whether pest populations are below, at, or exceeding a level that warrants the expense of activities to reduce their density.

Within Integrated Pest Management (IPM) approaches, there are two main pest thresholds considered:

a. Economic injury level (EIL)

The economic injury level is the minimal population density that will cause economic damage and therefore justify the cost of artificial control measures. In this context the term “injury” is defined as the effect that pest agents over crop plants, and “damage” refers to yield loss that is measurable. Focusing on damage over injury is important, as some injury at plant tissues does not necessarily leads to yield loss (e.g.: a beetle that eats the leaves of crop).

b. Economic threshold (ET)

The economic threshold is the level at which control measures should be implemented/applied to stop the increase of pest populations.

**Plan:** A document or a set of documents, including a diagram or a list of intended actions, used to define and achieve an objective or goal. For the purposes of this standard, a plan contains objectives, quantitative targets and parameters, timebound management actions, resources and responsible personnel.

## V.

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**Vineyard:** The whole area within a farm containing grapevine plantations.