



## *Vermont Legislative Research Service*

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### **The Impact of ATV and OHV use on Water Quality**

All-terrain vehicles (ATVs) and off-highway vehicles (OHVs) are common in the state of Vermont due to the large expanses of undeveloped land and the agriculture industry. In this report, we outline the impact of all-terrain vehicles and off-highway vehicles on water quality in Vermont. We give an overview of ATVs and OHVs the the impacts that they have on water quality. Also included is an overview of laws that regulate ATV use around the country as well as in the state of Vermont.

### **General Overview of ATVs/OHVs**

#### **Definitions**

- **ATV:** All-Terrain Vehicles are any nonhighway recreational vehicles, excluding snowmobiles. All-terrain vehicles have at least two low pressure tires, are not wider than 64 inches, have a dry weight of less than 2,500 pounds and are used for cross-country trails or on a combination of “land, water, snow, ice, marsh, swampland, and natural terrain.” ATVs do not include any “electric personal assistive mobility device” or electric bicycles.<sup>1</sup>
- **OHV:** Off-Highway Vehicles are recreational vehicles that are often used on cross-country trails or on a combination of “land, water, snow, ice, marsh, swampland, and natural terrain.” These vehicles are specifically operating off-highway. Includes light trucks, motorcycles, and snowmobiles, etc. <sup>2</sup>

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<sup>1</sup> Vermont General Assembly, “Title 23: Motor Vehicles Chapter 032: All-Terrain Vehicles,” accessed November 2023, <https://legislature.vermont.gov/statutes/section/23/031/03501>.

<sup>2</sup> The State of Vermont, Agency of Transportation, Department of Motor Vehicles, “Vermont All-Terrain Manual,” accessed December 27, 2023, [https://dmv.vermont.gov/sites/dmv/files/documents/VN-023-ATV\\_Driver\\_Manual.pdf](https://dmv.vermont.gov/sites/dmv/files/documents/VN-023-ATV_Driver_Manual.pdf); United States Department of Agriculture Forest Service, “OHV Riding and Camping,” accessed November 2023, <https://www.fs.usda.gov/activity/superior/recreation/ohv>.

## Fuel and Use

ATVs and OHVs use gasoline for most of their fuel. According to a report by the U.S. Department of Transportation, as of 2021, ATVs use 55.5 gallons per ATV per year for each state. Other OHVs can use anywhere from 59 to 100 gallons per OHV per year for each state.<sup>3</sup>

According to the U.S. Department of Transportation, Federal Highway Administration OHVs can be used for all different types of uses. According to this report, 74% of ATV drivers used ATVs for at least one non-recreational activity such as farming or hunting in 1997. Because this data is older this number could have changed by 2023.<sup>4</sup>

ATVs and OHVs can be used for working as well as recreational uses. Some working purposes are:

- Farming
- Ranching
- Hunting
- Small-scale forestry activities
- Border patrol and security
- Construction operations
- Emergency medical response
- Search and rescue
- Law enforcement
- Land management and surveying
- Military operations.<sup>5</sup>

Not all these uses are specific to Vermont, however many can be possible uses in Vermont. As a large agricultural state, ATV and OHV use in farming is prevalent in Vermont.<sup>6</sup>

## Vermont ATV trails

For recreation, ATVs are often ridden on trails on private land in Vermont. There are many local clubs with trails that ATV riders can ride on. The rider does not need to be part of the club to ride

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<sup>3</sup> United States Department of Transportation, Federal Highway Administration, *Methodology to Estimate Non-Highway Recreational Fuel Taxes CY 2016-2018*, July 2021, [https://www.fhwa.dot.gov/policyinformation/motorfuel/non-hwy\\_recreational\\_fuel\\_tax\\_estimate\\_report\\_2021.pdf](https://www.fhwa.dot.gov/policyinformation/motorfuel/non-hwy_recreational_fuel_tax_estimate_report_2021.pdf).

<sup>4</sup> United States Department of Transportation, Federal Highway Administration, *Off-Highway and Public-Use Gasoline Consumption Estimation Models used in The Federal Highway Administration*, June 2015, <https://www.fhwa.dot.gov/policyinformation/pubs/pl17012.pdf>

<sup>5</sup> Center for Disease Control and Prevention, "All-terrain Vehicles and Work," accessed November 2023, <https://blogs.cdc.gov/niosh-science-blog/2012/10/24/atv/>; United States Department of Transportation, Federal Highway Administration, *Off-Highway and Public-Use Gasoline Consumption Estimation Models used in The Federal Highway Administration*, June 2015, <https://www.fhwa.dot.gov/policyinformation/pubs/pl17012.pdf>.

<sup>6</sup> Center for Disease Control and Prevention, "All-terrain Vehicles and Work."

on their trails. Trails have seasonal restrictions that are determined by the landowners and weather conditions. Trails often close at the beginning of the winter months.<sup>7</sup>

Figure 1 below is a copy of a map produced by the Vermont ATV Sportsman’s Association, listing the ATV trail list where riders can ride their ATVs.<sup>8</sup>

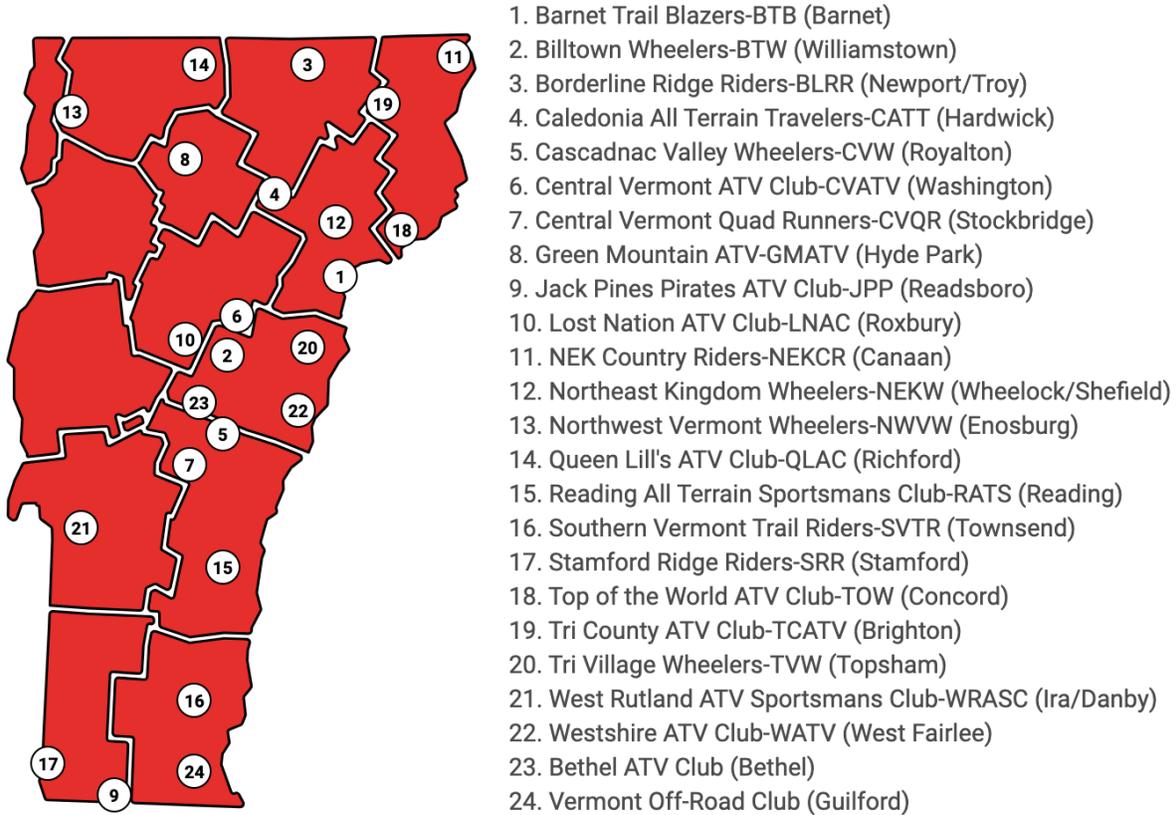


Figure 1: Vermont ATV Trail List<sup>9</sup>

Source: Vermont ATV Sportsman’s Association Inc., “Trails,” accessed November 2023, <https://vtvasa.org/trails.html>.

<sup>7</sup> Vermont ATV Sportsman’s Association Inc., “Clubs,” accessed November 2023, <https://vtvasa.org/clubs/>; The State of Vermont Agency of Natural Resources, “All-terrain Vehicles,” accessed November 2023, <https://fpr.vermont.gov/recreation/activities/all-terrain-vehicles>.

<sup>8</sup> Vermont ATV Sportsman’s Association Inc., “Trails,” accessed November 2023, <https://vtvasa.org/trails.html>.

<sup>9</sup> Vermont ATV Sportsman’s Association Inc., “Clubs,” accessed November 2023, <https://vtvasa.org/clubs/>.

## Impact on water quality

Natural areas are impacted by OHVs and ATVs in many ways, including damage to vegetation, wildlife habitats, soil quality, and air quality.<sup>10</sup> This report focuses on both direct and indirect OHV effects on water quality.

### OHV-Caused Runoff

OHVs can cause compacted soil, which leads to an increase in precipitation runoff. A study completed in the Mojave Desert shows that in locations where OHVs are present and move over soil, runoff was approximately 5 times greater than places where OHVs are absent.<sup>11</sup> Another study, completed by the US Department of Agriculture's Forest Service, found that disturbance by ATVs on ATV trails increased runoff and sedimentation rates by at least 56% and up to 625% of the rates of undisturbed forests.<sup>12</sup>

As runoff increases in both amount and velocity, soil content is more vulnerable to erosion. This leads to an increase in levels of turbidity, or contamination in water, and rates of sedimentation, or how materials settle in water, which can worsen the water quality within watersheds.<sup>13</sup> As OHVs are often used on trails and follow specific routes, they can create tracks that guide water flow directly to bodies of water.<sup>14</sup> This can alter preexisting natural drainage and further promote the contamination of aquatic ecosystems.<sup>15</sup>

### Water Contamination

OHVs and ATVs also introduce new contaminants to ecosystems, which then enter waterways and lead to a decrease in water quality. These contaminants are emitted from OHVs and enter waterways directly, enter soil through precipitation, or are deposited on snow, all of which can lead to the contamination of wetlands. Some contaminants typical in snowmobile emissions include benzene, ethylbenzene, m-, p-, and o-xylenes, and other OHVs may also release 1,3-butadiene and toluene.<sup>16</sup> These petroleum-based contaminants have been shown to cause negative impacts to human health—benzene, ethylbenzene, and 1,3-butadiene are designated

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<sup>10</sup> D.S. Ouren, Christopher Haas, C. P. Melcher, S. C. Stewart, P. D. Ponds, N. R. Sexton, Lucy Burris, Tammy Fancher, and Z. H. Bowen, "Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands: A Literature Synthesis, Annotated Bibliographies, Extensive Bibliographies and Internet Resources," U.S. Department of the Interior, Open-File Report 2007-1353, 2007, accessed December 27, 2023, <https://pubs.usgs.gov/of/2007/1353/report.pdf>.

<sup>11</sup> Richard M. Iverson, Bern S. Hinckley, Robert M. Webb, and Bernard Hallet, "Physical Effects of Vehicular Disturbances on Arid Landscapes," *Science* 212, no. 4497 ( May 1981): 915-917, <https://www.science.org/doi/10.1126/science.212.4497.915>.

<sup>12</sup> Dexter Meadows, Randy Foltz, and Nancy Geehan, "Effects of All-Terrain Vehicles on Forested Lands and Grasslands," report prepared for the United States Department of Agriculture Forest Service, December 2008, accessed December 27, 2023, [https://www.fs.usda.gov/rm/pubs\\_other/rmrs\\_2008\\_meadows\\_d001.pdf](https://www.fs.usda.gov/rm/pubs_other/rmrs_2008_meadows_d001.pdf)

<sup>13</sup> Ouren et al., "Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands."

<sup>14</sup> Ouren et al., "Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands."

<sup>15</sup> Ouren et al., "Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands."

<sup>16</sup> Ouren et al., "Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands."

carcinogens by the United States National Toxicology Program.<sup>17</sup> OHV traffic can also produce airborne dust, which can then settle in wetlands and contaminate the water.<sup>18</sup> Lastly, OHVs can create direct contamination through leaking of fuels, particularly in older vehicles.<sup>19</sup>

## Impacts of mudding

If OHV/ATV use is taken off designated trails, it can lead to further harm of both forest and aquatic ecosystems, especially in wetland areas. The Forest Service states that wetlands can provide critical wildlife habitat, erosion and flood control, natural water purification, and special types of recreation.<sup>20</sup> If OHVs are used in wetland areas, these benefits are diminished.

Use of OHVs outside of designated trails is referred to as mudding. Mudding includes driving on lakeshores, streams, fields, and wet meadows. This can damage native plants, which increases runoff and sedimentation to nearby waterways. It can also harm fish because young fish live in gravel. If the gravel is shifted, then the fish get smothered. OHVs create hardened tracks in the mud, which creates channels allowing water to carry sediment and contaminants to waterways.<sup>21</sup>

## Water Quality Impact Specific to Vermont: OHV-Caused Runoff

Soils with moderate moisture experience more soil compaction; moisture allows soil particles to move but larger soil pores aren't overfilled with water, leading to maximized compaction.<sup>22</sup> While Vermont's annual precipitation varies by region, it is generally even throughout the year.<sup>23</sup> Vermont has a wet continental climate and does not typically experience sustained floods.<sup>24</sup> This means Vermont's soil is generally more likely to compact and therefore have more runoff. In addition, Vermont's average precipitation levels are predicted to increase over the next century, meaning an increase in the likelihood of compacted soil due to OHV use.<sup>25</sup>

According to the Vermont Department of Environmental Conservation, “[w]ater pollution limits our use and enjoyment of approximately 15% of Vermont’s lakes, and 20% of streams.” This pollution is mostly attributed to agricultural land, developed land, forest harvesting operations,

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<sup>17</sup> National Cancer Institute, “Cancer-Causing Substances in the Environment,” accessed December 2023, <https://www.cancer.gov/about-cancer/causes-prevention/risk/substances>.

<sup>18</sup> Ouren et al., “Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands.”

<sup>19</sup> Ouren et al., “Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands.”

<sup>20</sup> United States Department of Agriculture Forest Service, “OHV Use,” accessed November 2023, <https://www.fs.usda.gov/main/rtr/recreationists/ohv>.

<sup>21</sup> United States Department of Agriculture Forest Service, “OHV Use.”

<sup>22</sup> Jason Warren and Randy Taylor, “Managing Soil Compaction,” Oklahoma State University Extension Service, accessed December 2023, <https://extension.okstate.edu/fact-sheets/managing-soil-compaction.html#:~:text=Soil%20moisture%20is%20critically%20important,out%20before%20compaction%20can%20occur>.

<sup>23</sup> National Climate Data Center, *Climate of Vermont*, accessed November 2023.

[https://www.ncei.noaa.gov/data/climate-normals-deprecated/access/clim60/states/Clim\\_VT\\_01.pdf](https://www.ncei.noaa.gov/data/climate-normals-deprecated/access/clim60/states/Clim_VT_01.pdf)

<sup>24</sup> National Integrated Drought Information System, “Vermont,” accessed December 2023.

<https://www.drought.gov/states/vermont>

<sup>25</sup> NOAA National Centers for Environmental Information, “State Climate Summaries 2022: Vermont,” accessed November 2023. <https://statesummaries.ncics.org/chapter/vt/>

and streambank erosion. Pollution then ends up in Vermont's waters through stormwater runoff,<sup>26</sup> which is exacerbated by soil compaction due to OHV use.<sup>27</sup> The state of Vermont has four drainage basins, meaning pollutants from ATVs and OHVs that end up in waterways could contaminate Lake Champlain, Lake Memphremagog, the Connecticut River, or the Hudson River.<sup>28</sup> This poses threats to Vermont aquatic ecosystems, drinking water contamination, human health, and even economy.<sup>29</sup>

## Laws regulating ATVs

### Travel Management and Off-Highway Vehicle (OHV) Program

The US Department of Agriculture created a program to regulate OHV's, regarding national forests and classification of vehicles. Every national forest is required to designate their trails "open to motor vehicles."<sup>30</sup> When they designate these trails open, each national forest must include the class of the vehicle and the time the vehicle can be used. This program prohibits vehicles from operating outside of their designated areas. Designations will all be made by local governments and will include a motor vehicle use map.<sup>31</sup>

### Mudding Regulation

Mudding, that is tearing up forest roads and meadows, in US national forests is currently illegal.<sup>32</sup> The effect of mudding is also expensive to fix. "The repair work for recent mudding in a wet meadow near Ellensburg, Washington was estimated at \$4,000." If people are caught mudding, they can be fined up to \$5,000 and can be charged with a civil suit.<sup>33</sup>

### Vermont DMV

ATV drivers in Vermont can use their vehicles on all roads that are "not plowed or maintained during the snow season" and all other roads that have been deemed available to ATVs by the board of trustees or local governing body. This does not mean, however, that all roads open to snowmobiles are open to ATV drivers, only those roads approved by the local government.<sup>34</sup>

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<sup>26</sup> Vermont Department of Environmental Conservation, "Restoring Vermont's Waters," accessed November 2023. <https://dec.vermont.gov/watershed/restoring>.

<sup>27</sup> Ouren et al., "Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands."

<sup>28</sup> Vermont Department of Environmental Conservation, "Restoring Vermont's Waters."

<sup>29</sup> Vermont Department of Environmental Conservation, "Restoring Vermont's Waters."

<sup>30</sup> US Department of Agriculture, "Travel Management and Off-Highway Vehicle(OHV) Program." accessed December, 2023. <https://www.fs.usda.gov/recreation/programs/ohv/>

<sup>31</sup> US Department of Agriculture, "Travel Management and Off-Highway Vehicle (OHV) Program."

<sup>32</sup> US Department of Agriculture, "Mudding on National Forests is Illegal and Destructive," accessed December 2023. <https://www.usda.gov/media/blog/2013/07/17/mudding-national-forests-illegal-and-destructive>

<sup>33</sup> US Department of Agriculture, "OHV Use," accessed December 18, 2023.

<https://www.fs.usda.gov/main/rtr/recreationists/ohv>

<sup>34</sup> Vermont Department of Motor Vehicles, *ATV Driver Manuel*, "2023, [https://dmv.vermont.gov/sites/dmv/files/documents/VN-023-ATV\\_Driver\\_Manual.pdf](https://dmv.vermont.gov/sites/dmv/files/documents/VN-023-ATV_Driver_Manual.pdf)

ATV drivers are not allowed to drive on public land or water that is not declared usable for them by the Secretary of Natural Resources and any area that harasses wildlife. The Secretary of Natural Resources declared all frozen bodies of water are available for ATV use, except: Amity Pond in Windsor County, Marsh Pond in Rutland County, Bear Pond in Lamoille County, Sterling Pond in Lamoille County, and Lake of the Clouds in Lamoille County. The Fishing and Wildlife Department fishing areas are available for ATV that follows the department's regulations.<sup>35</sup>

### **Vermont Statute 23 V.S.A. Section 3510**

Local governments are permitted to regulate the operation of ATV's as long as they do not contradict Vermont State Statutes.<sup>36</sup>

### **Minnesota's regulations regarding ATV use**

Minnesota is included in this report as it was the only other state with clear state-mandated guidelines on ATV and OHV usage. Minnesota uses age restrictions for ATV use for people under 18 for Class I ATVs. Children are allowed to operate ATVs under the age of 10 on private property with a parent available for ATV safety training. At ages 10-11, children can operate an ATV on public lands or frozen waters up to 170cc if a guardian is present and has side-by-side seating and a steering wheel. Children ages 12-15 can operate an ATV if they have a valid safety certificate and an adult with a license is present or if they are with a parent on another ATV. Children ages 16-17 can operate an ATV with a Safety Certificate and a valid driver's license. Class 2 ATVs are more restricted with no allowance of operation for children under 15. Minnesota prohibits any rider under 18 from riding without a helmet or a seatbelt.<sup>37</sup>

Minnesota has a series of environmental protections regarding ATV and OHV use. To protect against invasive species, Minnesota requires ATV and OHV drivers to clean all gear before and after riding a vehicle and stay on the allotted trails. Riders are also prohibited from driving in wildlife management areas, unfrozen waters, or unauthorized trails. Minnesota also restricts OHV use in wetlands to not change "the natural and ecological balance of a wetland." This includes riding in low water of unfrozen public water. If these regulations are not followed, drivers convicted may face misdemeanors. Minnesotans can ride OHVs in a managed forest, limited forest, and closed forest. Managed forests are open to riding unless they are marked as "closed." Limited forests allow riders if the specific trail is labeled for a vehicle type. Closed forests allow riders if there is a frozen body of water to ride on.<sup>38</sup>

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<sup>35</sup> Vermont Department of Motor Vehicles, [https://dmv.vermont.gov/sites/dmv/files/documents/VN-023-ATV\\_Driver\\_Manual.pdf](https://dmv.vermont.gov/sites/dmv/files/documents/VN-023-ATV_Driver_Manual.pdf)

<sup>36</sup> Vermont General Assembly, "Motor Vehicles," accessed December, 2023, <https://legislature.vermont.gov/statutes/section/23/031/03510>

<sup>37</sup> Minnesota Department of Natural Resources, "Off-Highway Vehicle Regulations," accessed December, 2023, <https://www.dnr.state.mn.us/regulations/ohv/index.html#:~:text=Age%2010%20%26%2011-,May%20operate%20an%20ATV%20only%20on%20private%20property%20with%20permission,by%20parent%20or%20legal%20guardian>

<sup>38</sup> Minnesota Department of Natural Resources, *OHV Regulations*, 2023. [https://files.dnr.state.mn.us/rlp/regulations/ohv/ohv\\_regs.pdf?v=2023.10.02-11.14.15](https://files.dnr.state.mn.us/rlp/regulations/ohv/ohv_regs.pdf?v=2023.10.02-11.14.15)

## **The Bureau of Land Management suggested regulations**

The Bureau of Land Management suggests OHV riders wear helmets, follow signs, register your vehicle, have tall flags, and respect private property.<sup>39</sup>

## **Town of Swanton, Vermont**

The Town of Swanton, Vermont has their own ATV law in conjunction with 23 V.S.A. 3510 rules. The Town of Swanton emphasizes ATV owners' health, safety, and welfare as well as residents of the town's health, safety, and welfare. Some of the new rules laid out are speed limits, times of operation, racing rules and where one can and cannot ride. This is done to reduce noise pollution in the town as well injury.<sup>40</sup>

## **Town of Glover, Vermont**

The Town of Glover, Vermont also has an ATV law regulating the "time, manner and location of operation" of ATVs within the town. The purpose of this ordinance is to protect the health and safety of the residents and ATV operators as well as protect property, environment, and animals of the town. ATV in this ordinance is defined as any off-highway vehicle except for snowmobiles.<sup>41</sup>

## **H. 942: Transportation Program Adopted as Amended**

The legislature passed ATV regulations as a part of "Vermont Transportation Bill H.942" in 2020. The ATV portion starts on page 35 of the H. 942 documentation. The main outcomes were the requirements of helmets for operators, required insurance and Trail Access Decals for those riding ATVs on public roads or trails on public land.<sup>42</sup>

## **Conclusion**

In this report, we outlined the impact of ATVs and OHVs on water quality in Vermont. ATVs and OHVs increase runoff and sedimentation rates leading to decreasing water quality. Because of Vermont's moist climate, continued OHV and ATV use leads to more water contamination. As of 2023, Vermont has very limited ATV and OHV regulations, unlike Minnesota who created regulations not only for safety of the operator, but to protect the environment. With the absence of major legislation, some small towns in Vermont have created their own regulations for ATV use.

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<sup>39</sup> US Bureau of Land Management, "Off-Highway Vehicles on Public Lands," accessed December 2023.

<https://www.blm.gov/programs/recreation/OHV>

<sup>40</sup> Government of the Town of Swanton, *Ordinance Regulating All Terrain Vehicles(ATVs)*, June 2022.

[https://www.swantonvt.gov/fileadmin/files/town/Ordinances/ATV\\_Ordinance.pdf?7405d02b4b570c44900f15698bd0e606b785096](https://www.swantonvt.gov/fileadmin/files/town/Ordinances/ATV_Ordinance.pdf?7405d02b4b570c44900f15698bd0e606b785096)

<sup>41</sup> Government of the Town of Glover, *Ordinance Regulating All Terrain Vehicles*, August 2008.

<https://townofglover.com/wp-content/uploads/Regulating-All-Terrain-Vehicles-Town-of-Glover.pdf>

<sup>42</sup> Vermont General Assembly, *H.942*, 2020, <https://legislature.vermont.gov/Documents/2020/Docs/BILLS/H-0942/H-0942%20As%20Passed%20by%20Both%20House%20and%20Senate%20Unofficial.pdf>

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This report was completed on December 27, 2023, by Cassie Beeler, Erin Ahearn, and McKenna Halvorson under the supervision of VLRS Director, Professor Anthony “Jack” Gierzynski and Dr. Jonathan “Doc” Bradley in response to a request from Representative Charles Demrow.

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