

National-level Glyphosate Environmental and Social Risk Assessment (ESRA)

This ESRA was developed collaboratively by the FSC® Rest-of-Canada (ROC) User Group for nationwide applicability. This document will be used by FSC® certified organizations and by certification bodies as a check list to assess conformance with the requirements of the FSC® Pesticides Policy (FSC-POL-30-001 V3-0).

Date	October 16, 2023		
Forest Management Unit (FMU)	Missinaibi Forest		
Category of FSC Highly Hazardous Pesticide	Restricted		
Chemical pesticide	Glyphosate and its' salts	Purpose of use (protection of vegetation, logs, human health, livestock, native species, seeds, or seedlings, weed control, others)	Non-selective silviculture herbicide for the control of competing or non-desirable broadleaf and monocot (e.g., grasses and sedges) vegetation. This product is applied for site preparation and tending operations. Application methods include stem injection, cut stump application, backpack foliar, hand-held wand, ground-based air blast sprayer or aerial application.

HAZARD GROUPS & TYPES OF HAZARDS					
Acute Toxicity		Chronic Toxicity			
Toxic by Contact or Ingestion	Toxic by Inhalation	Carcinogenicity	Mutagenicity to Mammals	Developmental and Reproductive Toxicity	Endocrine Disruption
Harmful if swallowed. Causes eye and skin irritation (2, 3, 4).	Harmful if inhaled (2, 3, 4).	No. The Pest Management Regulatory Agency deems it non-carcinogenic (2).	No (2, 3, 4).	No (2, 3, 4).	The data is not clear as to whether Glyphosate is an Endocrine Disrupter. However, when used according to label directions, occupational risks and post-application risks are not considered a concern (2).

Table 1a and 1b. Hazard Groups and Types of Hazards pertaining to the application of Glyphosate on the FMU.

HAZARD GROUPS & TYPES OF HAZARDS		
Environmental Toxicity		
Acute Toxicity to Aquatic Organisms	Persistence in Soil and Water	Biomagnification -Bioaccumulation
Yes. Glyphosate formulations pose a negligible risk to freshwater fish and amphibians, but may pose a risk to freshwater algae, freshwater plants, marine/estuarine invertebrates, and marine fish if exposed to high enough concentrations. Hazard statements and mitigation measures (spray buffer zones) are required on product labels to protect aquatic organisms (2, 3, 4).	No. Degraded microbially to aminomethyl phosphonic acid (AMPA), which is further degraded to simpler molecules. Representative field soil half-lives range from 1-130 days depending on soil/climatic conditions (1,3,4).	Negligible. Glyphosate and AMPA are strongly adsorbed to soil (3, 4).

Table 1b.

References:

1. Re-evaluation Decision RVD2017-01, Glyphosate, Pest Management Regulatory Agency, 28 April 2017, ISSN 1925-1025 Catalogue number; H113-28/2017-1E-PDF, <https://www.canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/decisions-updates/registration-decision/2017/glyphosate-rvd-2017-01.html>
2. Glyphosate Label Amendment, Bayer Canada, April 28, 2019, https://www.roundup.ca/uploads/documents/Summary%20of%20label%20changes_Final.pdf
3. VisionMAX TM Silviculture Herbicide v2 SDS May 22, 2018, <https://www.roundup.ca/uploads/documents/msds/VisionMaxSilviculture-13382-EN-CA.518-1.pdf>
4. Timberline Forestry Herbicide SDS June 18, 2019, https://www.belchimcanada.com/MSDS/MSDS_E-184.pdf

Table 2. A Description of potential risks pertaining to each environmental value.

Exposure Elements	Minimum List of Values	Description of why/why not a Risk
Environmental	Soil (Erosion, Degradation, Biota, Carbon Storage)	<p>Minimal indication of adverse effects to Soil was found when used according to label instructions in forestry applications. Additional considerations are provided, below. Glyphosate degraded microbially to aminomethyl phosphonic acid (AMPA), which is further degraded to simpler molecules. Representative field soil half-lives range from 1-130 days depending on soil/climatic conditions. Glyphosate and AMPA are strongly bound to soil particles and do not pose a risk from leaching. Glyphosate is eventually broken down by bacteria in the soil.</p> <p>This product is non-toxic to most organisms in the soil, such as earth worms. It is recommended to avoid soil disturbance prior to the application of Glyphosate and avoid disturbance of the soil for 7 days post-application.</p> <p>The application of glyphosate on steep slopes or loose soil, particularly when dominated by deciduous woody shrubs or saplings may pose an erosion risk (1, 2, 3, 4, 5, 11, 12).</p>
	Water (ground water, surface waters, water supplies)	<p>Minimal indication of adverse effects to Water was found when used according to label instructions in forestry applications. Additional considerations are provided, below. Glyphosate formulations pose a negligible risk to freshwater fish and amphibians, but may pose a risk to freshwater algae, freshwater plants, marine/estuarine invertebrates, and marine fish if exposed to high enough concentrations. There is potential for contamination of water used for irrigation. However, risk of contaminated surface water for drinking water resources is low (1, 2, 3, 4, 5, 12).</p>
	Atmosphere (air quality, greenhouse gasses)	<p>Minimal indication of adverse effects to Atmosphere was found when used according to label instructions in forestry applications. Additional considerations are provided, below. Glyphosate does not pose a risk to air quality or contribute to greenhouse gas emissions when applied in compliance with meteorological (weather) conditions, proper flying techniques and using calibrated / maintained equipment (1, 2, 3, 4, 5, 12).</p>
	Non-Target Species (vegetation, wildlife, bees and other pollinators, pets)	<p>Most broadleaf plants will be killed or seriously injured by direct exposure to glyphosate, although there is a significant range of sensitivity among species. Minimal indication of adverse effects to other Non-target species (e.g., terrestrial microorganisms, mammals, invertebrates, and birds) was found when used according to label instructions in forestry applications. Additional considerations are provided, below. This product is non-selective and will harm most broadleaf vegetation which it is directly or indirectly (drift) applied to. Selective application methods allow desirable species to flourish which enables managers to meet sustainable forest management goals regarding species</p>

		composition. Glyphosate may affect fish and wildlife indirectly because killing the plants alters the animals' habitat. Health Canada's PMRA tests have shown no toxicity to bees. Herbicides prevent plants from making certain proteins that are needed for plant growth. Glyphosate stops a specific enzyme pathway (i.e. shikimic acid pathway) which is necessary for plants. Health Canada has conducted a detailed analysis of relevant studies to determine the impact of glyphosate use on pollinators, beneficial insects, and amphibians. It was determined that, when used according to label directions, glyphosate is not expected to pose a risk. Buffer zones prescribed for the protection of more sensitive aquatic organisms provide additional protection for amphibians (1, 2, 3, 5, 11, 12).
	Non-Timber Forest Products (as FSC-STD-01-001 V5-2 FSC Principles and Criteria, criterion 5.1)	Minimal indication of adverse effects to Non-timber forest products (NTFPs) was found when used according to label instructions in forestry applications. Additional considerations are provided, below. The application of Glyphosate may temporarily reduce the availability of broadleaf plant related NTFP's within the treatment area for several years (10).
	High Conservation Values (particularly HCV 1-4)	Minimal indication of adverse effects to HCVs was found when used according to label instructions in forestry applications and in accordance with HCV Management Strategies. Additional considerations are provided below. Forest Manager's certified to the National Forest Stewardship Standard of Canada are required to assess HCV status within their Forest Management Unit and ensure that proper HCV Management and Monitoring Strategies are in place to maintain or enhance those HCVs. Herbicide application in accordance with those HCV Management Strategies will ensure that identified HCV's (1-4) are maintained or enhanced thus eliminating risk to HCV's (10).
	Landscape (aesthetics, cumulative impacts)	When used according to revised label directions, glyphosate products are not expected to pose risks of concern to the environment. Labelled risk-reduction measures mitigate potential risks posed by glyphosate formulations to non-target plants and freshwater/marine/estuarine organisms. In the terrestrial environment the only risk identified was for terrestrial plants, therefore, spray buffer zones are required to reduce exposure to sensitive terrestrial plants. Glyphosate breaks down in soil and water and is not expected to remain for long periods of time. (2). The application of glyphosate will be evident during the first few year's post-application.
	Ecosystem Services (water, soil, carbon sequestration, tourism)	Minimal indication of adverse effects to ecosystem services was found when used according to label instructions in forestry applications. Additional considerations are provided below. Glyphosate can pose a risk to water features if the product label, buffer zones and local/provincial regulations are not followed. Glyphosate can also pose a risk to water features by contamination from spills, run-off, or improper equipment washing/rinsing techniques. The application of glyphosate has less than 25% effect

		on the transformation of nitrogen and carbon in the soil profile, meaning glyphosate is not expected to impact soil conditions. Forestry applications of glyphosate could impact the visual aesthetics for tourism operations, but this impact would diminish over short period of time (1, 2, 3, 4, 5, 12).
<p>Organization references regarding local conditions, specific label instructions, and regulatory requirements:</p> <p>Please refer to the applicable Annual Spray Project Description and Plan for the Missinaibi Forest for additional information.</p>		

Table 3. A Description of potential risks pertaining to each Social Value.

Exposure Elements	Minimum List of Values	Description of why/why not a Risk
Social	High Conservation Values (especially HCV 5-6)	Minimal indication of adverse effects to HCVs was found when used according to label instructions in forestry applications and in accordance with HCV Management Strategies. Forest Manager's certified to the National Forest Stewardship Standard of Canada are required to assess the status of HCVs 5 and 6 within their Forest Management Unit and ensure that proper HCV Management and Monitoring Strategies are in place to maintain or enhance those HCVs as required within Principle 9 of the Standard. Herbicide application in accordance with those HCV Management Strategies would reduce risk to the HCVs (10).
	Health (fertility, reproductive health, respiratory health, dermatologic, neurological, and gastrointestinal problems, cancer, and hormonal imbalance)	When used according to the label instructions, products containing glyphosate are not expected to pose risks of concern to human health or the environment. Pesticides are registered for use in Canada only if the level of exposure to Canadians does not cause any harmful effects, including cancer. As part of the re-evaluation decision for glyphosate, Health Canada reviewed the dietary exposure to glyphosate and found that the levels found in food would not be a health risk to Canadians. Currently, no pesticide regulatory authority in the world, including Health Canada, considers glyphosate to be a carcinogenic risk of concern to humans. The PMRA is continuing to monitor activities of regulatory organizations. Health Canada will take appropriate action if human health or environmental risks of concern are identified (2, 9).
	Welfare	Minimal indication of adverse effects to Welfare was found when used according to label instructions in forestry applications. Herbicide application for silviculture purposes are intended mainly for vegetation not consumed by people. Required public notification, signage and treatment area monitoring minimize the risk of food gathering taking place in treated areas. In addition, Glyphosate and Aminomethyl Phosphonic Acid (AMPA) are not expected to accumulate in animal tissues (5, 12).
	Food and Water	Minimal indication of adverse effects to food and water was found when used according to label instructions in forestry applications. Additional considerations are provided, below. The Food and Drug Act prohibits the sale of any food product that contains pesticide residues exceeding the Maximum Residue Limit (MRL). Health Canada has set standards that limit the amount of Glyphosate residues that are expected to remain on food products. These levels are set well below what could potentially pose a health risk. In 2015, Canadian Food Inspection Agency tested samples of fruit, vegetables, and grain products for Glyphosate residues. The results show a high degree of compliance with the Government standards. In addition, Glyphosate and AMPA are not expected to accumulate in animal tissues. Risk of contamination of drinking water is low (1, 2, 3, 4, 5, 12).

	Social Infrastructure (schools and hospitals, recreational infrastructure, infrastructure adjacent to the FMU)	Minimal indication of adverse effects to Social Infrastructure was found when herbicide is used according to label instructions in forestry applications (2).
	Economic Viability (agriculture, livestock, tourism)	Glyphosate application presents risk to sensitive non-target vegetation, which may have economic impacts. When applied for forest management purposes the risk to sensitive agricultural crops or range lands is minimal. Forestry applications of glyphosate could impact the visual aesthetics for tourism operations, but this impact would diminish over short period of time (10).
	Rights (legal and customary)	Minimal indication of adverse effects to Rights, accept when access is restricted, was found when used according to label instructions in forestry applications. The protection of legal and customary rights is an important consideration of forest management planning and operations. Within the National Forest Stewardship Standard (NFSS) the protection of legal and customary rights are considered in Principle 1 in regards to tenure rights, in Principle 2 in regards to workers' rights, in Principle 3 in regards to Indigenous rights, and in Principle 4 in regards to the rights of local communities, With adherence to all applicable laws and the NFSS there is no risk to human rights. GreenFirst is aware of and monitoring the results of a recent lawsuit against the government of Ontario by various Treaty 9 communities which includes the use of pesticides and herbicides in the Area of Exemption.
	Others	No additional values were identified in this assessment.
Organization references regarding local conditions, specific label instructions and regulatory requirements:		
Please refer to the applicable Annual Spray Project Description and Plan for the Missinaibi Forest for additional information.		

References

1. Backgrounder Glyphosate half-Life in Soil, Updated October 2005, https://biofortified.org/wp-content/uploads/2011/05/monsanto_glyphosate_halfife.pdf
2. Re-evaluation Decision RVD2017-01, Glyphosate, Pest Management Regulatory Agency, 28 April 2017, ISSN 1925-1025 Catalogue number; H113-28/2017-1E-PDF, <https://www.canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/decisions-updates/registration-decision/2017/glyphosate-rvd-2017-01.html>
3. Glyphosate Label Amendment, Bayer Canada, April 28, 2019, https://www.roundup.ca/_uploads/documents/Summary%20of%20label%20changes_Final.pdf

4. VisionMAX TM Silviculture Herbicide label PCP 27736, https://www.roundup.ca/uploads/documents/labels/27736_VisionMax_Approved_ENG_Label_12Jun_2019.pdf
5. VisionMAX TM Silviculture Herbicide v2 SDS May 22, 2018, <https://www.roundup.ca/uploads/documents/msds/VisionMaxSilviculture-13382-EN-CA.518-1.pdf>
6. International Agency for Research on Cancer (IARC), <https://www.iarc.fr/news-events/glyphosate-monograph-now-available/>
7. European Food Safety Authority (EFSA), <http://www.efsa.europa.eu/en/press/news/151112>
8. Australian Pesticide and Veterinary Medicines Authority, <https://apvma.gov.au/node/13891>
9. Health Canada - Pesticide and Pest Management, <https://www.canada.ca/en/health-canada/services/consumer-product-safety/pesticides-pest-management.html>
10. USDA/Forest Service. (2011). Glyphosate Human Health and Ecological Risk Assessment Final Report. Prepared by Syracuse Environmental Research Associates, Inc. under USDA Forest Service Contract AG-3187-C-06-0010, https://www.fs.fed.us/foresthealth/pesticide/pdfs/Glyphosate_SERA_TR-052-22-03b.pdf.
11. Henderson, A. M.; Gervais, J. A.; Luukinen, B.; Buhl, K.; Stone, D.; Cross, A.; Jenkins, J. 2010. *Glyphosate General Fact Sheet*; National Pesticide Information Center, Oregon State University Extension Services. <http://npic.orst.edu/factsheets/glyphogen.html>.
12. Timberline Forestry Herbicide SDS June 18, 2019, https://www.belchimcanada.com/MSDS/MSDS_E-184.pdf

Table 4. Strategies defined to minimize Environmental and Social Risks associated with the Application of Glyphosate.

Exposure Elements	Mitigation Strategies
<p>Environmental and Social Exposure Elements</p> <ul style="list-style-type: none"> • Soil • Water • Atmosphere • Non-Target Species • Non-Timber Forest Products • High Conservation Values (1-4) • Landscape • Ecosystem Services 	<p>Follow all pesticide label application instructions, including all updates to label. Organizations should take reasonable steps toward avoiding environmental and social impacts by following the mitigation strategies provided below as well as organization or site-specific strategies (1, 2, 3).</p> <p>Consider the use of alternative vegetation control measures on the FMU unless applying glyphosate is the only effective, practical, and cost-effective control measure.</p> <p>Ensure proper consultation opportunities are made available to affected stakeholders and Indigenous communities.</p> <p>Ensure stratification within planned tending blocks is completed in order to tend only areas that require treatment.</p> <p>Ensure all reasonable points of access into the treatment area are posted to notify the public of the herbicide application.</p> <p>Ensure product is stored in the original container until being mixed and applied.</p> <p>Store product in a secure location, away from children, food, drink, and animal feed</p> <p>Ensure buffer zones are applied as specified in the label to capture any potential drift or run-off that may occur from the application. Avoid applications when winds are gusty.</p>

<ul style="list-style-type: none"> • High Conservation Values (5-6) • Health • Welfare • Food and Water • Social Infrastructure • Economic Viability • Rights • Others 	<p>Apply only when the potential for drift to areas of human habitation or area of human activity such as houses, cottages, schools, and recreational areas is minimal. Take into consideration wind speed, wind direction, temperature inversions, application equipment and sprayer settings.</p> <p>Apply only when weather conditions at the treatment site allow for complete and even coverage. Ensure herbicide is mixed according to product label. Apply only under conditions of good practice, specifically aerial applications as outlined in the National Aerial Pesticide Application Manual.</p> <p>Avoid unintentional product contact with desirable foliage, desirable green stems, or the fruit of desirable crops as this product is non-selective and may harm to these plants.</p> <p>Ensure product is mixed with the specified volume of water for the specific application type and applied using properly calibrated and maintained equipment that can deliver desired volumes.</p> <p>Ensure any spills are promptly cleaned up and hazardous contaminated material is disposed of in an approved landfill or store in a secure location for collection by approved waste disposal service. Follow all local/regional/national/international regulations.</p> <p>Do not apply Glyphosate on steep slopes (i.e. slopes high risk of erosion, landslides and avalanches) or in loose soil conditions to avoid erosion, particularly on those sites dominated by deciduous stems that will be harmed and have potential to degrade the stability of the slope.</p> <p>Maintain compliance with product label and product application rates. Application rates should be based on undesirable species type and density of competing vegetation. Use minimum application rates to achieve results.</p> <p>Ensure applicators or other persons involved receive all necessary training and licensing requirements are maintained.</p> <p>Do not spray vegetation to the point of run-off.</p> <p>Do not mix or store product in galvanized or unlined steel containers, combustible gases may develop. Ensure product is mixed and transported in stainless steel, fiberglass, plastic, or aluminium containers with water only, unless otherwise specified.</p> <p>Limit the need for repeated applications by applying only under approved weather parameters.</p> <p>Make Safety Data Sheets readily available on-site.</p> <p>Have first aid kits, eye wash stations and spill kits readily available and on-site.</p> <p>Follow Label instructions specific to required Personal Protective Equipment (PPE).</p> <p>All persons involved in the application must wash hands and face before eating or drinking.</p>
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	<p>Once Glyphosate application is complete, wash equipment in an area where there is no risk of contaminating water sources. Do not dispose of herbicide waste or wash equipment in or near any body of water that will allow run-off from equipment washing to enter waterway.</p> <p>All equipment should be washed post-application and product jugs rinsed three times and made unusable. Do not reuse container for any other purpose. For disposal, empty container may be returned to the point of purchase or disposed of at an approved waste disposal location. Follow all local/regional/national/international regulations.</p>
<p>Organization references regarding local conditions, specific label instructions, and regulatory requirements:</p> <p>Please refer to the applicable Annual Spray Project Description and Plan for the Missinaibi Forest for additional information.</p>	

References:

1. VisionMAX TM Silviculture Herbicide label PCP 27736,
https://www.roundup.ca/_uploads/documents/labels/27736_VisionMax_Approved_ENG_Label_12Jun2019.pdf
2. VisionMAX TM Silviculture Herbicide v2 SDS May 22, 2018,
https://www.roundup.ca/_uploads/documents/msds/VisionMaxSilviculture-13382-EN-CA.518-1.pdf
3. Timberline Forestry Herbicide SDS June 18, 2019,
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