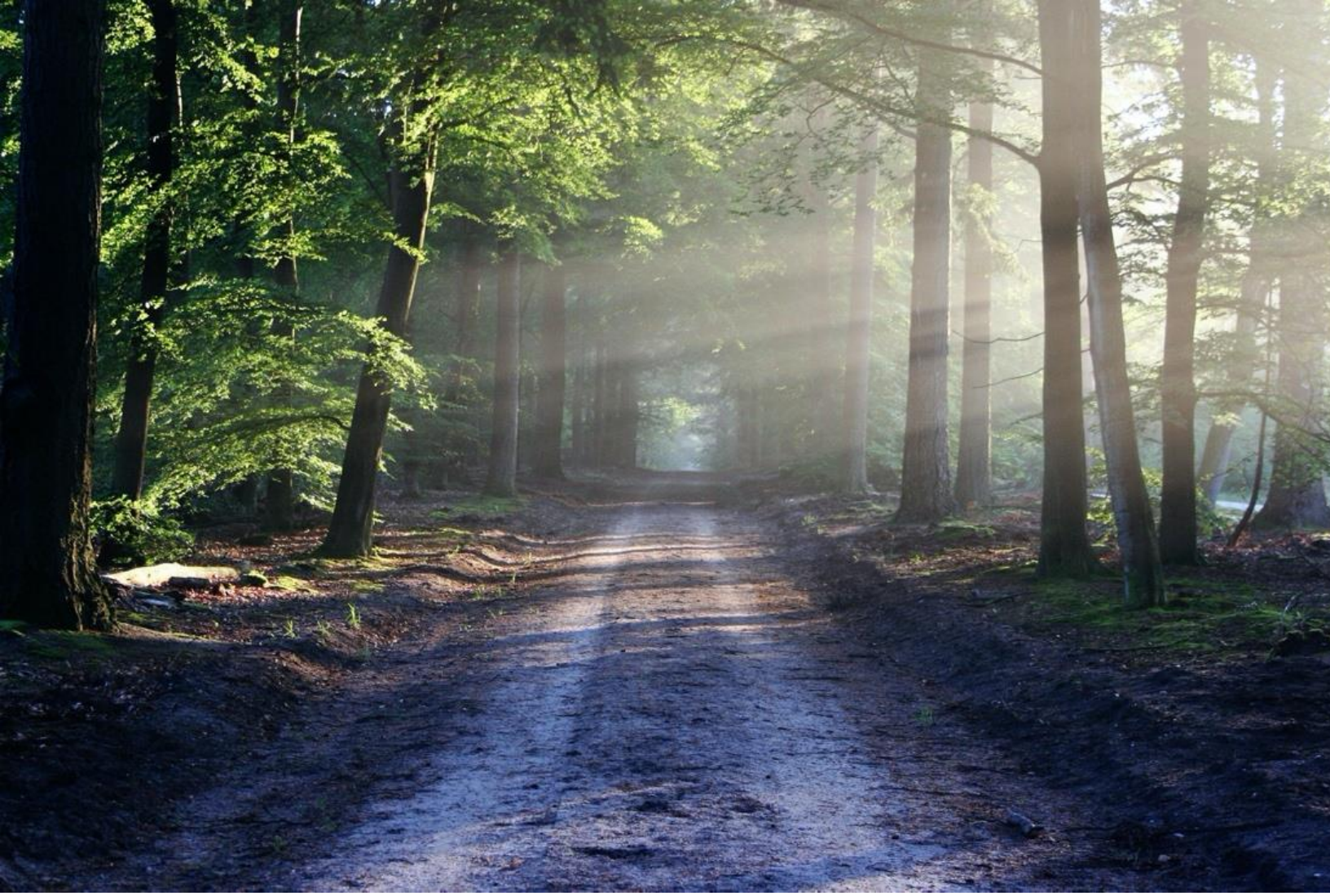

A Path Towards

Improved Off-Highway Vehicle Rider Safety:

Findings from Injury Prevention Research in Nova Scotia

December 2022

INJURY FREE NOVA SCOTIA

STRIVE HEALTH
Leading Quality Improvement Strategies

Acknowledgement

Strive Health wishes to acknowledge that their offices are located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People. This territory is covered by the "Treaties of Peace and Friendship" which the Mi'kmaq and Wolastoqiyik people first signed with the British Crown in 1725. We must further acknowledge that people of African descent have shared these lands for over 400 years in Nova Scotia and over 50 strong and resourceful African Nova Scotian communities exist today.

Strive Health thanks all individuals who contributed to this work including the project leads, key informants, project collaborators and survey participants. This report would not be possible without your guidance, expertise and or input. Thank you!

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Abbreviations

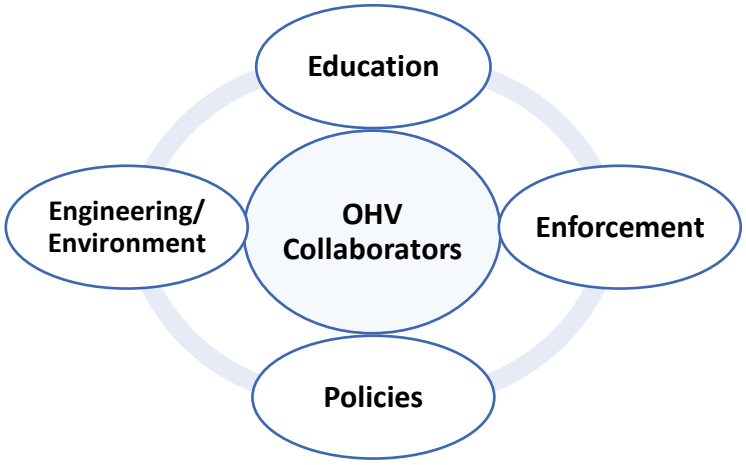
ATV: All-terrain vehicle
ATVANS: ATV Association of Nova Scotia
Bikes: Off-road motorcycle
COHV: Canadian Off-Highway Vehicle Distributors Council
CQC: Canadian Quad Council
IFNS: Injury Free Nova Scotia
MMIC: Motorcycle & Moped Industry Council
n: number
NS: Nova Scotia
NSORRA: Nova Scotia Off-Road Riders Association
NSTR: Nova Scotia Trauma Registry
OHV: Off-highway vehicle
OHVA: Off-highway Vehicle Act
SANS: Snowmobile Association of Nova Scotia
SxS: Side-by-side vehicle

Executive Summary

Injury Free Nova Scotia (IFNS) is a provincial non-profit organization **committed to eliminating serious and preventable injuries** within the province. With the support of Strive Health, an external consultant organization, **research** was undertaken regarding the topic of **off-highway vehicles (OHVs)** to **inform future injury prevention initiatives.** Approaches utilized to gather requested information included internet searches, secondary analysis of documents, key informant interviews, informal discussions, an online survey of OHV riders and data requests to the Nova Scotia Trauma Registry (NSTR) and Registry of Motor Vehicles. Below is a summary of key findings.

OHVs include: all-terrain vehicles (ATVs), side-by-sides, off-road motorcycles and snowmobiles.

A variety of **partners** are **interested in OHV injury prevention** and **strongly support a collaborative approach to rider safety**. These include: the **riders** themselves (as well as parents of youth riders), **OHV rider associations/federations**, **manufacturers**, **healthcare professionals/ provincial bodies**, **public safety organizations**, **government departments**, all levels of **law enforcement** and **land owners** (private and provincial). As illustrated in the figure below, project participants suggested **OHV Injury Prevention has four foci: Education, Enforcement, Policies** and **Engineering/ Environment**.



Education had many facets. This included all riders understanding the importance of and following **OHV legislation,** such as the **consistent use of safety gear** and completion of a **safety training course** (which includes both OHV riding practice and theoretical knowledge)**.** For youth riders and their parents/guardians, this theme included education regarding OHV size recommendations, an understanding the youth's 'readiness' to ride as well as the necessity of **parental supervision**. Enhancing awareness of safe, responsible OHV use and consistent messaging focused on those that experience the highest rates of injuries/fatalities were proposed educational activities to improve rider safety.

Enforcement included the appropriate **monitoring of OHV trails** with **enforcement of OHV legislation and regulations** at the **local, provincial and federal levels**. Key informants and survey respondents advocated for **enhanced enforcement** to improve rider safety and injury prevention, noting a current lack of capacity, in particular given the **rise in OHV sales/use since the onset of the pandemic**.

OHV Policy for rider safety included aspects such as **mandatory use of a compliant helmet**, other **protective equipment** and **safety training**, along with policies related to how and where OHVs can be driven. Guidelines related to **appropriately sized OHVs for riders** were also discussed. While some project participants recommended a review of existing policies/legislation, many suggested the priority should be enhanced enforcement of existing requirements.

Engineering encompassed the design of the environment as well as the technical design of OHVs. It is equated to ensuring that **trails are safe**, **well-designed**, **connected** and **maintained**. Project participants highlighted the importance of trail development and maintenance in order to improve rider safety, including the safe passage of OHVs from trail to trail or to access services such as gas, meals and accommodations. **Engineering** also included **improved design** and **manufacturing of OHVs themselves**, such as the evolution of enhanced safety features and standards.

All four components (Education, Enforcement, Policies and **Engineering/Environment) together were deemed essential to support OHV rider safety and injury prevention.**

An examination of data from the **NS Trauma Registry** (NSTR), 2016-2021, revealed key information: there was a **65+% increase in injuries/deaths from 2019-20 to 2020-21**, (from n<50 to n=80). This rise in traumatic injuries somewhat correlated with the reported increase in ridership and OHV registrations provincially since the onset of the COVID-19 pandemic.

Of the **80 individuals suffering a traumatic injury (including 6 deaths) in 2020-21**:

- **9-of-10** were **operators**
- **86% were male**
- **50%** were **aged 18 < 35 years old**
- **29%** were **impaired by alcohol**
- **1/3** were **not wearing a helmet**

Project participants suggested **more should be done** to share knowledge of injuries/fatalities publicly while addressing gaps in existing datasets in order to have an accurate understanding of all factors.

Although there are a number of **limitations** to this report (e.g., non-random survey sample, information gaps), the **volume of qualitative and quantitative information** gathered, the **diversity of organizations engaged** and the **consistency in key priorities** suggests that the information assimilated will be useful for OHV injury prevention initiatives by Injury Free Nova Scotia and its partners.

In summary:

- This report provides insight into the **culture of OHV use**, rider safety and injury prevention.
- Across project participants, the **key themes** were the need for:
    - **Enhanced education/awareness,**
    - **Enhanced enforcement**,
    - **Sharing of injury data/information**
    - **Partner collaboration.**
- The **development and maintenance of the trail system** along with the **review of existing policies and legislation** were also proposed as important aspects for enhancing rider safety and preventing injuries.

Next steps:

In order to truly understand the current state so that ideas and actions to improve rider safety and prevent injuries can be explored and solutions implemented system-wide, the consultant team suggests **all interested parties** could benefit from **further collaboration and communication. Partners can include** riders and their associations (e.g., All-Terrain Vehicle Association of NS, Snowmobile Association of NS, NS Off-Road Riders Association), injury prevention organizations (e.g., IFNS, Child Safety Link), health care (e.g., Nova Scotia Health Authority, IWK Hospital, Public Health), enforcement (e.g., police agencies, Department of Natural Resources), legislators/policy makers (e.g., governments) and researchers (e.g., NSTR). **Together**, priorities can be identified, interventions explored including assessment of feasibility, evaluability and potential impact, from which decisions and actions can be taken in an attempt to address the recent rise in OHV-related injuries provincially.

1. Introduction

Injury Free Nova Scotia (IFNS, https://www.ifns.ca) is a provincial non-profit organization **committed to eliminating serious and preventable injuries** within the province. To better understand the topic of **off-highway vehicles (OHVs),** including their **use, challenges** and **opportunities** regarding **rider safety** and **injury prevention,** an external consultant organization, Strive Health, was engaged to support OHV research efforts.

PLEASE NOTE, in this report:

- ☞ **OHVs include** all-terrain vehicles (ATVs), side-by-sides (SxS), off-road motorcycles and snowmobiles.
- ☞ The term 'bikes' refers to off-road motorcycles; and, 'survey' refers to the OHV Rider Survey.

The specific information requested by IFNS included:

- The common types OHVs owned/used;
- OHV legislation/guidelines;
- The purpose of ownership/use;
- OHV rider beliefs and values regarding their vehicles, safety and injury prevention;
- The prevalence, type and mechanism of OHV-related injuries including mortality;
- Recent changes in OHV technology/product design;
- OHV partners/interested parties; and,
- Promising OHV injury prevention initiatives.

The following report summarizes the methods applied and findings from the overall project, aligned with each of the above topics.

2. Methods

Research approaches utilized to gather information included internet searches, secondary analysis of documents, key informant interviews, informal discussions, an online survey of OHV riders and data requests to the Nova Scotia Trauma Registry (NSTR) and Registry of Motor Vehicles.

Internet Searches/Document Analysis

A series of internet searches were conducted to identify OHV-related partners, key organizations, and any reports or studies that would inform the research. Retrieved documents were stored in a virtual library and an Excel file (document analysis framework) was utilized to record findings.

Key Informant Interviews

During August - September 2022, **nine key informant interviews** were conducted virtually with **12 individuals**. Participants (Appendix A) were from national organizations, provincial rider associations, injury prevention organizations, child safety programs and provincial government departments. Discussion questions explored the individual's role and their perceptions regarding **OHVs and their use**,

including the **challenges and opportunities** regarding **rider safety and injury prevention**. In addition to the key informant interviews, **two other individuals** from different organizations provided **informal feedback via unstructured telephone conversations**. The views and opinions expressed by the key informants are presented from their perspectives within this report.

OHV Rider Survey

An online survey (Appendix B) was prepared and launched on October 28, 2022, remaining open for 10 days until Nov 7, 2022. **Riders' experience, aspects of OHV safety, supervising youth riders, personal injuries, product design** and **technology perceptions** as well as **opinions** as to **why injuries may have occurred** and **what could be done to improve rider safety** were assessed. Being a convenience sample, the survey was not randomly distributed. The link was posted on the IFNS website, advertised/shared on Facebook and disseminated to **rider associations** members, resulting in **730 participants** (583 completed and 147 partially completed surveys). Only two questions were mandatory, if they rode in the past two years and if they were a parent or guardian of a youth rider. Accordingly, samples sizes for each question are reported.

Nova Scotia Trauma Registry

An **aggregate data request** was submitted to the NSTR, which collects data related to individuals incurring a **major trauma** in the province. The IFNS data request examined **OHV-related injuries/death between April 1, 2016 and March 31, 2021, by**:

- OHV type (ATVs including side-by-sides, off-road motorcycles, including mini-bikes and snowmobiles);
- Timing (monthly, quarterly, annually);
- Location (Nova Scotia Health Zone where the incident took place);
- Type of Trauma (traumatic injury, death, fractures, poly-trauma);
- Mechanism of injury (e.g., collision, rollover, ejection);
- Rider position (driver, passenger);
- Demographic characteristics (age, sex); and
- Contributing factors (e.g., use of alcohol/other substances, lack of a helmet).

Nova Scotia Registry of Motor Vehicles

A data request was submitted to the **Registry of Motor Vehicles** to identify the **number of OHVs registered in the province over time**. A time point (April 1) of each year was utilized to estimate the annual change in OHV registrations, given OHVs require annual registration. *Readers note*: *Registration **exemptions** exist for OHVs driven on private lands or for a Status Indian who operates an OHV on communal Reserve land.*

The following section provides the summary of information gathered.

3. Findings

3.1 Types of OHVs

3.1.1 Types

There are **four common types of OHVs: all-terrain vehicles (ATVs), side-by-sides (SxS), snowmobiles and off-road motorcycles**.

- ATVs, also known as quads or four-wheelers, are defined as a motorized OHV designed to travel on four low pressure tires, having a seat designed to be straddled by the operator and handlebars for steering control.[1]
- A SxS is an all-purpose utility vehicle with two to six seats. It is operated by a steering wheel and foot pedals and features a roll cage-enclosed cab.[2]
- A snowmobile, sometimes called a sled, or simply by the brand name *Ski-Doo*, is a motorized vehicle that uses sled-type runners or skis to travel over snow or ice.[3]
- Off-road motorcycles, commonly called dirt bikes, are lighter and more flexible than road-going bikes. They typically have long suspension travel, knobby tires, high ground clearance, and are geared higher to provide more torque in off-road situations.[4]

3.1.2 Sales

According to publicly available data reported by the Canadian Off-Highway Vehicles Distributors Council (COHV), annual retail ATV sales (which includes SxS) fluctuated over time from 2016 to 2021.[5] From 2019 to 2020 however, **sales increased 31%**. Sales in Nova Scotia decreased year-over-year in 2017 and 2018, followed by a 5% increase in sales in 2019. A **32% increase occurred in 2020,** similar to what was seen nationally that year.[5]

- **Canada**: n=43,481 ATVs sold in 2019, with n=56,789 sold in 2020.
- **Nova Scotia**: n=2,230 in 2019 and n=2,940 in 2020; ~5% of national sales in both years.

Public sales data for **off-road recreation bikes** is only reported nationally. Once again, 2020 saw an **increase in units sold, with sales up 63% nationally** over the prior year (9,456 bikes sold versus 5,792 in 2019).[5] According to the International **Snowmobile** Manufacturers Association, Canada saw a **16% increase** in **sales** in the winter of 2020-21, with 50,567 new sleds sold, the highest sales since 2000.[6]

3.1.3 Provincial Registrations

OHVs should be registered annually according to Nova Scotia's legislation. **ATVs including SxS** are the most common type of OHV registered, representing **82-84% of all OHV registrations** (Table 1). According to the Registry of Motor Vehicles, **as of April 1, 2017** there were **26,444 ATVs registered**, with this increasing to **37,306** by **April 1, 2022**, a **41% increase over time** (2017–2022).

During the same time period, **snowmobile registrations increased by 53%** (from 4,702 to 7,212 units; 14-16% of OHV registrations), while **off-road motorcycle registrations increased by 115%** (from 338 to 727 units; 1-2% of OHV registrations). **Combined**, the registration of all OHV types, including multipurpose vehicles and dune buggies, **increased by 44%.** The only decline was in the

number of registered 3-wheel ATVs, from 165 in 2017 to 134 in 2022. Three-wheel ATVs, known as all-terrain cycles (ATCs) were last manufactured in 1987.[7]

Table 1

NS OHV Registrations as of April 1st, 2017 - 2022

	01-Apr-17	01-Apr-18	01-Apr-19	01-Apr-20	01-Apr-21	01-Apr-22
ATVs (all types)	26,444	28,674	31,020	32,570	36,284	37,306
Bikes	338	379	430	480	620	727
Snowmobile	4,702	4,870	5,324	5,888	6,624	7,212
Other OHVs	145	170	201	222	245	266
TOTAL	31,629	34,093	36,975	39,160	43,773	45,511

Note: Data provided by the NS Registry of Motor Vehicles.

In NS, registrations as of April 1st annually showed **2021 had the highest year-over-year percent increase in total OHVs registered** as of that date **at 12%** (vs 4-8% increases in prior years).

While the actual **number of unregistered OHVs is unknown**, when asked in the rider survey, 43 individuals **(7%** of 618 respondents to that question) **said that not all of the OHVs they own are registered**. The most common reason cited for not registering OHVs related to the **exemption of driving only on private lands/courses** (n=22, 51%). Three respondents answered that they didn't believe that OHVs should be registered and just one selected the option that they were not aware of the registration requirement.

☞ Key informant feedback aligns with sales and registration data, suggesting **an increased number of riders and new riders** since the start of the COVID-19 pandemic in 2020.

3.1.4 OHVs Ridden in NS, Rider Experience

Reader note: Survey participation was voluntary. The number of participants per question is reported.

Survey Respondents

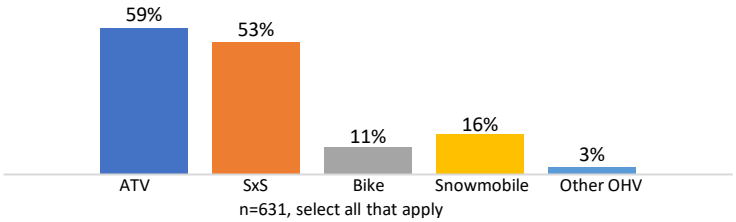
For context, 469 respondents **(83%) belonged to OHV rider associations**, with 9-in-10 being All-Terrain Vehicle Association of Nova Scotia (ATVANS) members (n=429). Snowmobile Association of Nova Scotia (SANS) membership was 13% (n=60) while 7% (n=31) belonged to Nova Scotia Off-Road Riders Association (NSORRA; i.e., off-road motorcycling). Eighty individuals (11%) indicated they did not belong to any rider's association.

Demographic data was only provided by a small sample: 107 of 114 identified as male (94%), with an average age of 49 years (n=115), 55% (n=57/103) had a household income of $100,000 or more, while 58% (n=67/116) had a post-secondary certificate or diploma. Participants indicated they lived (n=564) and operated an OHV (n=547) in one of the 18 counties across the province. While 30% (n=168) lived in Halifax Regional Municipality (HRM), 9% (n=53) in Colchester County and 8% (n=43) in Kings County, the

top places to ride were HRM, 22% (n=120), Cumberland County, 9% (n=50) and Hants District Municipality, 8% (n=46). All regions of the province were represented in the survey sample.

ATVs and SxS were the most common OHVs, ridden by over 50% of respondents (Figure 1), with 17% riding both. Most respondents (**68%)** ride primarily as an **operator**, 27% as both an operator and a passenger while only 2% indicated they ride solely as a passenger (overall n=652). Regarding the number of **OHVs owned by the household**, **57% indicated just one**, 21% two and another 21% of households owned three or more OHVs.

Figure 1
Types of OHVs Ridden



According to the survey (n=593), operating OHVs began at various times in life: **37% by the age of 25** and **35% after age 50**. Riding as a **passenger** was reported to begin **as early as infancy and as late as age 70**. The vast majority of survey participants (n=568) have been **riding for more than 5 years (83%)**, with fewer than **4%** (n=20) having **less than 2 years' experience**. The **average number of hours per week** riding an OHV were: **ATV 5hrs, SxS 6hrs, bikes 4hrs** and **snowmobiles 10hrs** (in season).

One-in-five respondents (**20%**, n=126) were a **parent or guardian of a youth rider** (i.e., someone under the age of 16 that rides as an operator or passenger), with 36% (n=46) of youth riding as a passenger, 22% (n=28) as an operator and 41% (n=52) as both. According to respondents:

> **Youth Operators, n=80**: The most common types of OHVs that youth operate were ATVs at 78% (n=62), followed by 25% (n=20) operating a dirt-bike and 19% a snowmobile and or SxS (n=15, each). Youth operation of an OHV was reported to **start as young as 2-years**, with 20 respondents (25%) indicating the youth began operating the OHV before the age of 6.
>
> **Youth Passengers, n=46**: For those respondents with youth that only ride as passengers, **54%** (25 respondents who supervised 37 youth) indicated the youth began riding as a passenger before the age of 6. The reported **age of youth passengers started as early as 1-year**.

3.2 Legislation

In **Nova Scotia**, usage of OHVs is guided by the **OHV Act** (OHVA).[8] Legislative requirements include **age restrictions,** mandatory **helmet use, safety training** requirements, as well as the need for a **permit** (with ID number displayed) and **insurance** if not on private property. (Note: OHV registrations have already been addressed in Section 3.1.3.)

3.2.1 Age Restrictions

Nova Scotia **age restrictions** are not standardized across OHV types. In general, operators must be 16 years old, however a person aged 14 or 15 may operate an OHV if they are under the direct supervision, and within sight of a parent or guardian, *and*, both the rider and parent/guardian have completed safety training (or passed a safety test if the person has a valid driver's license). Those under 14 may ride an OHV (other than an ATV) with these same restrictions but only **on private land** (or in the case of a snowmobile, also on a trail designated for those under the age of 14), *and*, they must also respect the manufacturer's size recommendations. According to the OHV Handbook, children under the age of 12 can only ride an ATV on a closed course, and, the following age and engine size restrictions exist:

- Ages 6 < 12 years: < 70 cc;
- Ages 12 < 16 years: 70 - 90 cc;
- Ages 16+ years: > 90 cc.[9]

Of respondents that supervise **youth ATV riders**, **16 (26%) indicated that at least one of the youths they supervise began operating an ATV before the age of 6** for which there is no engine size guidance.

Manufacturer ATV Recommendations

When looking at manufacturer's recommendations, COHV provided the following information for ATVs (Appendix C). **Type I ATVs**, which are intended for **single-rider use**, have four categories:

1. G (General Use Model): for recreational/utility use by an operator age 16 or older.
2. S (Sport Model): for recreational use by an experienced operator, age 16 or older.
3. Y (Youth Model): An ATV of appropriate size intended for recreational use under adult supervision by an operator under age 16, with the following age categories:
    a. Y-6+: a youth model ATV intended for use by children age 6 or older;
    b. Y-10+: a youth model ATV intended for use by children age 10 or older;
    c. Y-12+: a youth model ATV intended for use by children age 12 or older.
4. T (Transition Model): An ATV of appropriate size for recreational use by an operator age 14 or older under adult supervision, or, by an operator age 16 or older.

Table 2

OHV Rider Survey, Youth ATV Size Decision, n=62

The youth(s) operate an **ATV** that is **sized for them personally** based upon factors like their **physical size, strength, coordination, visual perception, emotional maturity and or ability to reason and make good decisions**.	**61%**
The youth(s) operate an ATV that is sized according to the manufacturer's recommendations (e.g., Y-6+, Y-10+, Y-12+, Category T).	18%
The youth(s) operate an ATV that is sized for their age according to **Nova Scotia requirements** (i.e., aged 12-15 with an engine size of 70-90cc, or aged 6-11 with an engine size of less than 70cc).	**13%**
I was not aware of any ATV size requirements for youth operators in Nova Scotia.	8%

Given the ATV age restrictions within the legislation, and in consideration of the above manufacturer's recommendations, **parents/guardians of youth ATV riders (n=62)** were asked to select one option (see table above) that best fit their situation regarding the size of ATV the youth rides. As seen in Table 2, only 13% follow Nova Scotia's legislation. The **majority (61%) select an ATV size that is personalized for the youth based upon multiple factors**.

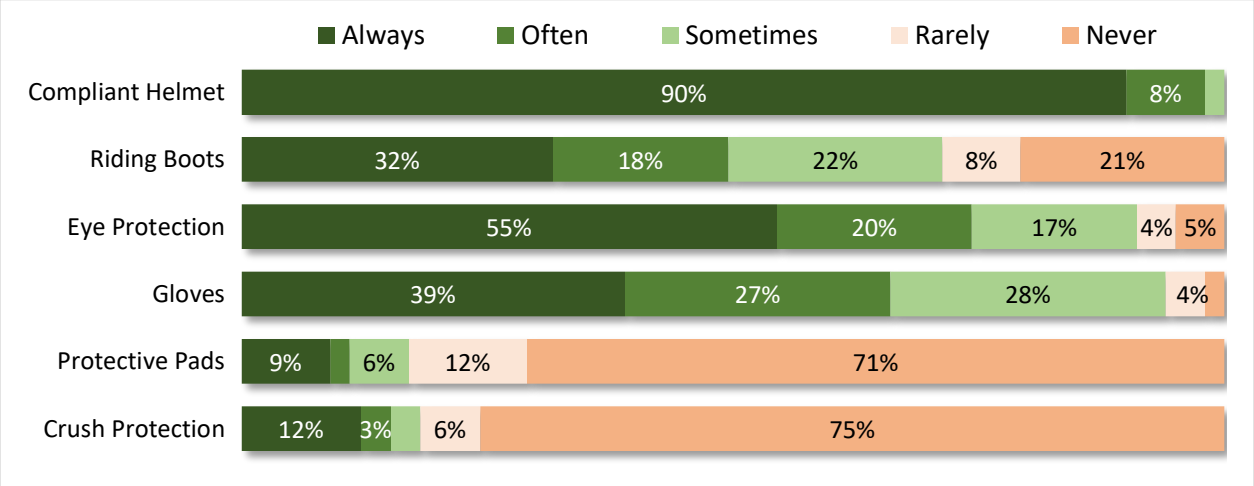
3.2.2 Safety Equipment

"While robust data is lacking, there is clear evidence in both ATV injury prevention literature and other motorized vehicle injury prevention literature that helmets reduce mortality and morbidity." Rattan et al., 2018[10]

With respect to mandatory helmet use in Nova Scotia, **Figure 2** shows the **safety equipment** that survey respondents said they use while riding, while **Figure 3** shows the same information for **youth riders**. As illustrated, 9-in-10 adult respondents indicated they always wear a compliant helmet, with that being 99% for youth riders.

Figure 2

Types of Safety Equipment Used While Riding an OHV

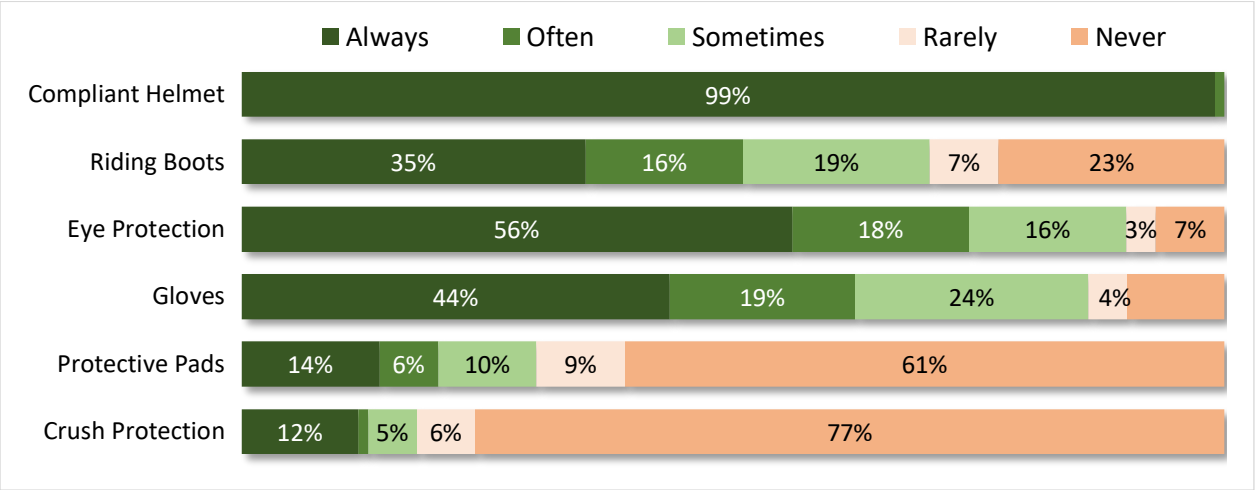


Note: Helmet n=609; Boots n=590, Eye Protection n=600, Gloves n=603, Pads n=581, Crush Protection Device n=538.

Survey respondents (n=611) indicated that the **cost of safety equipment** (44%), a **dislike of using the equipment** (45%) and a **lack of awareness** of the safety equipment that is required/recommended (30%) all prevented the use of OHV safety equipment by adult riders. Additionally, 21% cited a lack of belief that equipment increases safety, while 15% noted challenges with accessing equipment ('can't find the safety gear or the right sized equipment is not currently available').

Figure 3

Types of Safety Equipment Used by Youth While Riding an OHV



Note: Helmet n=125; Boots n=121, Eye Protection n=122, Gloves n=124, Pads n=113, Crush Protection Device n=108.

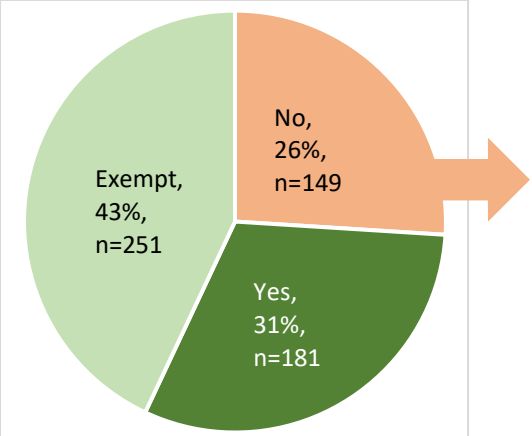
3.2.3 Safety Training

According to the OHV Handbook[9], children, youth and their parent or guardian must have a safety training certificate to ride an OHV. If an individual supervises a child or youth rider, they must both pass a safety training course which combines practice and theory (safe driving, proper use of safety equipment, knowing where to drive/places to avoid, recognizing how illegal driving can cause harm and driving the class of OHV the person plans to drive). Individuals aged 16 and older with a valid driver's license can also get a safety training certificate by passing a safety training test.

Survey participants were asked if they obtained an **OHV safety training certificate or passed a safety training test** (n=581). Over **40%** said they **were exempt**, Figure 4, while 31% answered 'Yes'. (*See exemption reasons listed on the next page*). Reasons the 149 individuals (26%) answered 'No' are listed below.

Figure 4

Safety Training



38%, n=45: I **don't believe that you need a safety training certificate to ride an OHV**.

12%, n=14: I **don't have access** to safety training where I live/ride.

8%, n=10: The **cost** for safety training is too high.

Other: Lack of awareness or time, not been offered, feel they ride safe (*and other responses that fall into one of the above categories, though they have not been reclassified*).

Note: You are exempt from the requirement to take safety training if you: Were 19 years or older before April 1, 2006 (born before April 1, 1987); and, Purchased an OHV before April 1, 2006; and, Registered an OHV on or before September 30, 2007; and, Have a valid driver's license; and, Are not a parent/guardian of an operator under 16 years old. You are also exempt if: Your spouse is exempt; You have proof that you passed a Canada Safety Council OHV Course (1991 or later); You are an employee who is using the OHV in activities relating to your job, your employer complies with the Occupational Health and Safety Act and ensures that you are a competent user of OHV equipment or provides training if you are not; You are self-employed (for example, farmer, fisher, forest worker while using OHVs for your work), except Guides (for example, any person, who for compensation or reward received or contracted for, supervises and assists another person who is operating on OHV for recreational purposes); You are a federal, provincial, or municipal government employee or peace officer while engaged in activities related to your duties; or, You operate a golf cart on a public or private golf course.

Of the respondents that supervise **a youth operator** and answered the question (n=74), **2/3** (n=49) indicated that **not all youth operators have completed an approved safety training course**. Cited reasons were that they **only ride on private property** (31%, n=14), they **did not believe that the youths need a safety training course** (20%, n=9) or that they **did not have access** to a course where they live/ride (18%, n=8). Two were not aware of safety training courses being offered for youth while another stated that they provided "*thorough instructions and do not let them operate alone*."

3.2.4 National Legislation

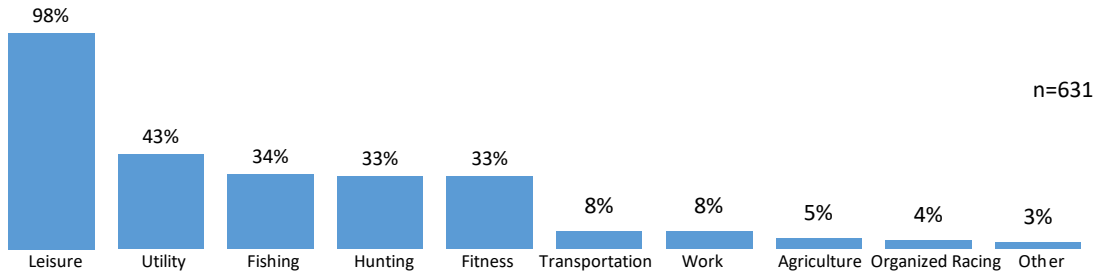
See Appendix D for a summary of ATV/OHV legislation nationally as summarized by Parachute. Across the country, OHV-related legislation varies. Quebec requires helmet, footwear and eye protection. PEI follows suit and adds gloves. Nova Scotia, New Brunswick and Newfoundland are the only provinces to mandate helmets at all times. Many provinces regulate speed on highways, but only Quebec regulates speed on trails. Impaired OHV riding is prohibited across Canada.

3.3 Purpose of OHVs

According to the survey, **98% of respondents** ride **for leisure or recreation** purposes (n=631). As noted in Figure 5, **4-in-10** also ride **for utility on private property** and about **1/3 for fishing, hunting and or physical activity/fitness reasons**. 'Other' reasons provided by respondents included for their mental health, geocaching and social reasons or to access their 'camp', e.g., *"participating in organized outings and to reach interesting places not easily accessed by other means"; "PTSD, Therapy, mental health*"; "*Access nature, mental health, social activity*".

Figure 5

Reasons OHVs are Ridden



Results were similar regarding the reasons why youth ride an OHV (n=126); 96% (n=121) for leisure or recreation, 29% (n=37) for physical activity and 18% (n=23) utility on private property.

According to key informants, OHV riding can be a form of physically fitness/activity given the way riders must position their bodies on the OHV (e.g., repositioning their body/standing when going up a hill or around a corner) and having the strength and agility to operate the machine. Pereira and colleagues (2021)[11] noted that motorized recreation is in the 'moderate-intensity' physical activity category. They also suggested that OHV riding may assist in improving mental health through interactions with nature and or via the social aspects of riding with friends or family.

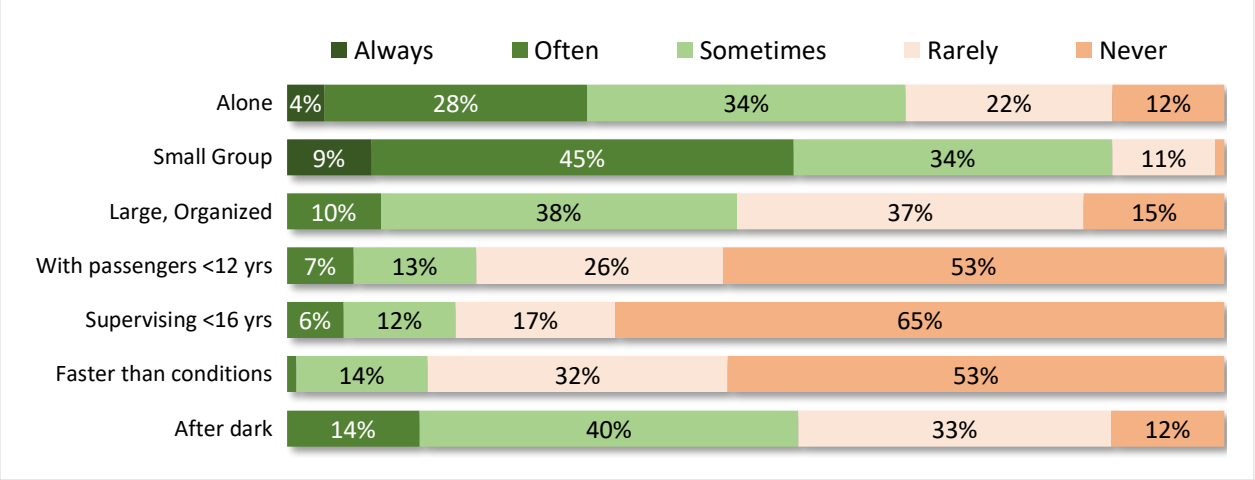
3.3.1 Ways/Places OHVs Operate

Survey respondents were asked to rate their level of agreement to four statements about their riding skills or knowledge. Only a small percent (**16%**, n=93/580) of operators **agreed/strongly agreed** that they have **significantly better OHV operating skills this year versus last year**. One third (**33%**, n= 191/578) **agreed/strongly agreed** that they are **more skilled at OHV operating than others in their community**. Ninety percent (n=532/589) **agreed/strongly agreed** that they are **aware of provincial OHV regulations**, while 77% (n=451/583) **agreed/strongly agreed** that they **know which trails are officially designated as OHV trails.**

Figures 6 and 7 summarize the ways and places individuals operate OHVs. 'In a **small group**' was the **most common way** of riding, however **1/3 often or always ride alone**. **Almost half** sometimes or often participate in **large or organized rides** and or **ride after dark**.

Figure 6

Ways OHVs are Operated

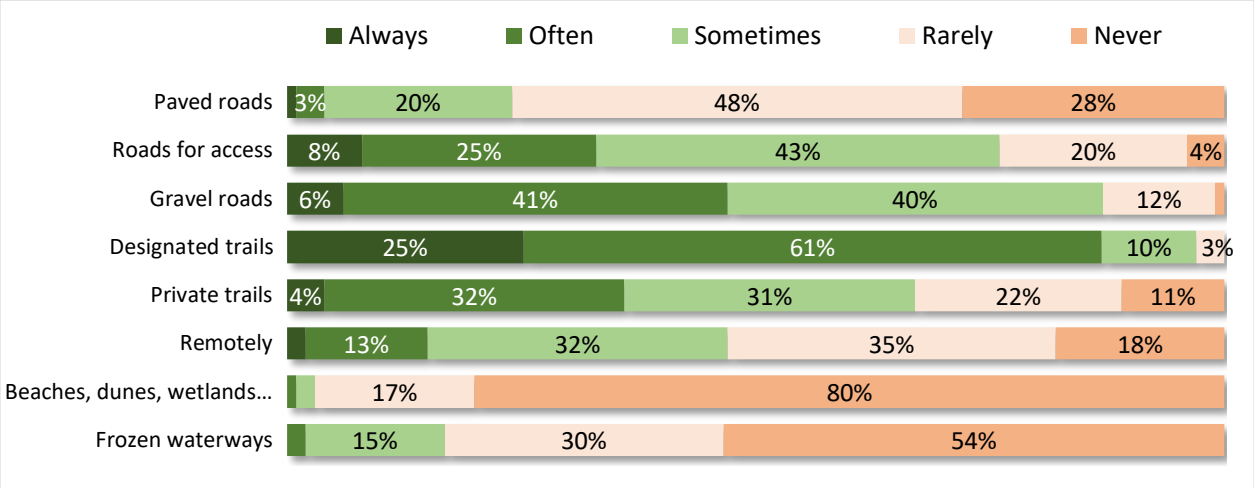


Note: Alone n=612; In a small group n=605; In large or organized rides n=597; With children under 12 as a passenger n=588; While supervising another rider under 16 years n=579; Faster than conditions allow n=597; While it's dark outside n=606.

The majority of riders (87%) use designated trails often or always, while a third use paved roads for access always or often (to travel from one trail to another or to access services). Riding on beaches,

dunes, wetlands or bogs is illegal in Nova Scotia; 80% of riders reported never operating an OHV in these places (Figure 7).

Figure 7
Places OHVs are Operated



Note: On paved roads n=601; On paved roads only for service access/trail-to-trail n=603; On gravel roads n=600; on designated trails n=608; On private trails n=592; Remotely off trails n=592; On beaches, dunes, wetlands, bogs n=596; On frozen waterways n=601.

3.4 Rider Injuries

Regarding **OHV rider injuries** within the past several years, informants were asked about their **understanding** of the **prevalence, type and or mechanisms of injuries**. In the **rider survey**, respondents were asked about **injuries they, or youth riders** they supervise, **have incurred**. A third perspective for this report is data provided from the **NSTR**.

3.4.1 Information Sources

Noted **data sources** from key informants included Statistics Canada reports for ATV and snowmobile fatalities, peer-reviewed publications (e.g., the 2019 Canadian Paediatricians Survey regarding ATV injuries), internal organizational data (e.g., the New Brunswick Trauma Program) and reports from the United States (e.g., Consumer Product Safety Commission).[12-15]

Several key informants, however, spoke to a **lack of publicly available information** regarding OHV injuries/deaths provincially. They added that in many instances, only **what is reported in the media is known**, or that they may hear second-hand from club members/riders themselves about incidents. According to ATVANS, their trail patrol volunteers have not observed an increase in injuries or collisions on their trails despite increased ridership in Nova Scotia since the COVID-19 pandemic.

A key informant from a Nova Scotia child safety organization shared their knowledge of **ATV injuries among Nova Scotia youth**. They stated:

- Injuries from ATVs specifically are overrepresented in those under 15;
- About half of those presenting to the IWK Health Centre, NS with ATV injuries were driving the ATV;
- During 2018-2020, about 30% of those presenting to the IWK with ATV injuries had a fracture. Other injuries include lacerations, soft tissue damage, sprains, pelvic fractures, head/chest trauma as well as injuries to multiple body parts; and,
- In 2021, ATV injuries were the #1 trauma-related reason for IWK Intensive Care Unit admission.

3.4.2 Rider Survey - Injuries

Of the 572 individuals that answered the question, "***Have you ever been injured when riding an OHV?***" **18%** (n=102) **indicated yes**, while **11%** (n=61) **had a near miss.** [While not defined, a near miss may mean a close call or an incident that did not result in an injury]. Injuries that respondents sustained ranged from bruises, lacerations and pulled muscles to fractures (broken ribs/bones/teeth), pinched nerves and concussions. Common reasons cited for the injury, when provided, included **speed, riding conditions** (ice/snow) and **inexperience**. The incidents were often described as **rollovers** (e.g., going too fast around a corner) and **collisions**. Other examples included encounters with uneven, wet or steep terrain, obstacles or 'washouts.'

"*Cuts, broken bones, dislocated joints, burns, concussions*"; "*hit a washout, was not wearing a helmet*"; "*Hit a unmarked chain across the end of a roadway"; "Fell off snowmobile*";
"*While riding a three wheeler the front tire got twisted in a tire rut and wrenched the bars and pulled my shoulder, there was alcohol involved*." Multiple Survey Respondents

With respect to injuries of **youth riders**, a small percent of respondents (**5%**, n=6 of 124) indicated that a **youth had sustained an injury**, typically as an operator. Injuries sustained included scrapes, bruises, sprains and a broken bone, with cited reasons when provided being rollover, flip or wipeout.

3.4.3 Nova Scotia Trauma Registry, OHV Injuries/Deaths

The following presents **aggregate-level findings** from the NSTR regarding OHVs. For an individual to be included in this dataset, they would have sustained a major trauma or death during the 5-year observation period of April 1, 2016 - March 31, 2021 in the province of Nova Scotia. See Appendix E for inclusion criteria.

! ***Please note**: The consultant team acknowledges that NSTR statistics represent real individuals, with families and friends. We intend to present findings in a respectful format.*

PREVALENCE, TYPES OF OHVs, RIDER DEMOGRAPHICS

- During the **5-year study period,** there were a total of **286 traumatic injuries** related to OHV use, of which **a 12% death rate (n=35)** was observed.

- From **April 1, 2020 to March 31, 2021,** there were **80 traumatic injuries in the province, of which 6 were fatalities (~8% mortality)**.
- **Almost 90%** of those with a traumatic injury (*excluding death*) **also sustained a fracture(s)** and **more than 2/3 suffered poly-trauma**.
- The most common mechanism of OHV injury or death was **a rollover** and/or **full ejection**.

Figure 8 shows the number of traumatic injuries and deaths that occurred from April 2016 to March 2021 **by OHV type**. After **a period of decline** between 2016 and 2020, there was a **65%+ increase** in injury and death from 2019-20 to 2020-21. Because snowmobile incidents were <5 during 2016-17 and 2019-20, the change over time is not reportable. **Off-road motorcycles** had the greatest increase at **200%,** from 7 to 21 events, while the increase in **ATV** incidents was **42%,** from 38 to 54 events in 2019-20 and 2020-21 respectively.

Figure 8
Number of Injuries/Deaths by OHV Type

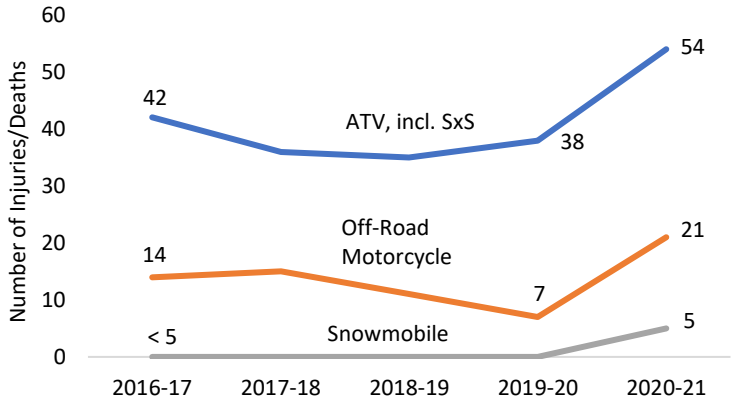
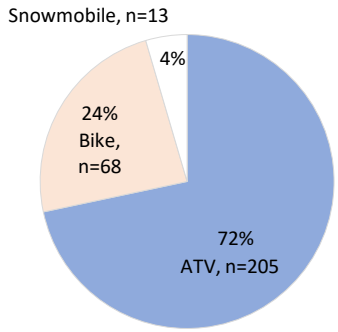


Figure 9
Percent of Injuries/Death by OHV Type, 2016-21 overall



Bike = Off-Road Motorcycle

Figure 9 shows that of all traumatic injuries/deaths in the NSTR related to OHVs over the 5-year study period, **72% occurred while riding an ATV**, **24% while riding an off-road motorcycle** and **4% were snowmobile riders**. As noted earlier in this report, unpublished data from the Nova Scotia Registry of Motor Vehicles shows registered OHVs in 2021 as being 83% ATVs, 1% off-road motorcycles and 15% snowmobiles, percentages that have essentially remained the same since 2017 (Table 1). While the absolute number and percent of ATV incidents was the largest, there was a higher proportion of injury/death with off-road motorcycle use (i.e., 24% of events but only ~1% of OHV registrations).

As also detailed earlier in this report, NS OHV registration data showed an **overall increase in OHV registrations over time**, with a **12% increase** for all types of OHVs **in 2021** versus the year prior (from 39,160 to 43,773 registrations, comparing as of April 1 of each year). According to key informants, and based on publicly available industry data, there have been **increases in the number of new riders and membership of OHV associations** as well as an **increase in OHV sales** during the COVID-19 pandemic. This may have resulted in a **higher number of new, inexperienced riders** using their OHVs during 2020-21. Given **pandemic restrictions**, access to OHV rider training opportunities may have been reduced.

For some perspective into the potential rate of injury/death in consideration of OHV registration data, the annual number of injuries/deaths (using the NSTR fiscal year of April – March) was calculated as a percent of OHV registrations. Acknowledging the limitations of this rough estimate, the prevalence data were: 2017, 0.18%; 2018, 0.16%, 2919, 0.13%; 2020, 0.12%; and, 2021, 0.18%. Note: the total number of traumatic injuries/deaths are not reportable given the number of snowmobile incidents were less than 5 per year for all years except 2020-21.

Rider Age

NSTR categorial age data were examined with **Table 3** showing the change in injuries/deaths by age category annually. Note: Those aged **under 12 and over 65 years** have been **consistently less than 5 events annually**, and as such, are **not included in this table**. Table 3 also shows the fluctuations/trends over time while Figure 10 presents the age data graphically.

Table 3

Annual Change in Injuries/Death by Age Category, 2016-2021

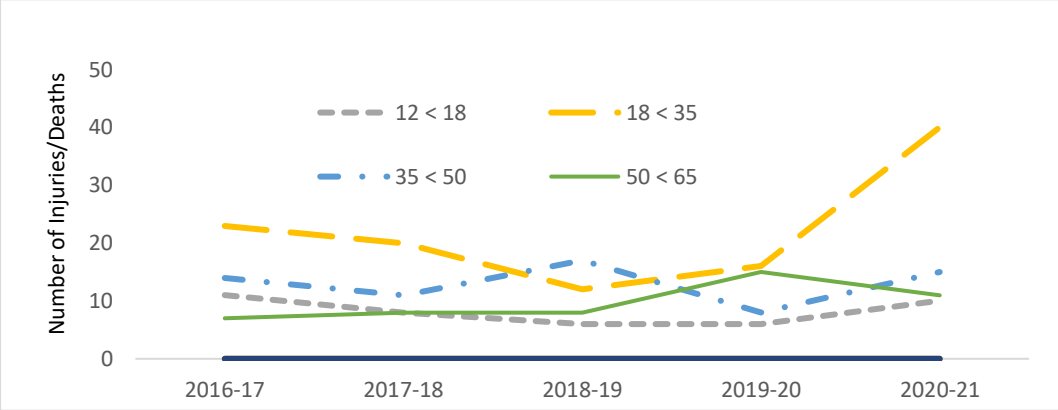
Age, years	2016-17 n	2017-18 %, n	2018-19 %, n	2019-20 %, n	2020-21 %, n
12 < 18	11	-27%, 8	-25%, 6	0%, 6	67%, 10
18 < 35	23	-13%, 20	-40%, 12	**33%, 16**	**150%, 40**
35 < 50	14	-21%, 11	55%, 17	-53%, 8	88%, 15
50 < 65	7	14%, 8	0%, 8	88%, 15	-27%, 11

As highlighted in Table 3, beginning in 2019-20, there has been a larger increase in injury/death occurring in **individuals aged 18 < 35 years** as compared to other age categories. A closer examination of the **18 < 35 age category** for the **year 2020-21** revealed two notable findings:

- 88% were male (n=35/40); and,
- When the age category was split into 18 < 25 and 25 < 35 years, there was equal distribution, with n=20 traumatic injuries/death in each group.

Figure 10

Injuries and Death by Age Category



Looking at all age categories for 2020-21, **those aged 18 < 35 accounted for 50% of all traumatic injuries/deaths** (n=40/80). The percentages for the other categories were: **19% ages 35 < 50**, **14% ages 50 < 65**, and **12% ages 12 < 18**. Under 12 years of age and over 65 combined was 12%. Due to sample sizes of less than 5 per age category, reporting at that level of detail for these age categories was not possible for 2020-21.

Of all individuals **suffering traumatic injuries or death in 2020-21**:

86% of **the riders were male**.
9-of-10 were operators (i.e., drivers).

50% of riders were **aged 18 < 35 years old**.
12% were **aged 12 < 18 years**.

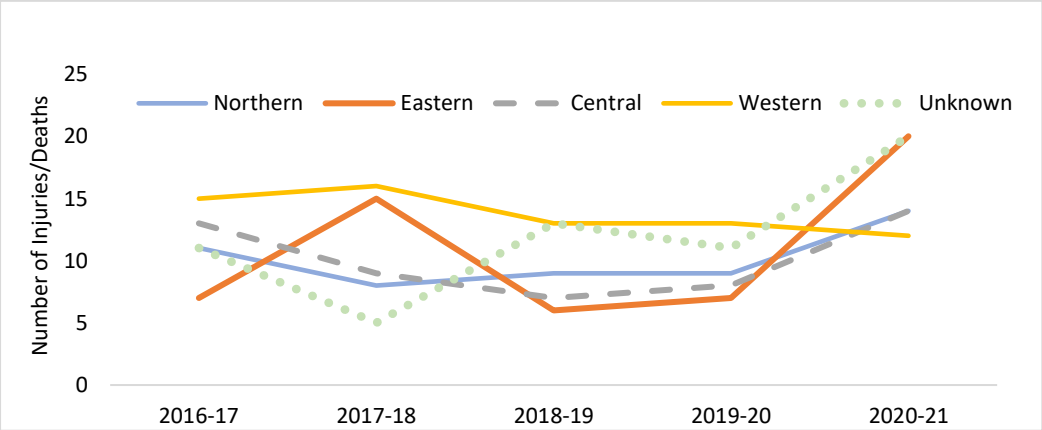
A Statistics Canada report on ATV **fatalities** from 2013 to 2019 showed similar findings to NSTR data.[12] They identified that 85% of fatalities were males, 8-in-10 were operators, more than 25% were aged 20-34 years, 12% were youth riders, and nearly half were a result of a rollover.

GEOGRAPHIC LOCATION, TIMING OF INJURIES/DEATHS

The geographic location of injuries or deaths by Nova Scotia Health Zone are presented in Figure 11. (Note, this was the location where the individual was riding at the time of the incident.)

Figure 11

Geographic Location of Injuries or Deaths by NS Health Zone



While it **appears** that there has been a larger increase in injuries/death occurring more often in the **Eastern Zone** in 2020-21 as compared to 2019-20, the **number of 'unknown' locations would influence these results**. Reasons for unknown location include a lack of documentation in the client's chart, sometimes due to individuals presenting themselves post-event and not sharing the geographic location where the injury occurred.

NSTR also provided the OHV injury and death data monthly and **seasonally** by calendar quarter (i.e., Apr-Jun, Jul-Sept, Oct-Dec, Jan-Mar). Results indicate that:

- Over time, **most deaths and injuries have occurred during the months of July to September**. In 2020, there were 34 injuries during this time period as compared to only 10 during July-September 2019 (a 240% increase over the prior year).
- The **month of August 2020 had the greatest number of monthly injuries/deaths** over the 5-year period (n=15), followed by July 2020 (n=11) with the second highest number on recorded injuries/deaths.

FACTORS CONTRIBUTING TO OHV INJURY

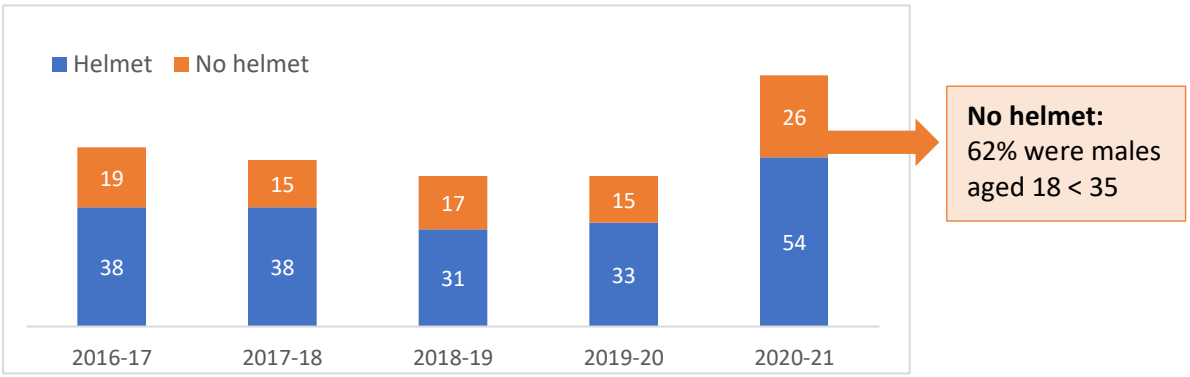
Helmet Use

Figure 12 presents the annual number of people over time who were, or were not, wearing a helmet when they sustained an injury/death. Consistently, approximately **2-in-3 riders were wearing a helmet (68% in 2020-21)**. These data are similar to Statistics Canada reporting of helmet use in ATV fatalities.[12] Of those **not wearing** one in Nova Scotia **in 2020-21, 62% were males aged 18 < 35**.

Looking further into the 2020-21 NSTR data, **82% of female riders** and **100% of those aged 18 and under** were **wearing a helmet** at the time of the incident. Lack of helmet use was observed with **all OHV types** and in those aged 18 and older.

Figure 12

Annual Number of OHV Injuries and Deaths by Helmet Use



Alcohol/Substance Use

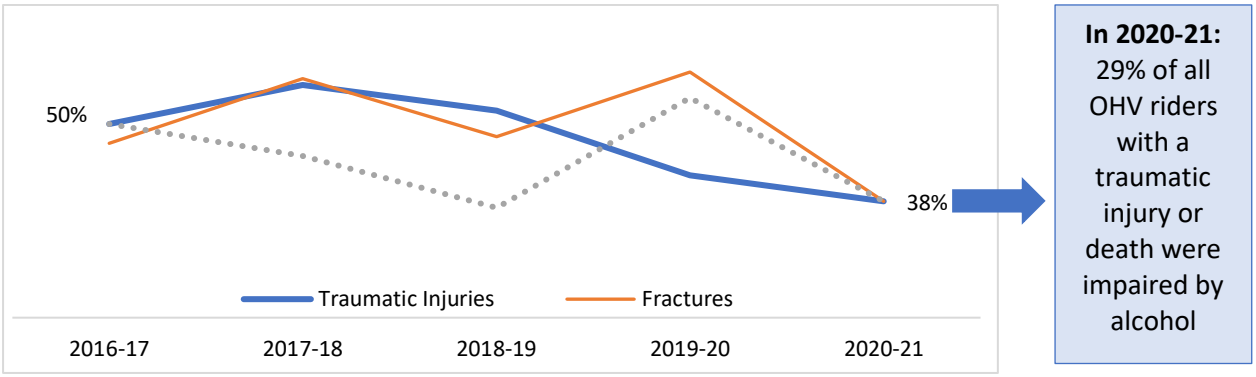
In their registry, NSTR captures the number of blood alcohol concentration (BAC) tests performed on OHV riders, as well as the test results (if they are under or over the legal limit of 17 mmol/L). The **highest number of BAC tests occurred in 2020-21**, with yearly testing numbers as follows from 2016-2021 respectively: 32, 41, 31, 38 and 60 (i.e., 88% more tests were performed in 2020-21 versus 2016-17).

Results overall indicate **a downward trend in the percent of BAC tests above the legal limit for those OHV riders suffering a traumatic injury/death, in those being tested, Figure 13**. The downward trend

was similar for those suffering fractures or poly-trauma (which are a subset of those with a traumatic injury/death), with the exception of 2019-20.

Figure 13

Type of Injury/Death and Percent BAC Tests >17mmol/L



Note: Traumatic Injuries includes death.

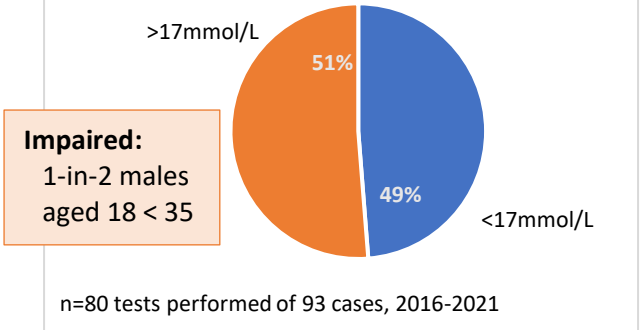
Note: BAC of 17mmol/L, or 0.08%, is the legal limit in Nova Scotia, however it is recognized that any BAC over zero can cause impairment[16] While this report uses the term 'positive' BAC test, it is possible that those with a BAC level of 0-17mmol/L were riding while under the influence of alcohol.

Although the **percent of tests positive for BAC >17mmol/L** has **decreased over time** (50% in 2016-17 to 38% in 2020-21), the **absolute number of positive tests did increase** during the same time period (from n=16 to n=23, a **44% increase in the number of individuals that tested impaired**). When comparing the number of positive BAC tests **in 2020-21** against the total number of traumatic injuries/deaths, **29% of all OHV riders experiencing injury or death were impaired by alcohol**.

When examining the **BAC data by age and sex** for those with a traumatic injury/death for the **combined years of 2016-2021**, a small number of females aged 18 < 35 were tested overall (n=14, data not shown) as compared to their male counterparts of the same age (n=80, Figure 14), keeping in mind most OHV riders are male. Testing rates were 78% and 86%, respectively, for females and males aged 18 <35.

Figure 14

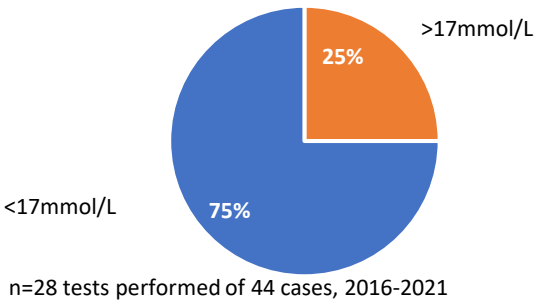
BAC Tests Males 18 < 35 with Traumatic Injury/Death



n=80 tests performed of 93 cases, 2016-2021

Figure 15

BAC Tests Females, all ages with Traumatic Injury/Death



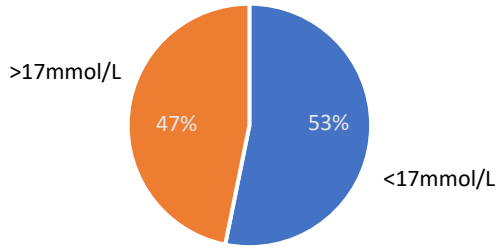
n=28 tests performed of 44 cases, 2016-2021

As shown in Figure 14, **1-in-2 male OHV riders aged 18 < 35, when tested, were impaired** beyond the legal limit when experiencing traumatic injuries/death. Based upon overall **incidence of events** (not just of those tested), the **impairment rate in this age category would be 44% for males**. The information for females by age breakdown is not reportable due to data size. Figure 15 shows that **over the 5-year period,** 64% of females were tested, and of those, **1-in-4 females were impaired** beyond the legal limit.

When looking at the **overall BAC testing/results for 2020-21**, **impaired riders** were using **all types of OHVs,** ATVs being the most common, **9-in-10 were male** and **48% were aged 18 < 35**.

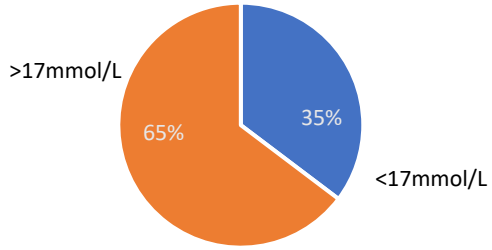
The BAC testing data were reviewed for **males aged 35 < 50 and 50 < 65 years** over the 5-year period, Figures 16-17. Again, the numbers were too small for females in these age categories to conduct a similar analysis. The testing rates for males were 82% and 76% respectively for ages 35 < 50 and 50 < 65 years.

Figure 16
BAC Tests Males 35 < 50 with Traumatic Injury/Death



n=47 tests performed of 57 cases, 2016-2021

Figure 17
BAC Tests Males 50 < 65 with Traumatic Injury/Death



n=34 tests performed of 45 cases, 2016-2021

While more males aged 35 < 50 were tested than those aged 50 < 65 (n=47, n=34, respectively), the percent of positive BAC tests was higher in those aged 50 < 65 years than their younger counterparts (65% versus 47%), Figures 9-10.

When looking at the **BAC testing/results for 2020-21** for these **age groups overall** (not broken down by sex), the percent impaired was 22% in those aged 35 < 50 and 30% for ages 50 < 65 years.

With respect to testing for **substances other than alcohol**, e.g., cannabis, cocaine, narcotics/ opiates and benzodiazepines, there was an **increase in the absolute number of tests being performed over time** (i.e., from 6 to 18 tests, 2016-17 to 2020-21 respectively). The **percent positive decreased slightly** from **83%** in 2016-17 to **78%** in 2020-21, but the numbers were small. Given this, these data cannot be reported in detail. In general, **over the 5-year period**, individuals that **tested positive for substances other than alcohol were male (73%), aged 18 < 35 years (48%)** or **35 < 50 years (30%)**. Individuals were **riding all types of OHVs**, although ATVs were the most common (72%).

Information Gaps

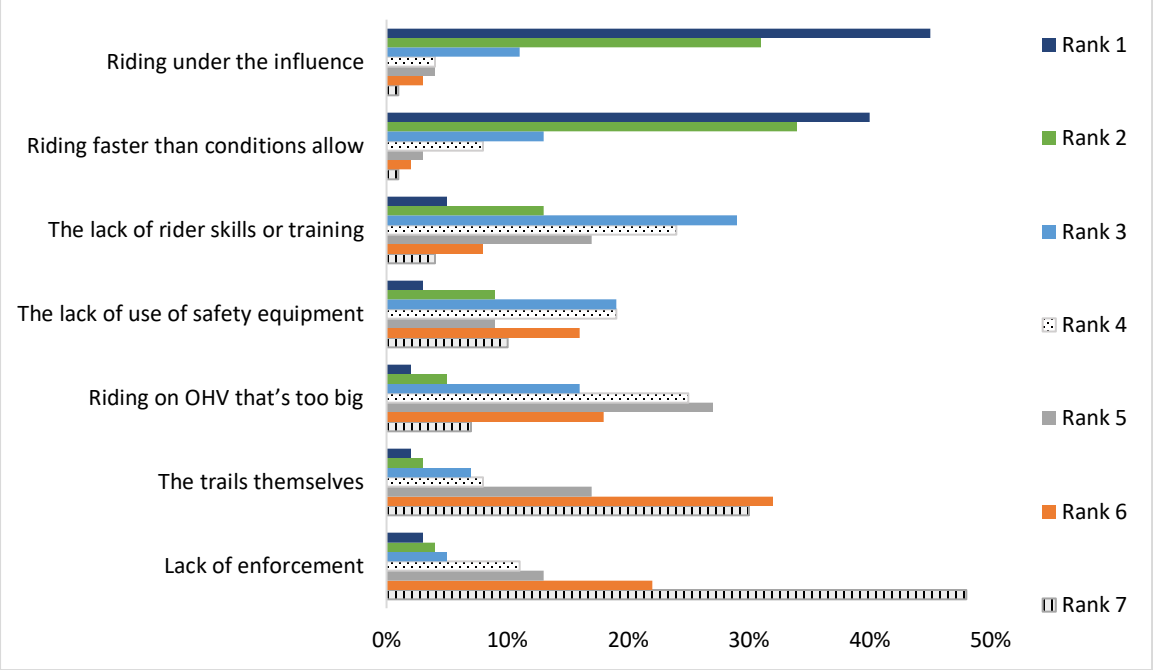
One key informant noted that the **Nova Scotia trauma datasets are missing further details** that could inform OHV injury prevention activities. For example, the **ATV data includes side-by-side vehicles** so there is no way of knowing if side-by-side machines, which are often viewed as a safer alternative to ATVs, were involved in fewer or more accidents than traditional ATVs, or if riders sustain more or less severe injuries. And similarly, the trauma dataset **does not collect information regarding the size of the OHV** involved in an incident leaving no means to understand if an injured youth was riding a youth- or adult-sized OHV. The speed of the OHV and road conditions at the time of the incident are also unknown.

3.5 Operator Behaviour, Beliefs, Values

Survey respondents were provided with a list of **factors that may increase the risk of injury** when riding an OHV and asked to **rank them** from most to least important (n=542). Of the seven choices, the top-ranked factors (Figure 18) were '**riding while under the influence** of substances including alcohol, cannabis and others' and '**riding faster than conditions allow.**' The lack of rider skills or training rounded out the top three. **Bottom choices** included the **lack of enforcement** or the **trails themselves**. Figure 19 presents additional ranking data for the lack of use of safety equipment and riding an OHV that's too big for an individual.

Figure 18

Ranking of risk factors that may increase rider injury

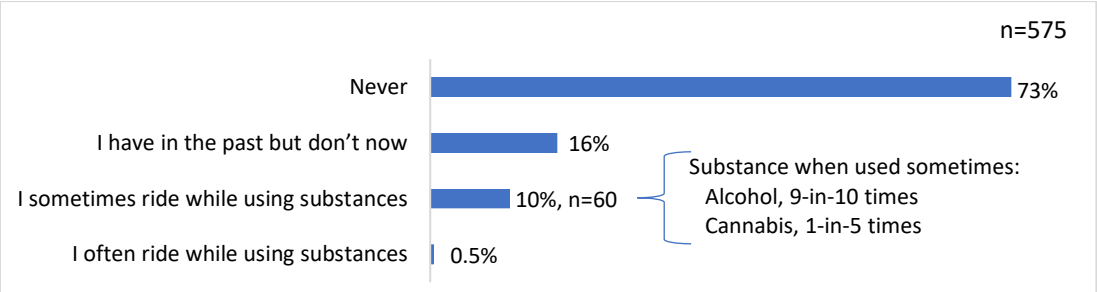


"Intrinsic risk factors for crash include: no helmet, multiple riders, riding after dark, alcohol and substances." Menon et al., 2022[17]

Survey participants (n=575) were also asked "***Have you ever operated an OHV while using substances, including alcohol, cannabis or cocaine?*** *This means any amount of substance, regardless of whether or not you feel the effects*." Figure 19 below shows the results, with **10%** (n=60) **sometimes** doing this, typically while consuming alcohol.

Figure 19

Operating While Using Substances



While the survey was intended for recent OHV riders, an **open-ended** question was posed for all respondents including those that indicated they have not ridden in the last two years. To the question of **why there have been deaths and tragic injuries related to OHV use**, 492 responses were recorded including 12 from non-riders. These participants had similar responses to current riders. Top choices were aligned with the ranking exercise (Figure 18) with **rider impairment** (use of alcohol, 'drugs') and **speeding** (riding too fast) frequently cited. **Lack of experience** (skills, training, education, riding beyond ability), **enforcement** or '**common sense,**' as well as poor decisions/judgement and 'driver error' and lack of safety equipment were also noted.

"*>>>>>>LACK OF ENFORCEMENT ON THE TRAIL SYSTEM >>>>>>> Riders are using machines under the influence of drugs and alcohol with little to no fear of being caught. There is also excessive speed and lack of respect from some riders knowing there is no trail Enforcement of rules or regulations.*"
Survey respondent

"*90% driver error, 10% equipment failure*" Survey respondent

"*High speed, Use of drugs, No training, No safety equipment being used, Poor condition of riding machines, Poor trail conditions, Using over sized machines, Under age riders, Lack of marked trails and Lack of law enforcement*." Survey respondent

"*Often caused by lack of ability or knowledge of the dangers inherent while driving any motorized vehicle and especially when travelling on trails where conditions can change quickly and of course trails are affected by severe weather. The use of alcohol or other substances certainly contributes to accidents. Although in Nova Scotia it is a requirement to take an ATV Riding course if the owner has not owned a machine prior to 2006 but enforcement personnel do not check this requirement. The reduction of enforcement officers in the province over the past 10 years has also added to more issues including accidents along trails."* Survey Respondent

Most key informants similarly suggested that OHV crashes, collisions and other incidents are linked to operators themselves ('human behaviour'). The **use of alcohol or substances** was cited as a likely **contributing factor** to OHV injury/death. Informants also noted that some individuals choose to **ride faster than conditions allow** (a 'thrill-seeker'). The **lack of use of safety equipment** was also highlighted by several. Another factor cited was the **inexperienced operator** – having a lack of rider skills in handling machines or lacking safety training. Examples provided included: operators not positioning the body properly when making a corner; going up a hill without sufficient power then hitting the throttle, causing the machine to flip backwards; travelling too fast on the shoulder of the road; or, young or inexperienced riders using a high-performance machine/riding beyond their ability.

"*Usually, the rider is doing something they are not supposed to be doing…usually breaking existing law or rules*." Key Informant

"*…riding beyond their ability. The youngest inexperienced rider on a high-performance machine or machines that are not designed for the rider…*" Key Informant

The **new/inexperienced rider** was stressed by key informants as an important consideration in the context of the recent and significant increase in OHV sales and use **during the COVID-19 pandemic**. For example, ATVANS estimated an approximate 15% annual increase in ridership over the past few years, with nearly 6,000 new ATV riders in 2021 as compared to 2020. SANS and NSORRA also noted increased sales and OHV use over the past several years. Some informants suggested there was not a parallel increase in OHV safety training, given the lockdown/provincial restrictions, or increased enforcement of OHV regulations during that same period.

When looking at OHV injury data, some informants suggested **the number of OHV users should be considered along with the number of OHV injuries** to have a true understanding of what the 'numbers' mean. And, when looking at youth injuries, some would be interested to know if the youth was using a properly sized OHV or not. One informant noted data from the United States references a disproportionate number of injuries being a result of youths riding vehicles that are not the right size for them.[14]

Trail Systems

Some informants highlighted that **injuries and deaths** have **occurred outside the OHV trail system**, for example on frozen waterways, private property or non-designated trail roadways. Several noted that the **trails need to be designed in a manner that supports rider safety**, and are **well-maintained and accessible**. For example, the engineering or design of trails that do not have sharp 'hairpin' corners or are not too steep of an incline; and or, trail connectivity – having safe access from one trail to another or from a trail to the services that riders may need (e.g., gas, food, accommodations).

"*… travelling fast because they want to sneak from one spot to another down the road…*"
Key Informant

3.6 Technology/Product Design

Key informants and survey participants were invited to provide their perspectives on any recent changes in **OHV technology or product design** that **may make these vehicles more or less safe nowadays versus in the past**. The survey had feedback from 297 respondents.

3.6.1 Technology/Design

According to COHV, technical standards for OHVs have evolved since the early 1990s. For ATVs, for example, the standard is now on its sixth version, updated as new technology is introduced into the vehicle to make them safer. Canadian standards are adaptations of or the same as those in the United States.

The industry experts noted that as **safety features evolve** in the automobile industry, these tend to trickle down to OHVs. Advanced safety technology utilized in vehicle manufacturing also passes onto street motorcycles, and eventually to off-road motorcycles. **Early crash detection** and its **warning signals** (e.g., sensitivity cameras, automatic emergency braking or vibrating handlebars/ steering wheel) were cited as potential features in future OHVs. Along similar lines, the technical standards for ATVs now address aspects such as 'leaning' while side-by-sides have evolved to include seatbelts, warnings when seatbelts are not engaged, roll-over protection and enhanced suspension.

☞ See further information regarding COHV and standards as provided by COHV in Appendix C.
The latest version of the standard includes, among other items, enhanced requirements for lateral and pitch stability, occupant handholds, rollover protective structure, occupant retention system, and more requirements for labels on the vehicle and in the Owner's Manual. Even though the industry standard is not mandatory, all the COHV members voluntarily comply with the standards.

Regarding **improvements in OHV design** over time, key informants and survey respondents stated that ATVs and other **OHVs have advanced in their design** with **better suspensions** and **power steering** making them easier to handle and turn, **braking abilities**, and a **lower center of gravity** which leads to less chance of a flip-over. **Side-by-sides** allow for passengers, increasing the recreational enjoyment for some riders, and can have **seat belts, roll-bars**, horns and **head/tail lights**. Their use has been rising in Nova Scotia, with an estimated 60-40 split now in favour of side-by-sides versus a traditional ATV, according to informants. **Survey respondents** and **key informants** also noted that newer model ATVs have four wheels versus three, reducing the potential for a rollover. **Some OHVs** are perceived to be **easier to operate** than other types of OHVs or **easier to maneuver** on certain terrain (e.g., going up a hill, around a tight corner, or travelling over loose gravel or snow).

"Machines are bigger now with more room and comfort seating reducing tiredness. Better lighting in headlights and in sxs cabs. Built in safety devices such as seatbelts where usage is required for increased acceleration. Better monitoring system of things like battery. Brake pads and shoes better. More comfortable helmets." Survey Respondent

The **weight, speed, engine size and horsepower of adult machines** have increased over time. One informant illustrated this suggesting older machines weighed ~300 pounds and had 350cc max while now some machines weigh over 800 pounds and have 1000cc. Another stated that snowmobiles can now travel up to 150km/hr while in the past the speed was ~30km/hr. Survey respondents noted similar changes in technology/product design: **better suspension, steering, brakes, head/tail lights, seatbelts, traction control, trail map technology/navigation systems, speed limiters, 4-wheel vs 3-wheel ATVs** and in **side-by-sides the roll cages** were frequently noted.

"*Power. That's the big one. Machines go a lot faster…than they used to even 10 years ago*." Key Informant

Several individuals (informants and survey respondents) spoke to the design of **youth ATV machines**, which are lighter in weight, smaller in size and have less overall power with 'learner keys,' speed limiters/a 'kill-switch.' They also do not have headlights, given they are not intended to be driven when dark. Machines also include signage, e.g., "Do not operate under the age of 16" or labelling based upon the manufacturer's recommendations, e.g., Y-6, Y-12. Speaking to child safety, one key informant suggested that **child-sized ATVs give a false sense of security to parents** who may believe that if their child is riding a machine that is targeted to their age and size that they will be safe, despite in their opinion, that there is a lack of evidence to support that.

Key informants stressed that **parents play an essential role** when it comes to youth riding, ensuring that the youth is 'ready to ride.' Parents need to consider the OHV manufacturer's **minimum age recommendation**, the youth's **physical size, strength, coordination, visual perception, emotional maturity and ability to reason and make good decisions**. Additional considerations include provincial legislation and manufacturer's size recommendations.

Another safety concern one key informant noted is that of riders coming from the urban centres to rural areas and riding too large of a machine, e.g., a child riding a parent's machine.

"*You see people coming up from the cities that come here. 'Oh, just get on the quad, Johnny, as long as you go by the house every 15 minutes, I know you're okay.' And he's riding around on dad's Canam 1000, Canam 850, Polaris 1000.*" Key Informant

Several survey respondents and one key informant noted that the **evolution of machines to make them safer,** in some cases may make **riders overly confident in their safety,** i.e., less aware of the risks of a rollover in a side-by-side, presuming enhanced safety when wearing a seat-belt, or driving at increased speed on terrain that may be unstable.

"*ATVs are now bigger and more powerful than ever (not to mention we now have those side by sides everywhere) and the technology like power steering just give people false confidence about how fast they can travel*." Survey Respondent

"*Side by side being enclosed/roll protection. Double edged sword though makes some feel they can't be hurt and drive faster more carelessly and more dangerous to other ohv if they collide with them*." Survey Respondent

A **technology-related safety risk** cited by informants was **after-market modifications** such as **removing speed limiters** or **changing an ATV seat** to allow for passengers when the machine was not designed for them.

In the rider survey, the question '*Have there been changes in OHV technology and design that you think **make riding an OHV less safe nowadays versus in the past**? If so, please describe the changes and their impacts*,' garnered 281 responses. Of those, 50 (18%) responded with some form of 'no.' Mentions of increased size, power and or speed were seen in most answers.

"*No, I know [horsepower] and vehicle size (wrt sxs's) have increased dramatically, but it is people who abuse it. My ATV has increased HP, but I use the torque when I need to get over a rock or stump, and not to increase my trail speed. My snowmobile is a 900 Ace and is not overpowered - but plenty for my needs. Nothing that I can think of would make it less safe. I just don't see anybody, anywhere not using PPE."* Survey Respondent

"*Engine power = ability to ride/drive beyond capabilities and/or conditions. No one needs a OHV that easily exceeds 100kph*." Survey Respondent

"Too much speed. Impacts are far greater these days due in most part to significantly increased speed. However, it has been my experience that the single most contributing factor is misuse of alcohol and other mood altering drugs." Survey Respondent

"They work so much better with alot [sic] more power that it is easy to drive over a riders ability especially when it is a new or novice rider. Graduated licensing would be a big benefit. Ie: 500cc max for the first year." Survey Respondent

3.6.2 Rider Safety Equipment

Some informants and survey respondents spoke about the **evolution of OHV safety equipment**, including efforts to make **helmets and protective gear** like pads safer. A few key informants spoke to the use of **crush protection devices** (CPD), which are designed to prevent the OHV rider from being pinned under the machine if it rolls, referencing recent changes in Australia to make CPDs mandatory in certain situations. These informants noted that they are **monitoring information** coming from Australia and in the literature to better **understand the actual impact of these devices regarding rider safety**, with some suggesting the data looks promising, while others were unsure of the potential benefit on rider safety.

"*Safety gear has also became [sic] safer over the years*." Survey Respondent

3.7 Partners/Interested Parties

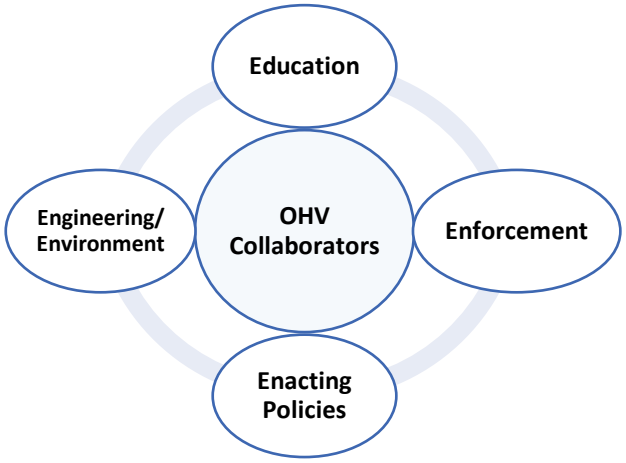
When asked who they thought were the **key collaborators** that may be **interested in OHV safety and injury prevention,** key informants proposed a broad variety of partners including:

- **Riders** themselves, as well as parents of youth riders;
- **OHV rider associations/clubs**, **manufacturers/manufacturers' representatives** (i.e., COHV, MMIC) and **dealers,** including sales representatives;
- **Healthcare professionals/provincial bodies,** including clinicians who treat patients with traumatic injuries;
- **Public safety organizations**;
- Provincial **government departments** responsible for **trail oversight, maintenance** and **OHV enforcement** (e.g., public works, natural resources), as well as those responsible for health **promotion** and **policy/legislation**;
- All levels of **law enforcement,** including the local/regional police, the Royal Canadian Mounted Police (RCMP) and the provincial Department of Justice); and,
- **Landowners** (private and provincially owned).

When asked who are the **most important groups that should be engaged regarding OHV safety and injury prevention initiatives**, most key informants suggested that there needs to be a **collaborative approach,** with all interested **parties working together**.

"*I don't know if there's necessarily anyone that's most important because I think all of them have a role in a different way*." Key Informant

Figure 20
OHV Collaboration



As illustrated in **Figure 20**, collaboration includes organizations interested in creating, updating or **enacting policies** regarding OHV safety and injury prevention, **enforcement** organizations/officers who are responsible to enforce regulations/laws, organizations responsible for ensuring the safety of the OHV trails and/or OHV vehicles themselves (**engineering/environment**) and organizations or individuals interested in safety training, **education** and awareness. Having 'one piece of the puzzle' without the others was viewed as sub-optimal, e.g., having a policy about helmet use without

appropriate enforcement of that policy. **Enforcement** officers were identified as key collaborators both from the perspective of enforcing existing policies (i.e., the Nova Scotia Off-highway Vehicles Act, OHVA) and informing any efforts to update existing policies (i.e., advising if a new proposed policy may be enforceable or not).

As one key informant stated, "***safety is everybody's business.***" They suggested that everyone needs to be as responsible as possible, including the **riders themselves**.

"*…the people who actually use the vehicles, because having a sense of their culture, being on the same page with them, is the strongest thing you can do*." Key Informant

Rider associations were viewed as most critical for some informants given that associations support those that use OHVs with education, safety training and awareness, as well as their role in supporting, developing, maintaining and monitoring the OHV trails. For example, ATVANS has ~150 trail patrol volunteers that monitor the trails and offer on-trail education and awareness messaging. They produced and distributed a 'responsible use' flyer to thousands of members and non-members.

"…the over 40 ATV Clubs in the province have been very active since 2006 building ATV Trails, educating club members, encouraging non club members to join or at least take the time to discuss issues of safety and trail etiquette. ATVANS has produced several brochures including a Trail Etiquette one which would help many to understand their responsibility while riding an ATV." Survey Respondent

An example of a **collaborative approach to OHV safety and injury prevention** is the **Road and Trail Safety Coalition** which was recently **established in New Brunswick**. This broad group of partners, with participant organizations as illustrated in Figure 20, meets regularly and uses organizational data to inform its activities and decision-making regarding OHV injury prevention. Analysts and others at the RCMP and Trauma New Brunswick worked together to create a 'common language' (i.e., standardized definitions of OHVs, age categories, etc.) to understand the 'who, what, when, where and why' of provincial OHV injuries, including death. They were able to identify:

- **Who** was being injured (i.e., the demographic characteristics of such as age/sex);
- **What** type of OHV was involved in incidents;
- **When** the injury occurred (specifically, the time of day, day of the week and months of the year);
- **Where** in the province the injury took place (e.g., which counties); and,
- **Why** the injury may have occurred (i.e., the contributing factors such as the use of alcohol/substances).

Their **merged datasets** created a **comprehensive overview** of findings. Results were shared with the Road and Trail Safety Coalition members to permit **data-driven decision-making**. Their data showed the **highest [traumatic] injuries occurred in males, aged 15-24, riding ATVs while using alcohol +/- other substances**. Based upon these data, and in consideration of available resources, interventions were explored and targeted to these riders/situations. Information regarding the New Brunswick Road and Trail Safety Coalition campaign can be found here: www.greatsummers.ca

3.8 Injury Prevention

3.8.1 Injury Prevention Organizations/Safety Knowledge

When asked **where they look** for **injury prevention and safety knowledge,** a variety of places were noted by key informants and survey respondents.

Survey respondents (n=587) indicated that **rider associations (63%), manufacturers (34%)** and the **government (31%)** were their sources of safety information. Informants from rider associations and industry cited national/international bodies such as the **Canadian ATV Safety Institute** (CASI), a division of the CQC; the **Recreational Off-Highway Vehicle Association** (ROHVA); the **American National Standard Institute** (ANSI); and the **National Off-Highway Vehicle Conservation Council** (NOHVCC), a non-profit that provides educational resources for individuals, clubs and decision-makers to promote safe and responsible OHV recreation. Informants from CQC said safety training committee members pass safety knowledge and information down through instructors and safety training courses.

Some informants cited they look for information and position statements from the **Public Health Agency of Canada** or other credible organizations such as the **Canadian Paediatric Society**, American Academy of Pediatrics and Canadian Medical Association. Others suggested provincial data sources (e.g., **British Columbia Injury Research and Prevention Unit**) as well as peer-reviewed literature and or environmental scans, in order to identify injury prevention best practices. The Atlantic Collaborative on Injury Prevention (ACIP) was also a cited organization.

3.8.2 OHV Safety or Injury Prevention Initiatives

Internet searches revealed some literature regarding interventions aimed at reducing injuries.

- Holt (2022) described a **trauma surgeon-led and sponsored education initiative**.[18] They promoted ATV safety using **simulators and discussions** for area **high school students**. Helmet use, alcohol avoidance and safe ATV operating were emphasized. Using the trauma registry, they reviewed ATV admissions from 2009 through 2020 examining demographics, helmet use and clinical outcomes. Their findings revealed that un-helmeted ATV riders suffered significantly more severe head and neck injuries, had a worse overall Injury Severity Score (ISS) and higher mortality rates than those that wore a helmet. Although only 15% of riders were helmeted, ATV **crash admissions decreased in the 5 years study period**. They concluded that although OHV trauma and mortality are still frequent, especially in un-helmeted riders, the decrease in area ATV crashes was encouraging. They stated that trauma surgeons had an opportunity to make a difference in public awareness and education through comprehensive physician-funded and directed injury prevention and research efforts.

- Jennissen (2020) explored youth's thoughts regarding how they might be best reached and persuaded to ride ATVs more safely.[19] Attendees of three ATV safety workshop sessions at the 2018 National Future Farmers of America Convention answered questions after facilitated discussion. Three hundred nine FFA members from 62 clubs across 29 states participated. Almost all clubs stated that one reason most youth don't ride ATVs safely is because of personal

beliefs (e.g. inconvenient/not as enjoyable to ride safely). Almost three-quarters stated that an unsafe **riding behaviour young people would be most likely/willing to change** was **wearing a helmet**. Traveling at lower speeds and not carrying passengers were behaviours they felt as least likely to change. Over half of the clubs stated that one of the best places to **reach youth** was **at schools**; the second most frequently mentioned was **social media**. Safety presenters that clubs felt youth would be **most likely to listen to** were **peers and those just slightly older than the target audience**. Other presentation groups frequently mentioned were **crash survivors** and those whose **loved ones had been injured or died in ATV crashes**. A variety of **celebrities and authority figures** were also suggested. Activities thought to be most effective at promoting safe riding were presentations with **real-life injury examples including videos that might create a 'fear factor,' and hands-on activities**. The **least effective** methods **were lengthy, non-interactive presentations and printed materials with lots of facts/statistics**.

- Jennissen also led ***Safety Tips for ATV Riders (STARs) programme: a short-term impact of a school-based educational intervention***, published in 2014.[20] They did a pre- and post- student survey to determine demographics, knowledge and reported likelihood of using the information learned. STARs increased short-term ATV safety knowledge and almost half the participants reported they would use the safety information presented. Males and frequent riders seemed more resistant, but **some groups that may be more vulnerable to a potential ATV crash and injury** (i.e., younger students, females and infrequent riders) **appeared amenable to the training** with higher increases in post-program scores and greater intention of improving safety behaviours.

In **Ontario**, an **inquest into the death of a child**[21] that occurred while riding an ATV proposed several jury recommendations, including:

- Integration of OHV safety into current teachings of motor vehicle safety in schools;
- Collaborative creation of a mandatory, standardized safety and training course which includes both theoretical and practical hands-on learning. It is suggested that all youth and adults must complete the course in order to obtain an OHV permit/license/certificate of competency or to purchase an OHV;
- Stricter, enforceable provincial regulations regarding the age of OHV operators/passengers, use of safety equipment and 'zero-tolerance' for blood alcohol concentration levels;
- Harmonized national OHV legislation;
- Enforcement of safety regulations by a 'trail warden system" as utilized in Quebec;
- Collection/tracking/public reporting of incidents and offences including use of safety gear;
- Enhanced awareness campaigns as well as the development of educational materials primary care and emergency providers can use with patients/families;
- Creation of an OHV Advisory Committee to make evidence-informed decisions/legislation; and,
- Insurance rebates for those completing OHV safety training.

Rider associations noted that various OHV annual activities are well promoted and often organized in conjunction with local governments. Snowmobile week in January (which is international) includes radio

and television ads. Each June, during ATV and Quad Safety Week, the COHV encourages safe riding habits among all ATV and quad riders by sharing a variety of safety rules, for example:

GEAR UP – ALL THE GEAR, ALL THE TIME
Safety starts with wearing the right gear, including a compliant helmet (per provincial regulations), goggles, a long-sleeve shirt, long pants, over-the-ankle boots and gloves.

AVOID RIDING ALONE
Make it a habit to ride in groups of two or more and adopt the "buddy system" – with each rider keeping track of another rider. If you do ride alone, make sure someone knows your route and schedule.

DON'T RIDE IMPAIRED
Riding is physically and mentally demanding. Don't ever ride under the influence of alcohol or drugs. These substances significantly reduce decision-making abilities and reaction times. Always ride sober.

In 2022, through social media platforms (Facebook, Twitter and Instagram), the Safety Week campaign reached an estimated 132,700 individuals (unique views), with over 4,270 engagements (likes, comments, shares or link clicks). COHV also supports provincial federations across the country (e.g., ATVANS), and has a grant program that supports education and trail infrastructure maintenance and development, which may help make trails safer for OHV riders.

The Canadian Quad Council has informational articles and videos on their website called 'Trailbox Talks' https://quadcouncil.ca/2021/06/03/introducing-trailbox-talks/

One informant spoke of the **Saskatchewan Indigenous Technical Training Program** as an example of an innovative educational initiative for Indigenous Peoples, while others noted that Parachute promotes national guidelines. Another informant suggested that **manufacturers in the USA must offer OHV buyers safety training**: https://cfmotousa.com/customer-care-recall-info/vehicle-safety They saw this as a potential opportunity – when someone buys a machine, if they do not have safety training, they could be offered it at that time and or provided with some instructions on its safe use.

4. Challenges/Opportunities

Key informants were asked what they thought were the **biggest challenges and opportunities** with OHVs when it comes to **rider safety and injury prevention**. Survey respondents were also invited to share their opinions as to what could be done to improve rider safety and prevent injuries. Highlighted across respondents and organizations were the concepts of **education and enforcement,** and to a lesser extent, **the trail system** and **policies**.

4.1 Education

Participants suggested there is a **lack of education and or awareness,** in general, regarding OHVs, their proper use, the training requirements and other policies or legislation aspects. **Effective rider safety education and training programs,** including their availability, were stressed as important aspects to prevent injuries, especially given the increase in ridership since the COVID-19 pandemic. **Education and awareness for the parents of youth riders** was noted as a challenge by **the majority of key informants**. Rider associations and the industry councils spoke about and provided hard copy examples of pamphlets and posters created to support educational activities.

"Because OHVs are used in remote areas, it's the individual who must make sound decisions to keep themselves and others safe. Education is the key." Survey respondent

Some informants noted that there may be certain **attitudes and beliefs** in parts of the riding community that can be a challenge to rider safety. For example, some individuals don't believe they need to take a safety training course because they use OHVs or similar machinery for work (e.g., logging, frequent use of tractors). Another example provided was that some riders believe they **do not need to wear a helmet** because they are **only going a short distance**.

"Riders who have undergone formal training on quadbike riding were found to be four times more likely to wear helmets than those who did not." Menon, 2022[17]

"*Almost every problem, I / we have seen is liquor or speed created. SLOW DOWN AND LIVE*."
Survey Respondent

One child safety expert spoke to the **belief of parents** that the 'earlier they start to ride the better,' because they are developing their riding skills: the informant stated that children don't have the capacity to make certain decisions and react in certain situations. Another example was that of parents wanting to make a safe decision when taking their children on their machines, asking for advice on the use of 'car seats,' having a lack of understanding of the actual risks of doing so on an OHV.

"*…parents calling us asking what the best car seat would be if they want to take their kid, their baby, on an ATV*." Key Informant

While training is mandated in Nova Scotia, for snowmobilers, there is a **lack of training opportunities**. Given the unpredictability of winter conditions and the need to pre-schedule a training course, (e.g., create the training plan, pick a date, advertise, register interested individuals, etc.), it is very challenging to 'build a course' (have a sufficient snow-base), plan and then hold training activities. As noted earlier, according to the rider survey, 26% of respondents (n=149) said they have not taken rider training or have passed a safety test. For youth riders, 66% (n=49) had not completed an approved safety training course.

Opportunities

When asked what is the **most important thing** that could be done **to reduce injuries and or death** associated with OHV use, **education and awareness** was a top answer for many. For key informants this included collaborating with organizations/partners to create enhanced awareness and 'socializing' key messages regarding the safe, responsible use of OHVs. Suggested themes included the consistent use of safety gear, not operating while using alcohol or other substances, not riding alone, and for youth, ensuring they are on a properly sized vehicle and being supervised. Some organizations suggested that they could use help in better educating the public. The importance of consistent funding for sustained, annual social marketing campaigns was also highlighted.

"Education, mandatory safety courses for new riders, provide incentives to riders to take a course, no fee course...waive registration fee for the year." Survey Respondent

"*I think supervision, safety equipment, and then probably safety and education training*." Key Informant speaking to the what's need to prevent youth injuries

Regarding education/awareness, New Brunswick implemented targeted campaigns as a starting point to address their identified priority population: males aged 15-24, riding while using substances. They are using **social media platforms that appeal to the targeted audience**, e.g., TikTok, videogame ads and YouTube, to talk about ATV, trail and road safety. Their approach is to 'empower riders to ride safely,' helping them understand the consequences of risky behaviour. Another informant suggested something similar, i.e., using **messaging that focuses on the positive** (I ride safe/am proud) versus trying to change negative behaviours.

"*…the perspective of riders is: it's not me, it's the other guy. I ride properly. I ride responsibly. It's those other people that don't*." Key Informant

Safety Training

Several survey respondents supported free and or mandatory safety training for new operators and young riders as well as 'refresher' training for older riders that may be exempt from this requirement. A few informants noted that it's hard to change the habits of adult riders. As such, several stressed the importance of training/supporting younger drivers and instilling proper riding habits from the start, although Menon 2022 suggests:

"An immature age of driving initiation was found to predispose riders to more risky driving habits, including excessive speed and failure to wear protective gear." Menon, 2022[17]

As COHV noted their **'Gear Up - all the gear, all the time'** message is a foundation of safety training courses so that riders have this instilled in them from their very first experience. NSORRA mentioned a similar mantra of '**all the gear, all the time**' as being the culture of off-road motorcycle riding, with their training programs ongoing for over 10 years provincially. Some survey respondents though did not

perceive training as the way to prevent injuries: *"I don't think more safety training is the answer. Maybe more police on the trail."; "Focus more on policing use of alcohol and less on training programs."*

"Lower cost of training or allow for skill based exemptions [sic]. Each course is $200 per person per OHV type, and for dirt bikes the closest training is Halifax. If it's going to be required by law it should be more affordable and accessible." Survey Respondent

"I think we have things in place like training however I believe parents have a responsibility to ensure young drivers take the training." Survey Respondent

"*I think it's not promoted enough by government*." Key informant speaking about Safety Training

The need for **enhanced safety training opportunities**, including the need for funding of these, was suggested. Given the training mandate and the challenges faced when organizing training for snowmobilers, collaborative opportunities to support snowmobiler training in collaboration with SANS was suggested. ATVANS noted that they currently have more ATV safety trainers offering courses and instructors in the province than in the past, with some individuals starting 'safety training schools.'

"*People want to learn how to ride better.*" NSORRA Key Informant

4.2 Enforcement

"There is a robust body of evidence that enforced safety legislation of other motorized vehicles, namely automobiles and motorcycles, has a direct effect of reducing morbidity and mortality. This must be extrapolated to ATV safety." Rattan, 2018[10]

The majority of informants and 26% of survey respondents (n=108/408) cited lack of **enforcement as a concern**. Since the COVID-19 pandemic, there has been a significant increase in OHV sales and the number of new riders. At that same time, within the province, there has not been a perceived increase in **enforcement, according to key informants**. One informant noted that when the Nova Scotia government implemented **border restrictions during the pandemic**, some **enforcement officers** from the Department of Natural Resources were **reassigned to border patrol**, reducing their presence on trails at a time when there were many more riders overall and more new riders. And as noted earlier, the **lack of ability to enforce laws/policies on private lands** was also cited as an enforcement challenge.

According to the Nova Scotia OHVA, **enforcement** falls under the **responsibility of a 'peace officer,'** i.e., Conservation Officers within the Nova Scotia Department of Natural Resources and Renewables (DNR), local/town police and or the RCMP. Provincially there are 57-58 full-time **Conservation Officers**, approximately two per Nova Scotia county that have OHV enforcement as part of their broad mandate, according to the DNR informant.

"*RCMP and DNR do not have adequate numbers to dedicate personnel on a regular basis. DNR occasionally has a couple of officers on the trails but usually on a Tuesday or Wed, but seldom ever on the weekends when 90% of the drug use and riding takes place. It was bad when only booze was involved but the use of pot has made the problem significantly worst [sic].*" Survey Respondent

Survey participants were asked in the past two years how often they **noticed OHV enforcement officers** (i.e., any peace officer including natural resources, local/town police or RCMP) **when they ride**. Their responses (n=617) aligned with key informant perceptions with **8-in-10 stating never or rarely** (39% each), 19% answered sometimes and only 3% selected often.

"*Most provinces have adequate laws, but the enforcement just isn't there*." Key Informant

"*…lack of capacity to go in and enforce these things* [OHV policies]. *They have other priorities that they're essentially told matter more*." Key Informant

Opportunities

Enhanced enforcement of existing OHV rules was proposed as important to reduce injuries or death. Suggested examples included additional funding for more officers, having trail patrol or bylaw officers on trails as a 'trail warden system' and enhanced enforcement collaboration across organizations, (i.e., town police, RCMP and OHV officers working together regarding OHV enforcement).

"Stricter enforcement of the applicable legislation, and more enforcement staff and visibility." Survey Respondent

"Simple enforcement of the existing rules by DNR and the RCMP would curb 85% of the issues. Enforcement is almost non- existent and that allows reckless riders to break the rules because there is little fear of getting caught." Survey Respondent

"*…they're checking the low-hanging fruit. They can look at your license…check, see if you're registered or not…but it's more difficult to check whether somebody had a safety course or not. So, when enforcement does a blitz somewhere and they start asking people for the safety training …then you see a big surge of people wanting safety training in that area*." Key Informant

4.3 Policies/Trail Systems

An additional challenge was **ineffective policies** or 'loopholes' within them, such as the inability to enforce existing policies on private lands. Some informants also spoke to the **inconsistency in provincial regulations** across the country. Others iterated the need for **all levels of government** (federal, provincial, local) to develop responsible safety policies and regulations related to OHV standards and operation, including enforcement. For **those focused on injury prevention**, they suggested a **review of existing provincial policies** to see if anything needs to be strengthened. One informant focused on childhood injuries suggested OHVs should be 'treated like cars, banning their use under 16 years of age,' based on the injury data they have observed.

"…we're seeing kids having life-altering injuries from ATV incidents." Key Informant

"Legislation and enforcement are key public health measures to ensure the traffic safety environment (e.g., banning the production and use of certain designs) and the control of risky behaviors (e.g., driving under the influence of alcohol) to control injuries and deaths related to the use of quadbikes." Menon, 2022[17]

"*…there's a lot of exceptions in the policies."* Key Informant

Sustainable funding was also noted as a challenge, both to support **repeated educational campaigns** as well as to support **OHV infrastructure,** including trail maintenance, development and connectivity. Some informants spoke to a portion of provincial OHV registration costs being directed at trail infrastructure. Others noted that the trails themselves can contribute to injuries (i.e., sharp turns, unsafe grades). Survey respondents in particular pointed to the importance of trail development, maintenance and access.

"Trails should be widened to safely allow 2 way traffic to pass each other." Survey Respondent

"*Better infrastructure would mean less accidents, would mean more enforcement. It all comes hand in hand*." Key Informant

"Widening of trails and actually letting people use shoulder of the road for trail to trail purposes instead of making them use makeshift connection points where rollovers happen." Survey Respondent

4.4 Collaboration/Evidence-Informed Decision Making

Concerning **injury statistics**, one informant noted that the **lack of publicly available data regarding the prevalence of OHV injuries** causes an inability to engage partners in injury prevention. Another noted a **lack of detailed information** regarding the circumstances surrounding OHV incidents being collected when children present at the emergency room. Without this information, they do not know enough to say that an injury could have been more serious or could have been prevented.

"*The biggest [*challenge*], I would say, is probably not enough data and information…What was the size of the child? What was the size of the vehicle? What safety equipment were they wearing? Did they do any safety and education training? Where were they? Were they supervised?*" Key Informant

One suggestion was to **identify injury prevention leadership provincially**, including those responsible to get interested parties together to discuss the current state. Then **consistently gather data** to **understand what is happening** provincially so that **evidence-informed decisions** can be made: i.e., gather key organizations thereby taking a collective impact approach; gather available data; provide an overview of evidence-based interventions; discuss and collectively pick those interventions that

are doable within available resources/ supported by partners; implement the interventions, evaluate their impact and repeat the process.

In conjunction with the above would be the **standardized collection of detailed information** relating to OHV injuries/death, including contributing factors (e.g., helmet use), as well as the number of OHVs in use, in order to fully understand all aspects surrounding injuries/deaths.

5. Lessons Learned/Comments

Key informants were invited to share any final comments, suggestions or lessons learned. Many stressed the **themes of education, enforcement, policies** and **collaboration**, while a new theme of the **benefits of OHV use emerged**, which was also noted by survey respondents.

"*…when done safely with our responsible and safe usage regulations, it's a way to get kids not playing video games all day and engaging in the environment and being outdoors and getting fresh air and being physical*." Key Informant

Rider associations and COHV spoke to OHV use in light of the **benefits on riders' physical and mental health,** referring to OHV use as a power sport. Off-road motorcycle riding in particular requires a certain level of 'athleticism' - skills, strength and agility. As noted earlier in this report, the sales and use of OHVs increased significantly during the COVID-19 pandemic when Canadians were requested to stay home and or stay close to home. OHV use provided an outlet for Nova Scotians to be outside and or to be socially distant when with others.

"People engage in these activities because they are hugely beneficial mentally and physically. And we want to encourage more people to discover and engage in the sport that has so many benefits and at the same time do that responsibly and safely." COHV Informant

With respect to **partner collaboration,** one informant with an injury prevention focused organization reflected that they found **value in working 'with' rather than 'against' industry**. They acknowledged that there may be some things that organizations may not agree upon, but being open and transparent and sharing data and information can be informative. This also includes discussion of the evidence, or lack thereof, supporting any suggestions or recommendations for injury prevention initiatives, interventions or policies.

Along a similar line, another informant spoke to the importance of trying to '**break down the silos' amongst interested parties**, including across government departments. Another cited the importance of having **'everyone on the same page'** yet how challenging that can be when there is a lack of injury data/information.

Enforcement was re-iterated – policies or the OHVA alone are not going to prevent injuries if the rules are not enforced.

"*We also support the OHV Act. We believe that the Act in itself won't keep one person safe, but following the Act will. And we think that the greatest detractors for safety is the fact that the Act is a good Act, but it's not well enforced…we really need, in our opinion, additional enforcement so that folks realize that not only is this the rules, but you have to follow the rules*." Key Informant

A **Nova Scotia pilot project** (https://atvans.wildapricot.org/sharetheroad) was cited as an example of an initiative that supports a **safer, more regulated OHV environment**. In eight locations across the province, to support **trail connectivity issues**, people are allowed to ride legally on the shoulder of the road, or on the side of the road if the shoulder is too narrow, when travelling from one trail to another or from a trail to a service such as gas, food or accommodations. The three-year pilot project was extended by the province last year, with no known safety-related issues, incidents or fines. Extending this pilot into a regulated program was suggested by one key informant in order to continue to support responsible, safe OHV use. Survey respondents also repeated the importance of trail connectivity.

"SHARE THE ROAD! Snowmobiles are allowed to cross highways where ATVs/UTVs are not. Many times people take chances and drive faster on the road for fear of getting caught by police. If riders were legally allowed to use the shoulder of the road to access trails or amenities like gas or food, they would respect that privilege. Why rush or drive recklessly when you're not breaking the law? Share the road pilot project needs to be made law so every community can benefit. You will always have people who make bad choices, but law abiding citizens are not to blame. And I'd like to think there are more law abiding citizens than criminals!" Survey respondent

As noted earlier in this report, funding for **consistent messaging/annual education campaigns** was also reiterated. **Funding** was reinforced as a need to help offset costs **for training**, including the idea of offering training free for youth riders. One informant stated that the reason training completion rates are so high in New Brunswick is due to the rider's federation offsetting the cost of training. They also wondered if government could help support federations by buying needed **safety equipment** or if insurance companies could rebate some costs when rider training is completed. Interestingly, one informant suggested there is a lack of studies on what impact training has on rider behaviour.

6. Limitations

Overall, the research conducted was limited to the project scope and resource constraints. An exhaustive search of the literature/internet was not completed limiting the number of promising practices readily identified. A small number of individuals (n=14) and organizations were consulted (n=11) for the key informant interviews. The inclusion of unstructured conversations (n=2) resulted in lower amounts of shared information. Individual opinions expressed may not be reflective of others within their respective organizations. The OHV Rider Survey was primarily with participants from OHV associations and was non-randomized; perspectives may be different from others within their associations and or from the general public (OHV riders without association memberships).

As previously noted, the NSTR data has some information gaps: ATVs were not divided into traditional ATVs versus side-by-sides, which have some safety features such as seat belts and roll-cage enclosed cab, and are perceived as a safer vehicle by some; the size of OHV being driven is not documented therefore it is unknown if injured youth were riding an OHV that meets the requirements set out by the manufacturers and or Nova Scotia's legislation; and, the speed of the OHV at the time of the injury/death and trail/road conditions were unknown. Lastly, when categorical data total less than 5, they are not reportable making some calculations impossible.

Despite these noted limitations, the data shared by the NSTR provides valuable insights into the prevalence of injuries/deaths, the age and sex of those being injured and factors that may have contributed. Overall findings are similar to fatalities as reported by Statistics Canada.[11] Additionally, the volume of qualitative and quantitative information gathered from key informants, survey participants and subject matter experts, the diversity of organizations engaged, and the consistency in responses and themes suggests the information gathered will be useful for OHV injury prevention initiatives by IFNS.

7. Conclusion

IFNS was interested to understand the types of OHVs owned and used, the purpose of their ownership/use, rider beliefs, values and riding habits, injury-related data, changes in technology and product design, legislation/guidelines, promising injury prevention initiatives, as well as the partners or parties interested in OHV rider safety and injury prevention. Information was gathered from internet searches, secondary analysis of documents, key informant interviews, informal discussions, an online survey of OHV riders and data requests to the NS Trauma Registry and Registry of Motor Vehicles. This report provides a summary of findings for each aspect of the requested data.

Analysis of data from the NSTR from April 1, 2016 to March 31, 2021 revealed that there has been an **increase in the combined number of traumatic injuries and/or deaths** that have occurred in the province over time, in particular since the start of the COVID-19 pandemic with a **65%+ increase** from 2019-20 to 2020-21. Many of those that sustain a traumatic injury also suffer fractures and poly-trauma. The **overall fatality rate for OHV incidents is 1-in-10.** Most injuries occur during the **summer months**, with August 2020 recording the highest number of injuries of any month during the 5-year period. ATVs (which includes side-by-sides) are the most popular OHV-type in the province, as such, most injuries occur on ATVs; however, the **rate of injury for off-road motorcycle riders spiked 200%** from 2019-20 to 2020-21 (from 7 to 21 traumatic injuries/death). The mechanism of injury/death most often is **rollover** or **ejection** and **9-in-10 times** it's the **operator** that sustains the injury/death. Overall, **1/3** of those injured were **not wearing a helmet and 29% were impaired by alcohol beyond the legal limit**. Findings suggest **males aged 18 < 35 were injured most often, accounted for 62% of un-helmeted riders, and, of those tested for alcohol, 1-in-2 were impaired beyond the legal limit**.

The information gathered from all data sources provides insight into the culture of off-highway vehicle use, rider safety and injury prevention opportunities. Across informants and survey respondents, the **key themes were the need for enhanced education/awareness, enforcement**, and the sharing of **injury data/information** coupled with **partner collaboration.** The **development and maintenance of the trail system** along with the **review of existing policies and legislation** were also proposed as important aspects of injury prevention.

Next Steps

In order to further understand the current state, so that ideas and actions to improve rider safety and prevent injuries can be explored and solutions implemented system-wide, the consultant team suggests that all interested parties could benefit from **further collaboration, communication and evaluation** of their current and future rider safety and injury prevention activities. This includes a review of NSTR datasets for fiscal 2021-22 to understand if injuries/deaths have changed since March 31, 2021. Additionally, opportunities to expand the NSTR dataset so as to capture information that addresses knowledge gaps could be explored. Having the 'complete picture,' sharing that knowledge with interested parties and collaborating together on solutions (with evaluation) will allow Injury Free Nova Scotia and its partners to focus their resources on activities that may enhance OHV rider safety and prevent injuries. **Partners can include** riders and their associations (e.g., All-Terrain Vehicle Association of NS, Snowmobile Association of NS, NS Off-Road Riders Association), injury prevention organizations (e.g., IFNS, Child Safety Link), health care (e.g., Nova Scotia Health Authority, IWK Hospital, Public Health), enforcement (e.g., police agencies, Department of Natural Resources), legislators/policy makers (e.g., governments) and researchers (e.g., NSTR).

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Appendices

Appendix A: Project Participants

Thanks to all for your participation!

Injury Free Nova Scotia Project Leads:
Peri Lockhart, IFNS Health Promotion Consultant
Jenna Hopson, IFNS Board Co-Chair
Joy Chiekwe, IFNS Board Member

Key Informants:

Name	Title, Organization
Barry Barnet	Executive Director, ATVANS
Bianca Kennedy	President, COHV/MMIC
Corey Robar	Trails and OHV Program Officer, Department of Public Works
Don Stewart	President, SANS
Jim McGregor	Safety Committee Co-Chair, CQC
Li Liu	Technical Standards and Compliance, COHV/MMIC
Dr. Kirstin Weerdenburg	IWK Trauma Team Leader, Paediatric Emergency
Paul Demers	Director of Policy and Government Relations, COHV/MMIC
Ralph Matthews	Safety Committee Co-Chair, CQC
Dr. Richard Louis	Injury Prevention Specialist, NB Trauma Program
Samantha Noseworthy-Oliver	Health Promotion Specialist, Child Safety Link
Stephanie Cowle	Director, Knowledge Translation, Parachute

Information was also gathered from:

Josh Kelly	President and Training Chair, NSORRA
Sandra Olsen	Central Region Manager, Natural Resources and Renewables, Regional Services, Conservation Officer Service

Thanks as well to Karen Ssebazza, Trauma Registry Coordinator, Nova Scotia Health Trauma Program for her support and collaboration; to the Nova Scotia Registry of Motor Vehicles for OHV registration data; and, to those who participated in the NS OHV Rider Survey!

ATVANS: ATV Association of Nova Scotia
COHV/MMIC: Canadian Off-Highway Vehicle Distributors Council/Motorcycle & Moped Industry Council
CQC: Canadian Quad Council
NSORRA: Nova Scotia Off-Road Riders Association
SANS: Snowmobile Association of Nova Scotia

Appendix B: NS OHV Rider Survey

Injury Free Nova Scotia, a provincial non-profit organization committed to eliminating serious and preventable injuries, is currently conducting **research to increase and further its understanding of how to best prevent Off-Highway Vehicle (OHV) related injuries and/or death**. An independent consultant organization, Strive Health Management Consulting Inc., has been contracted to lead the research.

The **purpose** of this **anonymous survey** is to **gather information from Nova Scotia OHV riders (operators and passengers)** regarding the **types of OHVs driven, the ways they are being utilized and thoughts regarding safety**. Users of **all-terrain vehicles (ATVs & side-by-sides), off-road motorcycles and snowmobiles aged 16 and older** are invited to complete this **voluntary 10-minute survey** which is being distributed in collaboration with NSORRA, SANS and ATVANS.

All responses will be kept confidential and results will only be reported in an aggregate manner. **Your identity will not be associated with any responses you provide**. W**e value your input and the time you take to provide your feedback**. Your responses will help us better understand and support OHV injury prevention activities.

By clicking 'next' you acknowledge that you are a Nova Scotia resident 16 years of age or older and are giving your consent to participate in the survey. You are not obliged to answer all the questions and can discontinue at any point.

NEXT

Section A: OHV Experience

A1) In the past 2 years, have you participated in OHV riding? [Single response, **mandatory**]

a) Yes, as an operator
b) Yes, as a passenger *when selected, operator-only questions are hidden*
c) Yes, both as an operator and as a passenger
d) No *when selected, the individual skips to the youth section*

For this survey, OHV means an ATV, side-by-side, off-road motorcycle and or a snowmobile.

A2) What type of OHV do you ride? [Multiple response]

a) ATV
b) Side-by-side
c) Snowmobile
d) Off-road motorcycle
e) Other: _____ [Open text box]

A3) How many OHVs does your household own?
[Single numeric response]

A4) Are all of the household OHVs registered with the Nova Scotia Registry of Motor Vehicles? [Single response]

a) Yes
b) No *when selected, the individual is then asked QA5*
c) Not sure
d) No answer

A5) Why haven't you registered your OHV(s) with the NS Registry of Motor Vehicles? [Single response]

i) I wasn't aware it was a requirement
ii) I don't believe that we should have to register our OHVs
iii) I am exempt*
iv) Other: _____ [Open text box]

**You are exempt if you are: An operator who rides solely on our own property; or, A Status Indian who operates an OHV on communal Reserve land; or, A person related to a landowner by blood or marriage or common-law or registered domestic relationship and who rides solely on the related landowner's property.*

A6) What are the reasons you ride an OHV? [Multiple response]

a) Leisure/recreation
b) Physical activity/fitness
c) Utility on private property (snow removal, lawn maintenance, etc.)
d) Work
e) Transportation
f) Agriculture
g) Hunting
h) Fishing
i) Organized racing
j) Other: _____ [Open text box]

A7) At what age did you begin operating any type of OHV? [Single numeric response] *only for those that answered Yes to 1a or 1c (operators)*

A8) At what age did you begin riding as a passenger on any type of OHV? [Single numeric response] *only for those that answered Yes to 1a or 1c (passenger)*

A9) How long have you been operating: [Single response per row] *only for operators*

OHV Type	Less than 2 years	2-5 years	More than 5 years	I don't ride this type of OHV	No answer
An ATV	☐	☐	☐	☐	☐
A Side-by-side	☐	☐	☐	☐	☐
A Snowmobile	☐	☐	☐	☐	☐
An Off-road motorcycle	☐	☐	☐	☐	☐
Any other type of OHV	☐	☐	☐	☐	☐

A10) How many hours per week do you usually ride: [Single numeric response per row] *only for operators*

OHV Type	# Hours
An ATV	☐
A Side-by-side	☐
A Snowmobile	☐
An Off-road motorcycle	☐
Any other type of OHV	☐

For seasonal OHVs (e.g. snowmobiles), how many hours per week do you ride during riding season?

A11) How often do you typically ride an OHV in the following ways? [Single response per row] *only for operators*

	Never	Rarely	Sometimes	Often	Always	No answer
Riding alone	☐	☐	☐	☐	☐	☐
Riding in a small group	☐	☐	☐	☐	☐	☐
Riding in large or organized rides	☐	☐	☐	☐	☐	☐
Riding with children under 12 years old as a passenger	☐	☐	☐	☐	☐	☐
Riding while supervising another rider under 16 years old	☐	☐	☐	☐	☐	☐
Riding faster than conditions allow	☐	☐	☐	☐	☐	☐
Riding while its dark outside	☐	☐	☐	☐	☐	☐

A12) How often do you typically ride an OHV in the following places? [Single response per row] *only for operators*

Places you ride	Never	Rarely	Sometimes	Often	Always
On paved roads	☐	☐	☐	☐	☐
On paved roads, but only to travel from one trail to another or to access services	☐	☐	☐	☐	☐
On gravel roads	☐	☐	☐	☐	☐
On designated trails	☐	☐	☐	☐	☐
On private trails	☐	☐	☐	☐	☐
Remotely off trails	☐	☐	☐	☐	☐

On beaches, dunes, wetlands or bogs	☐	☐	☐	☐	☐
On frozen waterways	☐	☐	☐	☐	☐

A13) In the past 2 years, how often have you noticed OHV enforcement officers (i.e., any peace officer including natural resources, local/town police or RCMP) when you ride? [Single response]

a) Never
b) Rarely
c) Sometimes
d) Often
e) Always
f) No answer

Section B: OHV Safety

B1) Please rate your level of agreement with the following statements. [Single response per row] *only for operators*

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	No answer
I have significantly better OHV driving skills this year versus last year	☐	☐	☐	☐	☐	☐
I feel that I am more skilled at OHV driving than others in my community	☐	☐	☐	☐	☐	☐
I am aware of provincial OHV regulations	☐	☐	☐	☐	☐	☐
I know which trails are officially designated as OHV trails	☐	☐	☐	☐	☐	☐

B2) What type of safety equipment do you use while riding an OHV? [Single response per row]

	Never	Rarely	Sometimes	Often	Always	No answer
A helmet that meets safety standards (e.g., DOT, SNELL, BSI, CSA approved)	☐	☐	☐	☐	☐	☐
Riding boots	☐	☐	☐	☐	☐	☐
Eye protection	☐	☐	☐	☐	☐	☐
Gloves	☐	☐	☐	☐	☐	☐
Protective pads	☐	☐	☐	☐	☐	☐

A crush protection device	□	□	□	□	□	□

B3) Which factors do you think prevent the use of OHV safety equipment by riders? [Multiple response]

a) The cost of the equipment
b) The availability of the equipment (meaning you can't find the safety gear or the right sized equipment is not currently available)
c) Not being aware that safety equipment is required/recommended
d) Don't like to use safety equipment
e) Don't believe safety equipment increases safety
f) Other: _____ [Open text box]

B4) Have you ever operated OHV while using substances, including alcohol, cannabis or cocaine? This means any amount of substance, regardless of whether or not you feel the effects. [Single response] *only for operators*

a) Never
b) I have in the past but don't now
c) Yes, I sometimes ride while using substances *when selected, the individual is then asked B5*
d) Yes, I often ride while using substances *when selected, then asked B5.*
e) No answer

Reminder: all responses are anonymous.

B5) Which substances do you use while driving an OHV? [Multiple response] *only for those that answered yes (c or d) to B4*

a) Alcohol
b) Cannabis
c) Cocaine
d) Other: _____ [Open text box]

B6) Have you obtained an OHV safety training certificate or passed a safety training test? [Single response] *only for operators*

a) Yes
b) No *when selected, B7 is asked*
c) I'm exempt*
d) No answer

**You are exempt from the requirement to take safety training if you: Were 19 years or older before April 1, 2006 (born before April 1, 1987); and, Purchased an OHV before April 1, 2006; and, Registered an OHV on or before September 30, 2007; and, Have a valid driver's license; and, Are not a parent/guardian of an operator under 16 years old. You are also exempt if: Your spouse is exempt; You have proof that you passed a Canada Safety Council OHV Course (1991 or later); You are an employee who is using the OHV in activities relating to your job, your employer complies with the Occupational Health and Safety Act and ensures that you are a competent user of OHV equipment or provides training if you are not; You are self-employed (for example, farmer, fisher, forest worker while using OHVs for your work), except Guides (for example, any person, who for compensation or reward received or contracted for, supervises and assists another person who is operating on OHV for recreational purposes); You are a federal, provincial, or municipal government employee or peace officer while engaged in activities related to your duties; or, You operate a golf cart on a public or private golf course.*

B7) Why have you not obtained a safety training certificate or passed a safety training test? [Single response] *only for those that answered no to B6*

i) The cost for safety training is too high
ii) I don't believe that you need a safety training certificate to ride an OHV
iii) I don't have access to safety training where I live/ride
iv) Other: _____ [Open text box]
v) No answer

B8) Have you completed advanced rider training? [Single response] *only for motorcycle operators*

a) Yes
b) No *If no, ask B9*
c) No answer

B9) Would you be interested in taking an advanced rider training course? *only for those that answered no to B8*

a) Yes
b) No
c) No answer

Section C: Youth riders

C1) Are you **a parent/guardian of at least one person under the age of 16** that rides an OHV as an operator or a passenger? [Single response, **mandatory**]

a) Yes, they ride as an operator
b) Yes, they ride as a passenger
c) Yes, they ride as an operator and a passenger
d) No *skip to next section; if No to A1 and No to C1, send to Closing section*

C2) Which type of OHV does the youth(s) operate? [Multiple response] *only for those that indicated a youth operator in C1 (a or c)*

a) ATV
b) Side-by-side
c) Snowmobile
d) Off-road motorcycle
e) Other: _____ [Open text box]

C3) Nova Scotia currently has ATV size requirements for youth operators. Please select that statement that best fits your situation. [Single response] *only for those that answered ATV to C2*

a) I was not aware of any ATV size requirements for youth operators in Nova Scotia.
b) The youth(s) operate an ATV that is sized according to the manufacturer's recommendations (e.g., Y-6+, Y-10+, Y-12+, Category T).
c) The youth(s) operate an ATV that is sized for their age according to Nova Scotia requirements (i.e., aged 12-15 with an engine size of 70-90cc, or aged 6-11 with an engine size of less than 70cc).

d) The youth(s) operate an ATV that is sized for them personally based upon factors like their physical size, strength, coordination, visual perception, emotional maturity and or ability to reason and make good decisions.
e) Other: _____ [Open text box]
f) No answer

C4) Please answer the following questions about the youth rider(s). [Age dropdowns 1-16] *information for up to 5 youth operators/passengers can be added*

Current age	Age they began riding as a passenger	Age they began operating
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--

C5) Have all youth operators completed an approved safety training course? [Single response] *only for those that indicated a youth operator in C1 (a or c)*

a) Yes
b) No *when selected, C6 is asked*
c) No answer

C6) Why has the youth(s) not completed an approved safety training course? [Single response] *only for those that answered 'no' to C5*

a) The cost for safety training is too high
b) They only ride on private property
c) They don't have access to safety training where they live/ride
d) I don't believe that they need a safety training course
e) Other: _____ [Open text box]
f) No answer

C7) What type of safety equipment is used by the youth(s) while riding an OHV? [Single response per row]

	Never	Rarely	Sometimes	Often	Always	No answer
A helmet that meets safety standards (e.g., DOT, SNELL, BSI, CSA approved)	☐	☐	☐	☐	☐	☐
Riding boots	☐	☐	☐	☐	☐	☐
Eye protection	☐	☐	☐	☐	☐	☐
Gloves	☐	☐	☐	☐	☐	☐
Protective pads	☐	☐	☐	☐	☐	☐
A crush protection device	☐	☐	☐	☐	☐	☐

C8) What are the reasons they ride an OHV? [Multiple response]

a) Leisure/recreation

b) Physical activity/fitness
c) Utility on private property (snow removal, lawn maintenance, etc.)
d) Work
e) Transportation
f) Agriculture
g) Hunting
h) Fishing
i) Organized racing
j) Other: _____ [Open text box]

C9) Has the youth ever sustained an injury while riding an OHV, either as an operator or a passenger?
a) Yes, as an operator *when selected, C10 & 11 are asked*
b) Yes, as a passenger *when selected, C10 & 11 are asked*
c) No
d) No answer

C10) What type of injury did they sustain? [Open text box] *only if C9 indicates yes*

C11) Please provide details on how the injury occurred. [Open text box] *only if C9 indicates yes*

Section D: OHV Injuries

D1) Have you ever been injured when riding an OHV? [Single response]
a) Yes *when selected, D2 and D3 are asked*
b) No
c) I have had a near miss in the past
d) No answer

D2) What type of injury did you sustain? [Open text box] *only if D1 indicates yes*

D3) Please provide details on how the injury occurred. [Open text box] *only if D1 indicates yes*

D4) Below is a list of factors that may increase the risk of injury when riding an OHV. Please rank the following statements where the most important factors that could increase the risk of injury are ranked first. [Drag-and-drop ranking list]
a) Riding faster than conditions allow
b) The lack of use of safety equipment
c) Riding while under the influence of substances including alcohol, cannabis and others
d) The trails themselves
e) The lack of rider skills or training
f) Riding on OHV that's too big for the individual
g) Lack of enforcement of OHV rules/regulations

D5) Where do you look for OHV safety information? [Multiple response]

a) From riders' associations
b) From OHV manufacturers
c) From the government
d) From a friend or family
e) I don't look for safety information
f) Other: _____ [Open text box]

Section E: Changes in OHV Technology

E1) Have there been changes in OHV technology and design that you think make riding an OHV safer nowadays versus in the past? If so, please describe the changes and their impacts.? [Open text box]

E2) Have there been changes in OHV technology and design that you think make riding an OHV less safe nowadays versus in the past? If so, please describe the changes and their impacts. [Open text box]

Section F: Closing

F1) In Nova Scotia, there have been deaths and tragic injuries related to OHV use. Why do you think these have occurred? [Open text box] *asked to all participants, including non-riders and non-parent/guardians*

F2) What ideas do you have that could improve OHV rider safety and prevent injuries? [Open text box] *asked to all participants, including non-riders and non-parent/guardians*

Section G: Demographics

The following questions help us understand who has responded to this survey.

G1) In which county do you live? [Dropdown, Nova Scotia counties]

G2) In which county do you most often ride? [Dropdown, Nova Scotia counties, don't know/not sure]

G3) Do you belong to an OHV riders' association? [Single response]
a) Yes *when selected, asked G4*
b) No
c) No answer

G4) To which association(s) do you belong? [Multiple response] *only if G3 indicates yes*
i) ATVANS
ii) NSORRA
iii) SANS
iv) Other: _____ [Open text box]

G5) What is your gender identity?
a) Male

b) Female
c) Non-binary/non-conforming
d) No answer

G6) What is your age? [Single numeric response]

G7) What is your annual household income? [Single response]
a) Under $20,000
b) $20,000 - $29,999
c) $30,000 - $39,999
d) $40,000 - $49,999
e) $50,000 - $59,999
f) $60,000 - $79,999
g) $80,000 - $99,999
h) $100,000 or over
i) No answer

G8) Please specify your highest level of education. [Single response]
a) No high school diploma or certificate
b) High school diploma or equivalency certificate
c) No post-secondary degree, certificate or diploma but received some post-secondary education
d) Post-secondary certificate or diploma below bachelor level (e.g., trades certificate, college, or CEGEP diploma)
e) Bachelor's degree, university certificate or diploma above bachelor level
f) No answer

SUBMIT

Those are all the questions we have for you today. **Thank you for taking the time to respond** to our survey. **Your feedback is greatly appreciated**.

Appendix C: COHV/MMIC Safety Information and Standards

The following information was provided by COHV.

The Canadian Off-Highway Vehicle Distributors Council (COHV), originally founded in 1984, is a national, non-profit, trade association, which represents the responsible interests of the major OHV distributors, as well as the manufacturers, distributors and retail outlets of OHV-related products and services in Canada. The Motorcycle and Moped Industry Council (MMIC) originally founded in 1971, is a companion national, non-profit, trade association which represents the responsible interests of the major motorcycle and scooter manufacturers, as well as the manufacturers, distributors and retail outlets of motorcycle and scooter-related products and services in Canada. Note: The acronym 'COHV' from hereafter includes MMIC. *Report Edit*: visit https://motocanada.com for further details and reports.

COHV member companies account for approximately 90 percent of the new recreational off highway vehicles, all-terrain vehicles and off-road motorcycles sold in Canada. The COHV is funded entirely by its members and Industry Partners and by the programs and services it offers. Member companies such as Textron Off Road, Bombardier Recreational Products & Vehicles, Honda, Kawasaki, KTM, Polaris, Suzuki and Yamaha are committed to the integrity of the OHV industry.

The COHV mission is the ongoing education and training of the general public on the safe and responsible use of all-terrain vehicles, recreational off-highway vehicles (side-by-sides) and off-road motorcycles, as well as to promote the responsible interests of riders and the industry.

The COHV strongly supports practical, workable and enforceable policies to further improve rider safety. That is why the COHV and its member companies have been developing and undertaking safety programs for riders of ATVs, especially for children, since its formation. The industry has taken a strong leadership position in establishing, in conjunction with safety organizations, age restrictions, engine size restrictions, speed restrictions and usage recommendations. As an industry council, they know that safety recommendations need to be based on sound scientific data.

ATV Standards

The American National Standards Institute (ANSI) is a private non-profit organization that oversees the development of standards for products, services, processes, systems, and personnel in the United States. The ANSI –SVIA Standard for Four Wheel All-Terrain Vehicles and the ANSI –SVIA Standard for Recreational Off-Highway Vehicle standards are adhered to by COHV member companies.

The process of having standards developed is quite rigorous and all parties involved in the use of the product, service, etc. for which the standard is being developed must be involved. In addition, throughout standards development, there is due process which must be followed and the process can take many years to ensure thoroughness. Standards updates are similarly thorough.
The ANSI-SVIA standards for All-Terrain Vehicles have been updated every few years to ensure manufacturing developments aligned with high-quality and uniform standards. The most recent update was in 2017, and adopted by COHV companies in 2018.

In each new version of the industry standard, new safety innovations and safety improvements were introduced. The latest version of the standard includes, among other items, enhanced requirements for lateral and pitch stability, occupant handholds, rollover protective structure (ROPS), occupant retention system, (ORS), and more requirements for labels on the vehicle and in the Owner's Manual. Even though

the industry standard is not mandatory, all the COHV members voluntarily comply with the standards.

In the most recent version of the ROV standard COHV 2-2017 (ANSI/ROHVA 1-2016), some safety measures such as rollover protective structure (ROPS) and occupant's retention system (ORS) were enhanced.

There are three Industry Voluntary Standards for four-wheel off-highway vehicles, not including two-wheel off-highway motorcycles. When addressing safety and riding skills, it would be more appropriate to differentiate each type of off-highway vehicle, as their design and operational characteristics are very different.
The three different types of OHVs and the Canadian Industry Standards for each are outlined below.
COHV 1-2018 Canadian Standard for Four Wheel All-Terrain Vehicles

All-terrain vehicle (ATV). A motorized off-highway vehicle designed to travel on four low pressure tires, having a seat designed to be straddled by the operator and handlebars for steering control.

ATVs are subdivided into two types as designated by the manufacturer.

Type I – A Type I ATV is intended for use by a single operator and no passenger.
Type II – A Type II ATV is intended for use by an operator or an operator and a passenger. It is equipped with a designated seating position behind the operator designed to be straddled by no more than one passenger.

Type I ATVs are further identified by three intended usage categories as follows:

(1) Category G (General Use Model) ATV. An ATV intended for recreational and/or utility use by an operator age 16 or older.
(2) Category S (Sport Model) ATV. An ATV intended for recreational use by an experienced operator, age 16 or older.
(3) Category Y (Youth Model) ATV. An ATV of appropriate size intended for recreational use under adult supervision by an operator under age 16. Youth model ATVs can further be categorized as follows:
    (a) Category Y-6+ ATV. A Category Y-6+ ATV is a youth model ATV that is intended for use by children age 6 or older.
    (b) Category Y-10+ ATV. A Category Y-10+ ATV is a youth model ATV that is intended for use by children age 10 or older.
    (c) Category Y-12+ ATV. A Category Y-12+ ATV is a youth model ATV that is intended for use by children age 12 or older.
(4) Category T (Transition Model) ATV. A Category T ATV is an ATV of appropriate size that is intended for recreational use by an operator age 14 or older under adult supervision, or by an operator age 16 or older.

Type II ATVs are limited to one intended usage category as follows:

(1) Category G (General Use Model) ATV. An ATV intended for recreational and/or utility use by an operator age 16 or older with or without a passenger.

COHV 2 -2017 Canadian Standard for Recreational Off-Highway Vehicles
Recreational Off-highway Vehicle (ROV). A motorized off-highway vehicle designed to travel on four or more tires, intended by the manufacturer for recreational use by one or more persons and having the following characteristics:

- A steering wheel for steering control
- Foot controls for throttle and service brake
- Non-straddle seating
- Maximum speed capability greater than 30 MPH (48 km/h)
- Gross Vehicle Weight Rating (GVWR) no greater than 1700 kg (3750 lbs)
- Less than 2030 mm (80 in) in overall width, exclusive of accessories
- Engine displacement equal to or less than 1,000cc (61cubic inch) for gasoline fueled engines
- Identification by means of a 17-character PIN or VIN

COHV 3-2017 Canadian Standard for Multipurpose Off-Highway Utility Vehicles
A Multipurpose Off-highway Utility Vehicles (MOHUV) has features specifically intended for utility use and has the following characteristics:

- intended to transport a person(s) and/or cargo, with a top speed in excess of 25 mph (40.2 km/h)
- 2030 mm (80 in) or less in overall width;
- designed to travel on four or more wheels, two or four tracks, or combination of four or more tracks and wheels;
- using a steering wheel for steering control;
- with a non-straddle seat;
- with a Gross Vehicle Weight Rating of no more than 1814 kg (4000 lb), and
- with a minimum cargo capacity of 159 kg (350 lb).

<u>Children and Safety</u>
In commencing such a dialogue on ATV safety, it is recognized that most children injured in ATV accidents are with the use of adult-sized ATVs. The COHV recommends that no one under the age of 16 years be permitted to ride an adult-sized machine. Therefore, any safety-related policy intending to improve child safety should include a prohibition from operating adult-sized ATV machines.

Our manufacturers consequently make recommendations on engine sizes, maximum speeds and size and weight of machines based on age, and not on weight and height. Age Determination Guidelines were developed by the Consumer Product Safety Commission and most recently updated in 2020 to address consumer product characteristics to the skills, play behaviours and interests of children. The Consumer Product Safety Commission – referenced frequently in Off-Highway Vehicle legislation in Canada and the United States – is an independent agency of the United States government which promotes the safety of consumer products by addressing “unreasonable risks” of injury; developing uniform safety standards; and conducting research into product-related illness and injury.

Statistics from the CPSC show that there are many fewer accidents and injuries when riding an appropriately-sized youth model ATV. CPSC statistics consistently indicate over 90 percent of all youth injuries could be prevented if legislation is implemented and enforced that requires youth to ride appropriately-sized all-terrain vehicles and be closely supervised by a parent, guardian or adult 19 years of age or older.

Therefore, the COHV has always recommended the following guidelines on age requirements:

- that rider education be mandatory for new riders under 16 years of age,
- that children under the age of 6 years should not be permitted to operate an ATV,
- that youth from 6 and under 12 should never operate an ATV with an engine size 70 cc or greater and that children from 12 and under 16 never operate an ATV with an engine size larger than 90 cc, and
- that all youth under 16 years of age must be supervised by an adult at least nineteen years of age or older.

These recommendations are incorporated in our Voluntary Standard and provide a sound basis for regulating the use of ATVs designed for use by persons under 16. To justify a different standard would require refuting the best available information on ATV safety.

The standard provides for 2 child-sized categories of ATV for those under 16 years of age. The first is intended for use by children 6 to 12 years of age (Y-6) with an engine size of 70 cc or less and an unrestricted maximum speed of 24 km/h or less, and the second is intended for use by children from 12 to 16 years of age (Y-12) with an engine size of 90 cc or less and an unrestricted maximum speed of 48 km/h or less.

The standard also specifies that youth model ATVs shall be equipped with a means of limiting throttle travel or other means of limiting the maximum speed attainable by the ATV. The speed limiting devices for Y-6 ATVs shall be capable of limiting maximum speed to 16 km/h or less. The speed limiting devices for Y-12 ATVs shall be capable of limiting maximum speed to 24 km/h or less. Most of Y-6 ATVs are equipped with a safety tether for adults to control the riding. An age warning label is also required to be affixed on all ATVs. To ensure that youth ATVs are not used at night, they are not permitted to have a headlight or taillight.

Training

The COHV strongly supports rider training and education through recognized and approved organizations such as the Canada Safety Council and the Rider Training Institute.
The COHV has provided funding to approved ATV rider training programs across the country since 1986. We also support mandatory safety education for all youth under the age of 16 years old. Since 1986, thousands of children age 6 to 15 have been trained to ride off-road motorcycles and ATVs.

With appropriate government regulation and support, education about all-terrain vehicles can be provided to all children six years of age to fifteen years of age whose parents or guardians specifically allow them to ride. All rider education of youth under 16 years of age must focus on riding only appropriately-sized youth all-terrain vehicles as recommended by the CPSC and manufacturer and mandatory close supervision by an adult at all times. With these safety measures and including mandatory parental or guardian supervision, riding an appropriately-sized youth model ATV is safer than many other recreational activities.

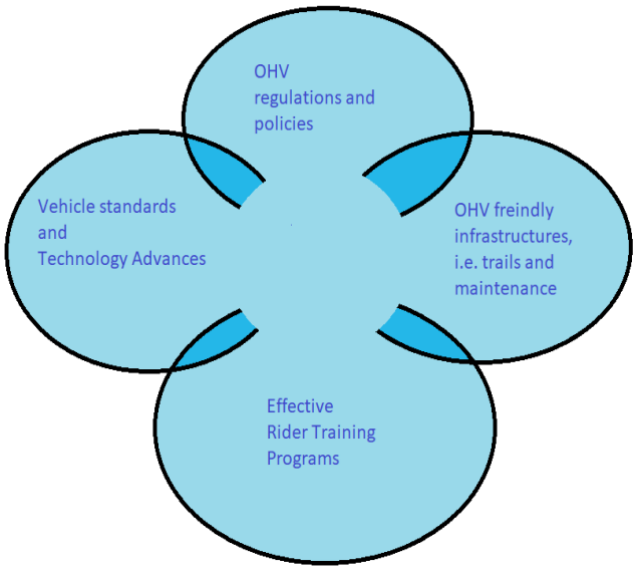
Off-Highway Vehicle Safety Strategy

COHV has been at the forefront of Off Highway Vehicle rider safety since its formation in 1984. To continue to improve rider safety, there are at least four interconnected components that should be taken into consideration.

- **Effective Rider Education and Training programs**. The OHV industry has developed rider training programs and offered safety materials free of charge for ROVs, ATVs and off-road motorcycles

for many years. The COHV provides funding to provincial rider federations to promote and undertake rider training.

- **Policies, Regulation and Enforcement**. For over 35 years the COHV and MMIC have worked with federal and provincial governments to develop responsible safety policies and regulations related to vehicle standards and operation. It has always been the case that we work to improve rider safety in conjunction with all levels of government.
- **Infrastructure that is OHV friendly**. The OHV industry has been advocating and funding OHV trail development and maintenance for many years, to help ensure an appropriate and safe place to ride and to reduce impacts on the environment. As mentioned, the OHV industry has funded and assisted OHV national and provincial federations for many years. Well-organized rider groups can effectively promote safety and responsible riding, and can take an important role for trail safety and maintenance.
- **Vehicle Standards and Technological Advances**. The OHV industry developed standards in conjunction with the American National Standards Institute and all of the COHV member companies voluntarily comply with them. Over the past 20 years, the standards have been revised many times to introduce and expand the application of available new technologies. As an example, today's ROVs have many more rider safety features than 10 years ago.



Working with a comprehensive strategy as outlined above will be the most effective approach to continue to improve rider safety. Further evidence that this approach is working can be found in the CPSC 2018 Annual report of ATV-Related Deaths and Injuries (published in Feb. 2020) which states that:

> *The 2018 emergency department-treated injury estimate for all ages reflects a decrease of 13 percent from the 2017 estimate, which is statistically significant (p-value =0.0197). The overall decrease of 38 percent between the estimated number of injuries in 2009 and 2018 is also statistically significant (pvalue < 0.0001). Linear trend analysis additionally indicates a statistically significant downward trend in ATV-related emergency department-treated injuries for all ages, collectively, during the years from 2009 through 2018 (p-value = 0.0073).*

The CPSC annual study provides a clear indication of the trend. The safety improvement in the past 10 years is not only a result of new technologies, but also a result of the combination of all four areas shown above. Finally, as an important part of the COHV Voluntary Standard, all ATVs are affixed with Warning Labels, with wording such as:

- Never operate without proper training or instruction;
- Never operate on public road;
- Never operate with a passenger (if it is designed for one person only);
- Never permit children under age 16 to operate this ATV (for ATVs larger than 90cc)
- Adult supervision required for children under age 16.

Appendix D: ATV/OHV Legislation Summary (Parachute)

Please refer to each provincial Act for scope of vehicle coverage.

Province/ Territory*	Mandatory Driver Safety Training	Mandatory Helmet Use	Minimum Operating Age, Location for Use, Supervision
British Columbia Off-Road Vehicle Act	**Yes** (mandatory for children 14 years of age and older if riding unsupervised by a parent)	**Yes**	A person 19 years of age or older must not authorize or permit another person < 16 years of age to operate an ATV. A child may use or operate an off-road vehicle on Crown land or private land without being supervised if the child is of the minimum recommended age, height and weight specified by the manufacturer, is at least 14 or 15 years of age, and a parent or guardian of the child states, in writing, that the child has appropriate training to use or operate the class of ATV, and the parent or guardian consents to the child using or operating the ATV without adult supervision. A child must carry a copy of the form.
Alberta Traffic Safety Act Vehicle Regulation Traffic Safety Act, Part 6	**No**	**Yes** Required on all public land, unless: ATV has manufacturer installed rollover protective structures and seat belts that are properly worn; and meets standards for a motor vehicle designed for roadway use.	Children <14 years cannot operate an ATV on a highway. Children < 14 years cannot operate an ATV on public property unless they are supervised by an adult who is 18 years of age or older and who occupies the passenger seat of the ATV or is following in close proximity to the ATV. If operating on private property, no age restriction applies.
Saskatchewan All Terrain Vehicles Act Traffic Safety Act	**Yes** (Only for children aged 12 to 15)	**Yes** (Does not apply when operating on land owned by themselves, the passenger or an immediate family member of either)	Children < 16 years can operate an ATV on land owned by an immediate family member. Children ages 12-15 years can operate an ATV on public or private property, on an untraveled portion of the highway or for the purposes of crossing a highway at the shortest route available, only if they have passed an approved ATV training course, or are accompanied on the ATV or are supervised by a person who has held continuously for the immediately preceding 365 days a permit to operate an ATV. Must have permission to operate an ATV on private land or Crown land used or occupied otherwise than by the Crown.

Province/ Territory*	Mandatory Driver Safety Training	Mandatory Helmet Use	Minimum Operating Age, Location for Use, Supervision
Manitoba Off-Road Vehicles Act	**No**	**Yes** Does not apply when operating an ATV for the purpose of farming, commercial fishing, hunting or trapping OR if the ATV is equipped with roll-over protection and seat belt assemblies that meet regulations and are properly worn.	Children under 14 years can operate an ATV provided they are supervised and accompanied by a parent or an adult who is at least the age of 18 years (and authorized by the parent) and is in clear view of the ATV during operation.
Ontario Off-Road Vehicle Act (ORV) Highway Traffic Act (HTA)	**No**	**Yes** Does not apply when operating an ATV on land occupied by the owner of the ATV	ORV: Children under 12 years cannot operate an ATV unless they are operating the ATV on land occupied by the vehicle owner or are closely supervised by an adult. HTA: No one is permitted to drive an ATV on a highway except in accordance with the regulations and applicable municipal by-laws.
Quebec An Act respecting Off-Highway Vehicles	**Yes** If operator is a minor, must have a certificate from an officer authorized by the Government, attesting they have competence and knowledge required to operate ATV.	**Yes**	Minimum driver age of 16 years for adult sized ATVs. Children under 16 years can operate youth sized ATVs as approved by regulation.
New Brunswick Off-Road Vehicle Act	**Yes** <16 years old	**Yes**	Children that are at least 14 years of age, and under 16 years of age, can operate an ATV appropriate for a person of that age provided they have completed an approved training course and are in clear view of and supervised by an adult who is 19 years of age or older and has completed a safety training course.

Province/ Territory*	Mandatory Driver Safety Training	Mandatory Helmet Use	Minimum Operating Age, Location for Use, Supervision
Nova Scotia Off-Highway Vehicles Act, Chapter 323 (OHVA)	**Yes**	**Yes**	Children that are at least 14 years of age, and under 16 years of age, can operate an ATV with direct parental/guardian supervision in clear sight, and both child and parent/guardian need to complete an approved safety training course. Children under 16 years of age can operate an ATV in a closed course with enforced course rules, provided they are supervised by a parent or guardian, have completed an approved safety training course, are wearing protective equipment, are operating an ATV that is fit for their age, size and capability and a trained official and trained first respondent are present.
Prince Edward Island Off-Highway Vehicles Act – General Regulations	**Yes** Mandatory for ages 14-15 and those without a valid driver's license for a minimum of 24 months	**Yes**	Children that are at least 14 years of age, and under 16 years of age, can operate an ATV if they have completed an approved safety training course and are directly supervised by an adult who either has held a valid driver's license for at least 24 months prior to supervising or holds a valid driver's license and has completed an approved safety training course. Individuals over the age of 16 years must have held a valid driver's license for at least 24 months or have completed an approved safety training course to operate an ATV.
Newfoundland and Labrador Motorized Snow Vehicles and All-Terrain Vehicles Act – Regulation	**No**	**Yes**	Children that are at least 14 years of age, and under 16 years of age, can only operate an ATV appropriate for their age, size and capabilities (90cc or less) and must be supervised~ by an adult who is 19 years of age or older. ~Supervision must consist of visual and voice communication with the operator.
Yukon Motor Vehicles Act	**No**	**Yes** Those 16 years of age or younger must wear a helmet.	When operating an off-road vehicle on, or crossing over a maintained road, you must have a valid driver's licence. Municipalities & communities may have their own rules for ATV use and should be consulted before riding an ATV.
Northwest Territories All-Terrain Vehicles Act **Nunavut** All-Terrain Vehicles Act	**No**	**Yes**	Minimum driver age of 14 years to drive on highway.

NOTES: OHVs include ATVs and can include snowmobiles, dirt bikes, motocross bikes, amphibious vehicles, quad bikes, etc. *Municipal Authorities may enact by-laws regulating the use of ATVs within their jurisdictions. Consult local municipality for any related by-laws; local authorities for further interpretation and current status. Parachute.ca July 2019

Appendix E: Nova Scotia Trauma Registry

Aggregate-level data from the Nova Scotia Trauma Registry (NSTR) were provided for Injury Free Nova Scotia. Data was pulled from the NSTR which contains all major traumas occurring within the province of Nova Scotia. The time frame of the analysis was April 1, 2016 to March 31, 2021.

The major trauma definition used by the NSTR is as follows:
Injuries resulting from a transfer of energy (mechanical, chemical or thermal) and resulting in an anatomical lesion due to an appropriate mechanism described by the Inclusion ICD-10-CA External Cause of Injury codes and one of the following criteria below:

- ISS ≥ 12 for blunt or burn trauma or hanging/drowning/other asphyxia or…
- ISS ≥ 9 for penetrating trauma or…
- Trauma Team Activation with/without admission to acute care facility, regardless of ISS or…
- Death in the Emergency Department due to appropriate mechanism of injury, regardless of ISS*(not superficial) or…
- Death within 24 hours of arrival to hospital due to appropriate mechanism of injury, regardless of ISS* (not superficial). Post 24 hours – must meet ISS criteria. Or…
- Death at the scene due to appropriate mechanism of injury, regardless of ISS* (not superficial) or…
- Predetermined inclusion at another trauma centre, where the individual has been treated and admitted, prior to transfer to a second, or third trauma centre for continuing care of initial injury.

Thank you to Karen Ssebazza, Trauma Registry Coordinator, Nova Scotia Health Trauma Program for her support and collaboration!