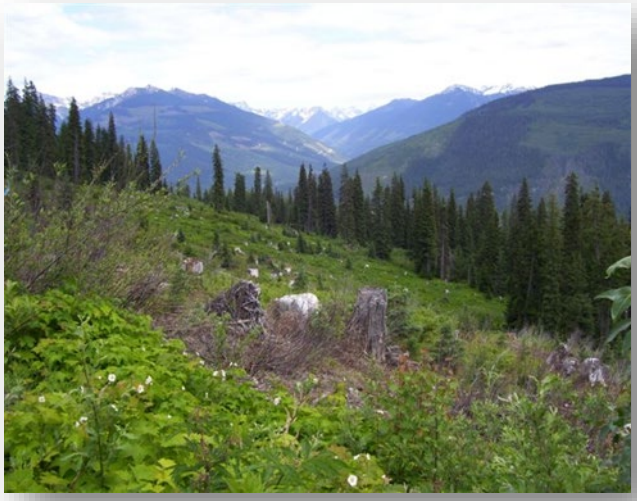
BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

2019

INTEGRATED PEST MANAGEMENT ACT

Forestry Pesticide User Audit



Environmental Protection Division | Regional Operations Branch

EXECUTIVE SUMMARY

In 2019, the Ministry of Environment and Climate Change Strategy's Compliance Team conducted an audit of British Columbia forestry herbicide users regulated under the *Integrated Pest Management Act* (IPMA or Act) and Regulation (IPMR). Forestry authorization holders in B.C. include both Confirmation holders (e.g. large forestry companies and Crown Corporations) who prepare and consult on a Pest Management Plan, and Pesticide User License holders that typically conduct the pesticide applications under contract for the Confirmation holders. Herbicides may be applied using either ground-based or aerial application methods, including the aerial application of the herbicide glyphosate.

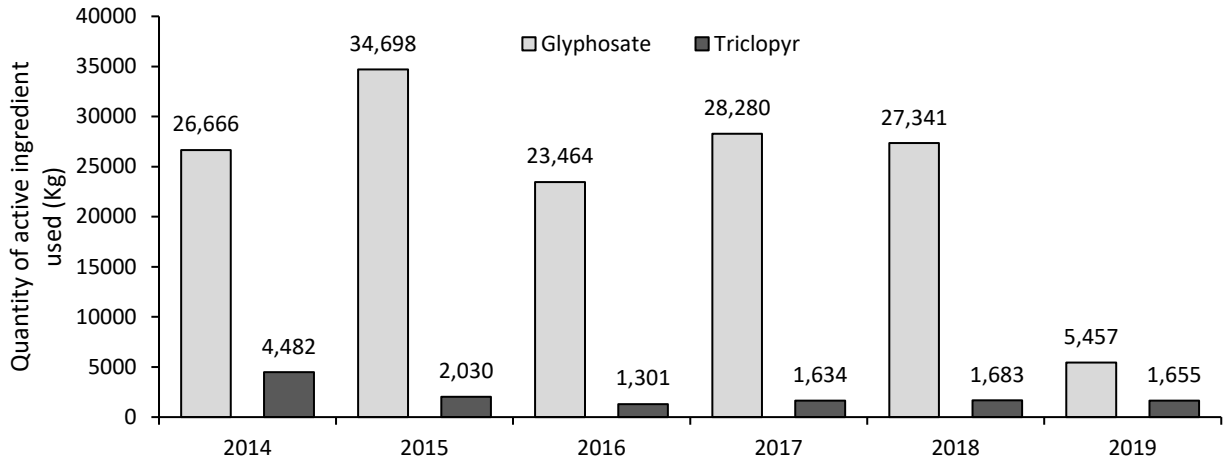
The main objectives of the audit included:

- To inspect both Confirmation and Pesticide User License holders to verify compliance with the regulatory requirements established in the Regulation and identify any environmental risks.
- To report out on trends in pesticide use and non-chemical treatment methods in the forestry sector over a six-year period from 2014 to 2019.
- To identify compliance promotion opportunities with industry.

A total of 21 inspections of both Confirmation holders and License holders were conducted in 2019, including both field and records review inspections. The results of the audit found an overall compliance rate of 86% for all inspections conducted. This included:

- 100% compliance rate for 18 field and desk audit inspections of Confirmation holders to demonstrate compliance with the requirements to use pesticides according to the principles of Integrated Pest Management and to adequately protect sensitive aquatic features. This included inspections of a total of 32 cutblocks with sensitive aquatic features that had received an aerial application of glyphosate.
- 0% compliance rate for 3 inspections conducted of Pesticide User Licensees conducting aerial applications of herbicides. The non-compliances determined were administrative in nature, and three advisories of non-compliance were issued in response.

An analysis of reported pesticides used from 2014 to 2019 indicated that a total of 158,691 kg of herbicides were applied by forestry companies in B.C. during this period, including 145,905 kg of glyphosate and 12,905 kg of triclopyr. Glyphosate use peaked in 2015 at 34,698 kg of active ingredient, dropping to 5,457 kg of active ingredient in 2019, as seen in the graph below. By region of the province, the highest amount of herbicide was applied in the Omineca, followed by the Peace and then the Cariboo, while the southern areas of the province had much lower amounts applied across all years examined. Finally, 2019 was the only year in which confirmation holders reported a greater area of non-chemical treatments (e.g. manual brushing) than chemical treatments.



Total quantity of pesticide active ingredients reported used between 2014 to 2019 by all forestry confirmation holders in British Columbia

No specific recommendations for legislative or policy changes emerged from the results of this audit. The ministry will continue to inspect forestry confirmation holders and associated licensees going forward, as well as work with B.C. Silviculture Committees to continue to promote compliance and best practices. In addition, the ministry will continue to monitor and report out publicly on trends in pesticide use in the forestry sector.

CITATION AND FURTHER INFORMATION

This report should be cited as:

2019 Integrated Pest Management Act – Forestry Pesticide Use Audit. Regional Operations Branch, British Columbia Ministry of Environment and Climate Change Strategy.

Further information regarding this report may be obtained by contacting:

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INTRODUCTION

BACKGROUND

The Ministry of Environment and Climate Change Strategy's Compliance Team conducts audits of the various sectors in the province that use pesticides to obtain a snapshot of compliance, and to examine trends in pesticide use. Audits are typically conducted through a combination of on-site inspections and the analysis of submitted data, reports, and management plans required under the *Integrated Pest Management Act* (IPMA) and Regulation. The primary objectives of audits are to determine compliance with key requirements, identify risks to human health or the environment, identify important trends in pesticide use, and to provide relevant information to inform policy or regulatory amendment decisions when they arise.

Forestry pesticide users were selected to be audited in 2019 to obtain a snapshot of their rate of compliance when applying pesticides by aerial and ground application methods. Under the IPMA, there are two primary categories of authorization that are required to apply pesticides in a forestry context:

1) **Pesticide Use Notice Confirmation** – this authorization is required for the management of forest pests on more than 20 hectares per year of public land that is used for timber production or is forested. Confirmation holders are typically larger companies or Crown Corporations that hold forest tenures such as forest licences. The Confirmation holder is required to prepare and consult on a Pest Management Plan (PMP), which details the IPM program and health and safety procedures for all pesticide applications.

2) **Pesticide Use License** – Pesticide User Licenses are required for the management of forest pests on private land, on less than 20 hectares per year of public land, or for the use of pesticides as a service. Licensees are typically smaller companies that apply pesticides either through ground based or aerial application methods. In BC, the majority of the pesticide use in forestry on public land is conducted as a service by Pesticide User Licensees working under the authority of a Confirmation Holder.

This report covers the inspection results of Confirmation holders and Pesticide User Licensees in the forestry sector under the IPMA and Regulation in 2019. Excluded from the scope of this report are forest health programs, such as the application of biological insecticides to control gypsy moth, and any invasive plant treatments done by forestry companies. This report also examines trends in pesticide use from forestry authorization holders for the six-year period from 2014 to 2019.

The specific objectives of this report include:

- Verification of regulatory compliance by all aerial forestry licensees operating in BC in 2019, including the protection of sensitive features such as wetlands, creeks and lakes when applying pesticides by aerial and ground application methods.
- Verification that Confirmation Holders are adhering to the procedures outlined in their Pest Management Plans, including pre- and post-treatment monitoring and assessments.

- An examination of the trends in pesticide application between 2014 and 2019, including an analysis of active ingredients used, methods of application, and chemical vs. non-chemical treatments.

It is important to inspect forestry pesticide users to confirm the protection of waterbodies, environmentally sensitive areas, and beneficial or rare plant species. Due to the increased risk of drift from aerial applications versus ground applications, it is important to conduct regular inspections of aerial treatments as well as ground treatments. In recent years there have been concerns expressed by some members of the public over the aerial spraying of glyphosate in the forestry sector in BC, and potential impacts on wildlife such as moose. Therefore, it is important to ensure that the public and authorization holders are aware that the ministry is performing regular compliance verification activities and analyzing pesticide use in this sector.

DEFINITION OF TERMS USED IN THIS REPORT

INTEGRATED PEST MANAGEMENT (IPM)

Integrated pest management is a science-based, stepwise process for managing pest populations that forms a cornerstone of the Act and Regulation. IPM includes the following elements: pest prevention, pest identification, monitoring, injury thresholds, treatment decisions, and evaluation. These elements ensure that pesticides are only used when necessary. Under Section 32 of the IPM Regulation, both pesticide user licensees and confirmation holders are required to follow the principles of IPM when using pesticides.

IPM includes the following six elements:

1. **Prevention**: planning and managing structures and habitats to prevent pests
2. **Identification**: identifying pests, their damage and their natural enemies
3. **Monitoring**: regular monitoring of pest populations using various methods that assess pest damage, presence of beneficial organisms, and environmental conditions
4. **Injury Thresholds**: using appropriate action thresholds based on potential damage, safety concerns, cost of control methods, and impact on beneficial organisms and the environment
5. **Treatment Decisions**: may include a combination of behavioral, biological, chemical, cultural and mechanical methods to reduce pest populations and damage to acceptable levels
6. **Evaluation**: conducting follow up evaluations to determine the effects and efficacy of management decisions

PESTICIDES

Pesticides are defined in the Act as “a micro-organism or material that are represented, sold, used or intended to be used to prevent, destroy, repel or mitigate a pest”.

Pesticides can be broken down into categories based on the pest they are targeting. The following pesticide categories below are the most commonly used in the forestry sector:

1. Herbicides – controls unwanted plants, brush or deciduous trees
2. Adjuvant/surfactant – increases the efficacy of a pesticide

Pesticide formulations consist of the active ingredient(s) and other ingredients. The active ingredients in a pesticide are what control the target pest. The other ingredients may aid in the stabilization, mixing, or application of the pesticide.

PESTICIDE FREE ZONES AND NO TREATMENT ZONES

Under Section 73 of the IPM Regulation, a 10 m pesticide-free zone (PFZ) is an area maintained around or along a body of water, a dry stream, or a classified wetland, and serves to protect these sensitive aquatic areas. It is defined in the Regulation as "an area of land that a) must not be treated with pesticide, and b) must be protected from pesticide moving onto it." A no-treatment zone (NTZ) is an area maintained around a PFZ that serves to prevent any pesticide from entering the PFZ, and is defined as "an area of land that must not be treated with pesticide". Typically, confirmation holders will instruct the herbicide applicators as to where the boundary of the pesticide free zone and no treatment zone should be located adjacent to each sensitive aquatic feature.

The PFZ is measured from the high-water mark of the sensitive feature, and the range in width of the No Treatment Zone maintained around the PFZ is based on the application method and other factors. In addition, the pesticide label may also prescribe buffers of specific distances that must be maintained for the protection of aquatic or terrestrial habitats.

REGIONS

This report references regions of the province, as shown in Figure 1:

- Vancouver Island
- Lower Mainland
- Southern Interior (Thompson-Nicola and Okanagan)
- Kootenay
- Cariboo
- Skeena
- Omineca
- Peace

***Figure 1**. Regions in B.C.*

METHODS

INSPECTIONS

Inspections of Pesticide User Licensees focused on licensed aerial applicators, as aerial applications represent the highest volume of pesticide use in forestry (as opposed to ground applications). Inspections verified compliance with pesticide use record, licensing, and certification requirements (i.e. IPMR sections 5, 35, and 50). Three inspections were conducted, as these three operators were the only aerial applicators licensed to conduct forestry herbicide applications in B.C. in 2019.

Eleven inspections were conducted on forestry Confirmation holders, which included obtaining pre- and post-treatment maps and surveys to compare what was stated in the Confirmation holder's PMP with what was conducted in the field. Ministry officers assessed each confirmation holder for compliance under section **69** of the IPMR for the following elements of IPM:

(1) A confirmation holder may use, or authorize the use of, a pesticide only after doing all the following in accordance with integrated pest management principles:

(a) implement the reasonable measures to prevent pests identified in the pest management plan prepared in relation to the confirmation;

(b) identify pest species and pest complexes to be managed;

(c) determine, on the basis of monitoring

(i) the population of pests and their location,

(ii) the environmental conditions and features of the treatment area, and

(iii) the damage that has been or may be caused by the pests;

(d) determine the injury threshold for each pest and apply it to the determination of when to use a pesticide;

(e) select pest treatment methods based on, as identified in the pest management plan prepared in relation to the confirmation,

(i) consideration of practical alternatives to pesticide use, and

(ii) protection of human health and the environment.

(2) A confirmation holder must make pre-treatment and post-treatment observations of the treatment area to evaluate the effectiveness and impact of each pesticide use.

Finally, seven field inspections focusing on Pesticide Free Zone requirements were conducted by performing visual observations one year after treatment occurred on a total of 32 different cut blocks. Observations were performed by helicopter and ground inspections, to ensure that a minimum 10 meter PFZ was maintained adjacent to waterbodies, dry streams, and classified wetlands.

Upon completion of all compliance inspections, the authorized party was issued an inspection report outlining the compliance status of each requirement assessed. Inspectors also discussed non-compliances encountered with the inspected party at the time of inspection.

PESTICIDE USE EVALUATION FOR FORESTRY CONFIRMATION HOLDERS

To complement the inspection results and provide context with respect to pesticide use over time, ministry staff analyzed annual pesticide use data submitted by confirmation holders. Each confirmation holder is required to submit a summary of all pesticide and non-chemical treatments for a calendar year. For each pesticide used, confirmation holders must report the product name, the active ingredient(s), the federal *Pest Control Products* (P.C.P) *Act* registration number, the total amount of product used in litres or kilograms, the number of hectares treated (ha), and the number of hectares of non-chemical control methods. Non-chemical methods reported used included manual brushing, stem girdling (physical removal of a layer of bark from the main stem of deciduous trees), sheep grazing, stem breakage, mechanical removal, and hand pulling.

The summaries for all forestry confirmation holders from 2014 to 2019 were entered into a database and information management system to calculate the quantity of active ingredient applied in the sector each year.

RESULTS

COMPLIANCE OUTCOMES

Inspections conducted on aerial pesticide user licensees to assess record keeping, licensing and certification requirements found administrative non-compliances for all three licensees inspected. Non-compliances included the failure to record the address of the confirmation holder, the pilot's name and certificate number, and method of application. The non-compliances noted were minor in nature, and each licensee was sent an advisory letter followed up by a phone call to discuss the results of the inspection.

The result of the inspections of Pest Management Plans and other required records of monitoring and pesticide use by confirmation holders was a 100% compliance rate for all 11 inspections conducted. A notice letter was sent to each confirmation holder outlining the results of the inspection. The Confirmation holder inspections focused on reviewing what was stated in the PMP in terms of how integrated pest management principles were going to be achieved after harvesting of a cut-block was performed. IPM officers then obtained pre- and post-treatment surveys and maps to verify that what was stated in the PMP reflected what actually occurred after a plantation was established and brushing was completed.

The inspections to ensure that Pesticide Free Zones were adequately maintained were performed by helicopter (example Figure 2). A visual inspection of each cut block clearly showed a lack of infringement on Pesticide Free Zones on all 32 cut blocks inspected. This resulted in a one hundred percent compliance rate for all seven inspections conducted.

Figure 2. *Pesticide Free Zone adjacent to a wetland and creek. The green vegetation indicates no pesticide application, and the brown vegetation shows where pesticides were applied.*

PESTICIDE USE AND NON-CHEMICAL PEST MANAGEMENT PRACTICES

NUMBER OF FORESTRY CONFIRMATION HOLDERS

From 2014 to 2019, the number of active forestry confirmation holders in B.C. varied from a high of 75 in 2016 to a low of 44 in 2019 (Figure 3). All 363 annual summaries of pesticide use from 2014 to 2019 were received and analyzed for this report. Most forestry confirmation holders from 2014 to 2019 were in the Omineca, followed by Vancouver Island, the Cariboo, and the Peace regions (Appendix A).

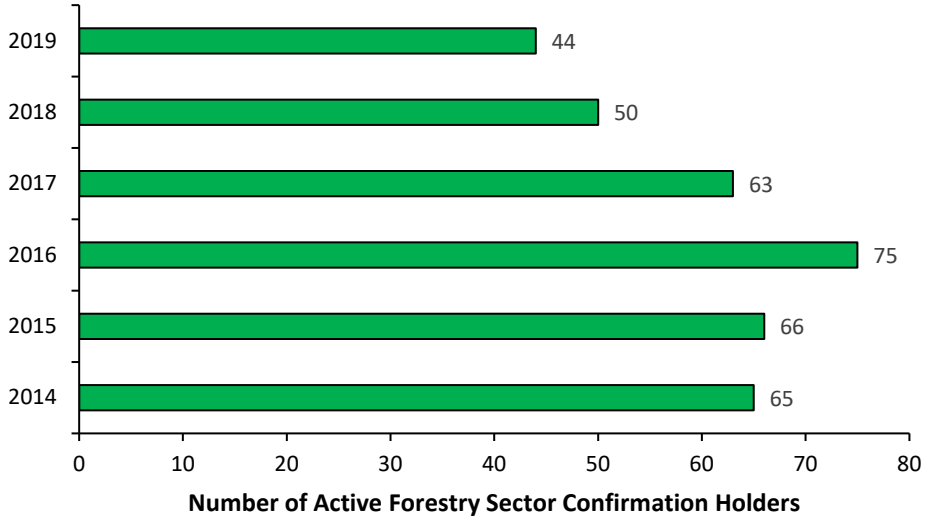

Figure 3. *Total number of active forestry confirmation holders in B.C. from 2014 to 2019*

SUMMARY OF PESTICIDE USE BY FORESTRY CONFIRMATION HOLDERS FROM 2014 TO 2019

Forestry confirmation holders reported using only the herbicides glyphosate and triclopyr over a six-year period from 2014 to 2019 (table 1). Glyphosate is the only herbicide applied by air, while both glyphosate and triclopyr may be applied by ground application methods.

Table 1. Total quantity of pesticide active ingredients used by all forestry confirmation holders from 2014 to 2019.

Pesticide Active Ingredient	Pesticide Type	Quantity of Active Ingredient Used (Kgs)
Glyphosate	Herbicide	145,905
Triclopyr	Herbicide	12,786

From 2014 to 2019, the quantity of herbicide active ingredient applied aerially (i.e. glyphosate) by forestry sector confirmation holders varied from a high of 31,513 kg of active ingredient in 2015 to a low of 3,837 kg of active ingredient in 2019 (Figure 4). The largest drop in pesticide use occurred between 2018 and 2019.

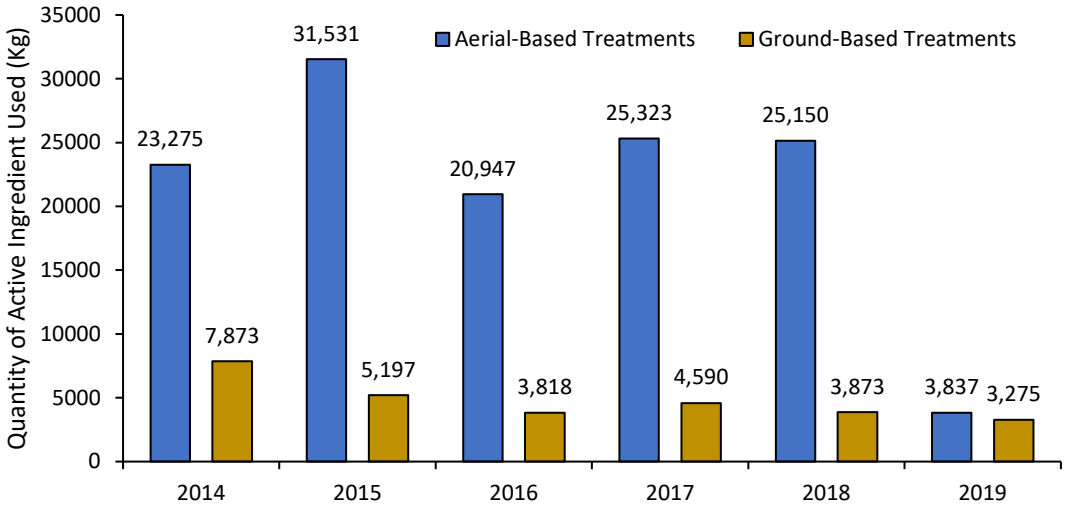

Figure 4. *Total quantity of pesticide active ingredients applied through aerial and ground-based methods in 2014 to 2019 by active forestry sector confirmation holders in B.C*

Similarly, the treatment area recorded for aerially applications from 2014 to 2019 varied from a high of 16,211 ha in 2015 to a low of 2,222 ha in 2019 (Figure 5), and the total amount of glyphosate applied peaked in 2015 at 34,698 kg, and was lowest in 2019 at 5,457 kg (Figure 6).

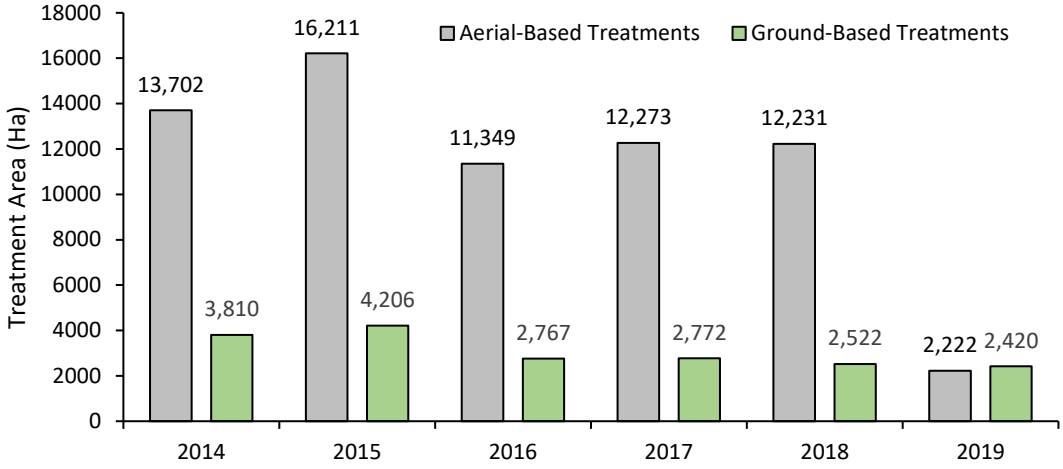

Figure 5. *Total treatment area of pesticide active ingredients applied through aerial and ground-based methods in 2014 to 2019 by active forestry sector confirmation holders in B.C.*

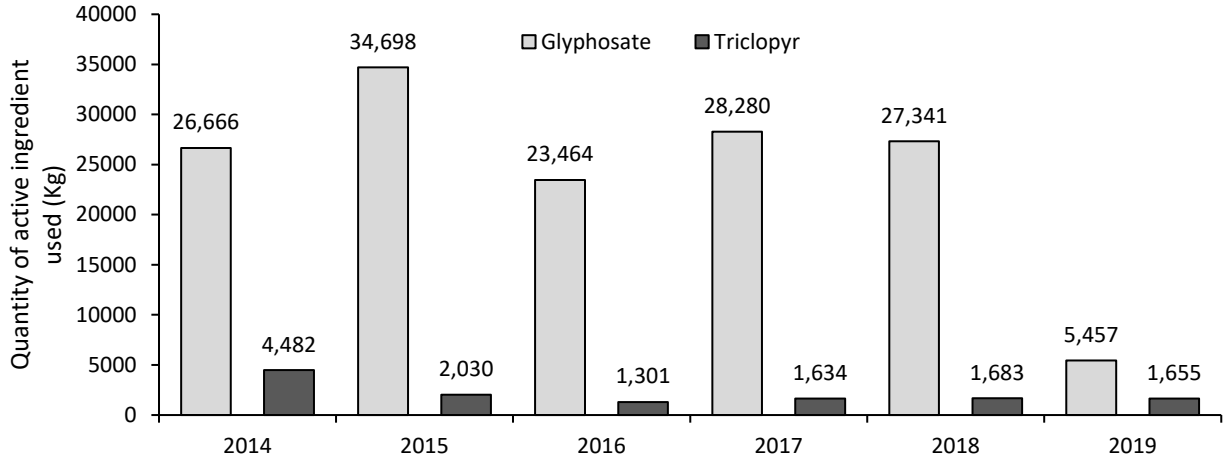

Figure 6. *Total quantity of pesticide active ingredients used over time from 2014 to 2019 by all forestry confirmation holders*

B.C. REGIONAL SUMMARY OF PESTICIDE USE FROM 2014 TO 2019

Since 2014, forestry confirmation holders have applied the most pesticide active ingredient in the Omineca, followed by the Peace and Cariboo regions (figure 7). The graph for total area of pesticide applications show a similar trend, however with a greater amount of ground-based application area in the Lower Mainland and Vancouver Island regions (figure 8).

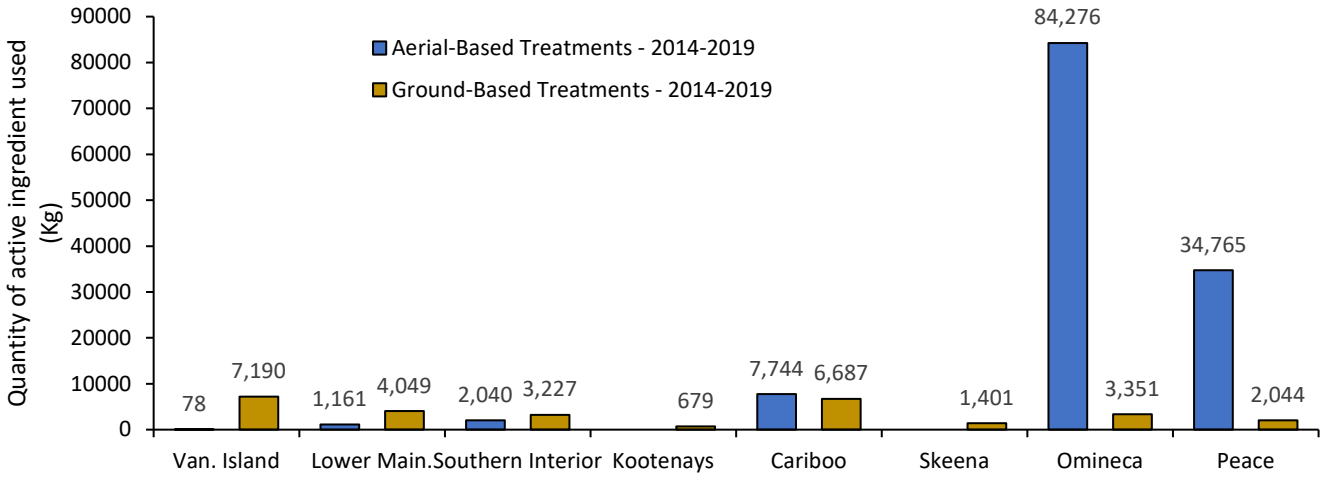

Figure 7. *Total quantity of pesticide active ingredients applied through aerial and ground-based methods in 2014 to 2019 by active forestry sector confirmation holders in each region of B.C.*

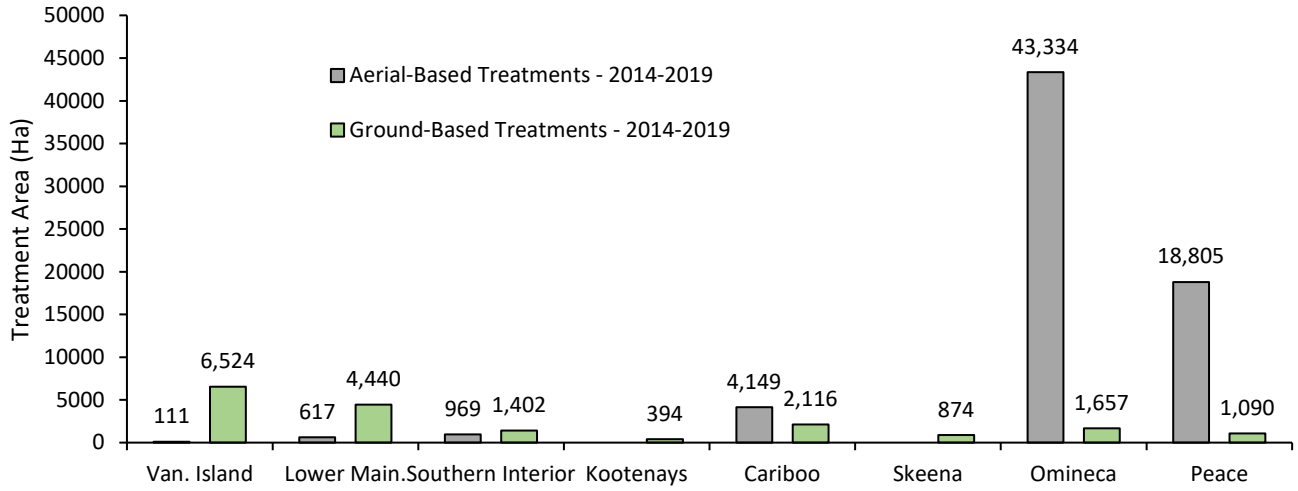

Figure 8. *Total treatment area of pesticide active ingredients applied through aerial and ground-based methods in 2014 to 2019 by active forestry sector confirmation holders in each region of B.C.*

NON-CHEMICAL PEST MANAGEMENT PRACTICES BY FORESTRY CONFIRMATION HOLDERS FROM 2014-2019

Forestry confirmation holders reported six types of non-chemical treatment methods to manage brush and other pests from 2014 to 2019. Manual brushing was the most commonly reported non-chemical treatment method, followed by girdling, sheep grazing, and mechanical removal (Figure 9).

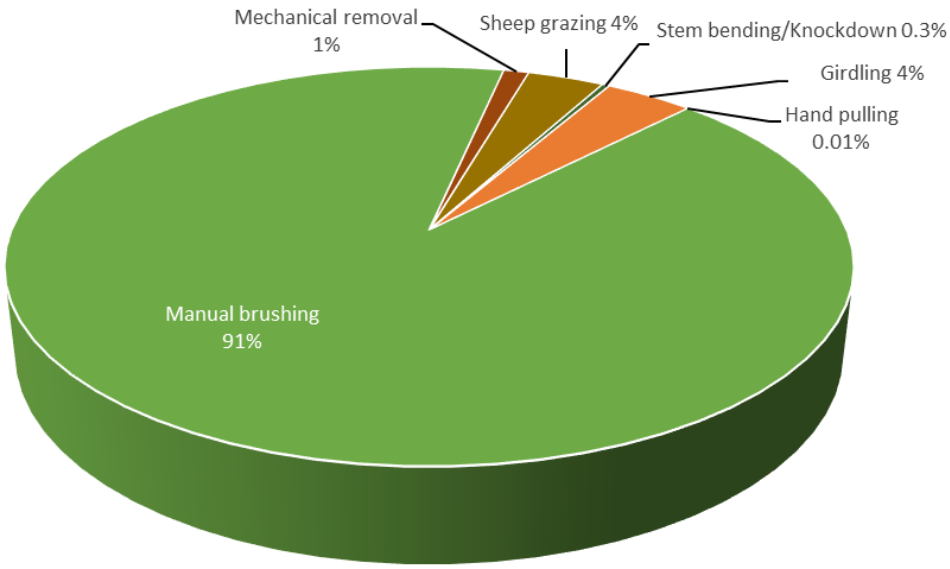

Figure 9*. Non-chemical controls methods used by forestry sector confirmation holders ranging from 2014 to 2019.*

Most forestry confirmation holders from 2014 to 2019 reported using non-chemical treatments along with herbicide treatments for managing forestry pests (Figure 10). 2019 was the only year in which confirmation holders reported a greater area of non-chemical vs. chemical treatments.

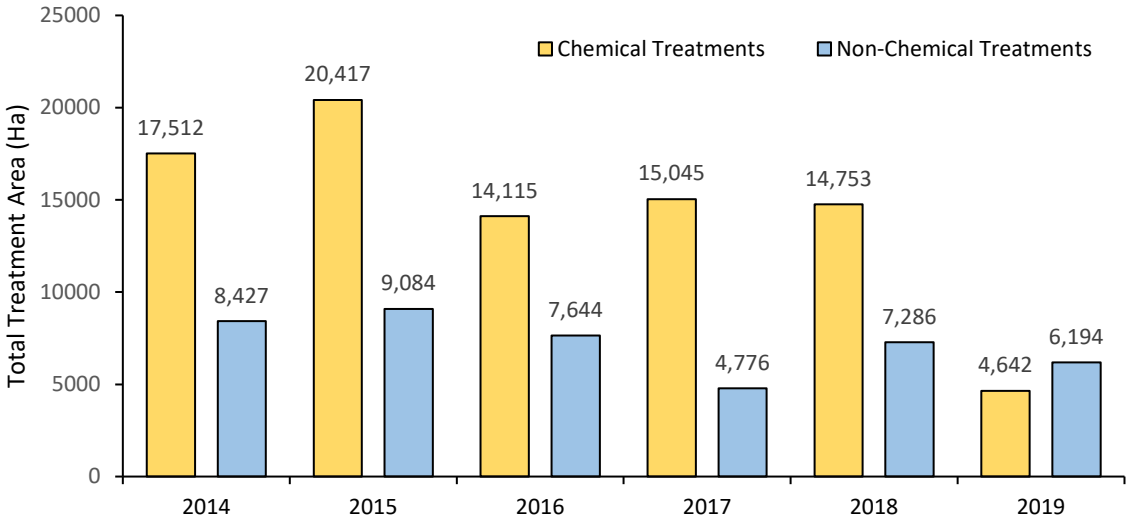

Figure 10. *Comparison of the total treatment area of chemical and non-chemical treatments in 2014 to 2019 by active forestry sector confirmation holders in each region of B.C.*

With respect to the ratio of total treatment area of chemical vs. non-chemical treatments reported between 2014 and 2019, considerable variation exists between regions of the province. The Omineca, Peace, and Vancouver Island regions all had at least a 2:1 ratio of chemical to non-chemical treatment area. In contrast, the Kootenays and Cariboo regions both reported a greater area of non-chemical vs. chemical applications (Figure 11).

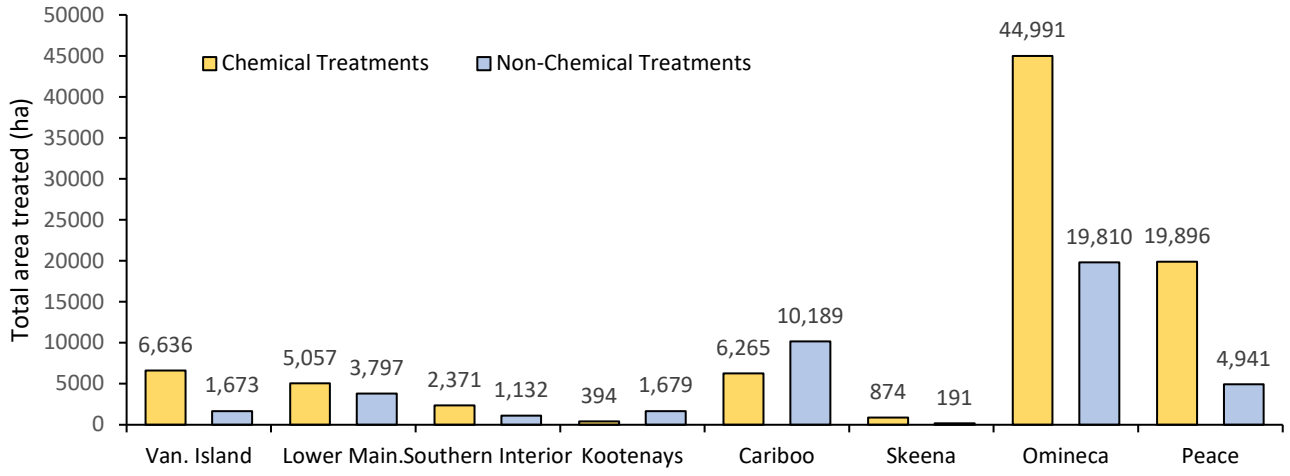

Figure 11. *Comparison of the total treatment area of chemical and non-chemical treatments in 2014 to 2019 by active forestry sector confirmation holders in B.C.*

DISCUSSION

COMPLIANCE RESULTS

For the completed inspections, the overall compliance rate was high with the exception of the pesticide use records audit of aerial licensees. However, these non-compliances were largely administrative in nature, and did not indicate a significant risk to the environment.

The results of inspections of Confirmation holders indicate that they adhere to the IPM practices described in their Pest Management Plans for cutblocks that have been recently planted. For example, prior to any activities being performed on a plantation, all inspected parties showed that adequate surveys were conducted to see if any manual or chemical brushing is required to allow planted seedlings to achieve free-growing status. If manual or chemical brushing was required, post treatment surveys were conducted to determine the efficacy of the treatment that was done.

Post-treatment surveys of cut blocks showed full compliance with the requirements to maintain a Pesticide Free Zone around sensitive aquatic features. This demonstrates due diligence on the part of the inspected parties, and may also be attributed in part to recent improvements in GPS mapping technology in aerial applications in combination with improved on-the-ground layout. This is an area where past inspections (e.g. 2010 to 2015) had shown significant non-compliance. Improvements in compliance rates may also be attributed to the current use of wider No Treatment Zone buffers versus past years where more narrow buffers of 10-15 meters led to PFZ infringement and environmental damage.

PESTICIDE USE

Overall pesticide use remained relatively steady between 2014 to 2018, but then declined substantially in 2019. This recent decline may be influenced by a number of factors, including the recent downturn in the forest industry in B.C., the declining numbers of confirmation holders, concerns from the public to reduce or alter practices relating to herbicide use, and forestry production cycles. Other reasons that may influence reduced pesticide use include:

- Prompt reforestation practices
- Site preparation to improve planting microsites
- The use of bigger and more improved seedlings
- The use of improved tree seed to create trees that have desirable traits such as faster growth, straighter stems, better wood quality, and insect and disease resistance.

It is interesting to note that in 2019, confirmation holders reported a greater area of non-chemical vs. chemical treatments. While this only occurred in one year, it indicates that there are a number of treatment options that are used in the industry as part of an integrated approach to vegetation management. Future analysis of chemical and non-chemical treatment area will be necessary to show if this represents a longer-term trend.

As part of promoting the compliance work that ministry inspectors do, ministry staff regularly attend industry meetings and conferences to discuss compliance work conducted. Ministry staff presented a booth at the 2020 Northern Silviculture Committee (NSC) workshop in Prince George in February 2020 (figure 12). The booth encouraged attendees at the workshop to discuss regulatory requirements, specific audit results, and trends in pesticide use over time with ministry staff.

Figure 12. *IPM Officer presenting the results of Forestry Audit work at the 2020 Northern Silviculture Committee (NSC) workshop in Prince George in February 2020.*

CONCLUSIONS AND NEXT STEPS

The results of this audit did not suggest the need for any specific recommendations for legislative changes. The compliance results indicate that the authorized parties inspected are adhering to regulatory requirements to abide by the principles of Integrated Pest Management and environmental protection. Going forward, the Ministry of Environment & Climate Change Strategy will continue to conduct compliance inspections in the forestry sector to ensure that authorization holders maintain a high rate of compliance in protecting the environment and sensitive areas.

APPENDICES

Appendix A: Total number of forestry sector confirmation holders for each region in B.C. from 2014 to 2019.

Region	Year	Confirmation Holders	Region	Year	Confirmation Holders
Vancouver Island	2014	13	Cariboo	2014	10
Vancouver Island	2015	14	Cariboo	2015	12
Vancouver Island	2016	14	Cariboo	2016	12
Vancouver Island	2017	13	Cariboo	2017	12
Vancouver Island	2018	8	Cariboo	2018	8
Vancouver Island	2019	9	Cariboo	2019	6
Lower Mainland	2014	8	Skeena	2014	1
Lower Mainland	2015	7	Skeena	2015	1
Lower Mainland	2016	6	Skeena	2016	1
Lower Mainland	2017	6	Skeena	2017	2
Lower Mainland	2018	5	Skeena	2018	1
Lower Mainland	2019	5	Skeena	2019	1
Southern Interior	2014	5	Omineca	2014	19
Southern Interior	2015	5	Omineca	2015	19
Southern Interior	2016	7	Omineca	2016	23
Southern Interior	2017	5	Omineca	2017	15
Southern Interior	2018	4	Omineca	2018	16
Southern Interior	2019	5	Omineca	2019	9
Kootenays	2014	2	Peace	2014	7
Kootenays	2015	2	Peace	2015	6
Kootenays	2016	2	Peace	2016	10
Kootenays	2017	1	Peace	2017	9
Kootenays	2018	1	Peace	2018	7
Kootenays	2019	1	Peace	2019	8

Appendix B: Compliance results for all inspections completed.

Authorization Holder Name	Authorization Type	Authorization Number	Region	Compliance Determination
Western Aerial Applications Ltd	Pesticide User License	763	OMENICA/PEACE	OUT
Bi-Air Application Services Ltd.	Pesticide User License	3175	OMENICA/PEACE	OUT
Buchanan & Sons Aviation	Pesticide User License	8141	OMENICA	OUT
BCTS Ft. St. John	Confirmation Holder	402-0666-16/21	PEACE	IN
BCTS Mackenzie	Confirmation Holder	738-0022-14/19	OMENICA	IN
BCTS Prince George	Confirmation Holder	402-0665-16/21	OMENICA	IN
Carrier Lumber	Confirmation Holder	330-0032-16/21	OMENICA	IN
Canfor Fort St. John	Confirmation Holder	124-0369-16/21	PEACE	IN
Canfor Prince George	Confirmation Holder	124-0366-16/21	OMENICA	IN
Canfor Houston	Confirmation Holder	124-0370-17/22	SKEENA	IN
Canfor Ft Nelson	Confirmation Holder	124-0371-19/24	PEACE	IN
Canfor Vavenby	Confirmation Holder	124-0368-16/21	CARIBOO	IN
Dunkley Lumber	Confirmation Holder	394-0019-17/22	OMENICA	IN
West Fraser Chetwynd	Confirmation Holder	276-0205-16/21	PEACE	IN
Canfor – Prince George	Confirmation Holder	124-0366-16/21	OMENICA	IN
Carrier Lumber	Confirmation Holder	330-0032-16/21	OMENICA	IN