New Hampshire Off Highway Vehicle Association

Economic Study
September 1, 2021

In 2019 House Bill 660 was introduced by Rep. Moynihan - An act relative to studying the economic and other impacts of OHRV use in NH. This study was to be commissioned by the Department of Natural and Cultural Resources. The Bureau of Trails Chief, Chris Gamache, advised that NHOHVA should financially participate in the economic study along with BoT to which NHOHVA agreed.

Due to financial constraints to provide the full scope required by HB660, the study was not initiated by the DNCR. However, it was agreed that NHOHVA should still complete the economic benefit portion of the study bill. Therefore in 2021, NHOHVA commissioned Dr. Daniel Lee, Economist, Data Scientist and Educator from Plymouth State University.

Dr. Lee holds a Ph.D. in Economics and teaches data analytics at Plymouth State, has worked on tourism research with the NH Economic Development Advisory Council, the Division of Travel & Tourism, and created the North Country Economic Index.

In 2020 the decision was made by NHOHVA affiliated clubs to commission this survey to show how important the OHRV community is to the tourism industry in NH. This conclusion of this study will show that over $300 million dollars has been directly contributed to NH by OHRV activities in 2020.

** Currently the New Hampshire Off Highway Vehicle Association is made up of twenty-eighty OHRV clubs representing almost 15,000 individual members throughout New England and beyond.

The Economic Contributions of OHRV Riders in New Hampshire

During Calendar Year of 2020

Daniel Lee

8/1/2021

Contents

1 Executive Summary

Overall scope and size of New Hampshire's OHRV industry

It was estimated that OHRV (primarily ATV, UTV, and trail bike) riders spent $296.5 million and directly created 1,689 jobs in New Hampshire during the calendar year 2020. OHRV riders directly spent at motor vehicle dealers, lodging facilities, restaurants, gas stations, automotive repair and maintenance, insurance carriers, grocery stores, and other retail stores. See Table 2.

Total economic effect

The total economic effect of spending by OHRV riders is much larger. The total retail spending of $296.5 million indirectly supported supply industries in the state by making purchases from them (indirect effect). Examples of these supply industries include accounting, advertising, employment services, and warehousing and storage. In addition, workers in the directly and indirectly affected industries spend their earnings in the state's service industries (induced effect), such as hospitals, schools, repair and maintenance services, gas stations, restaurants, and utility companies. In 2020, the total effect of OHRV rider spending was estimated to be 2,488 jobs, $116.5 millions in labor income (which is largely wages and salaries), or $298.1 million in output. The total effect is the sum of the direct, indirect and induced effect. See Table 1.

Total economic effect in perspective

The total economic effect of 2,488 jobs was 0.27% of all employment in New Hampshire [1]. This means 0.27% of all employment in New Hampshire was directly or indirectly dependent on OHRV rider spending. The total effect of $182.8 million in value added was 0.21% of the state's gross domestic product during 2020[2].

Contribution to taxes and government receipts

OHRV riders also contribute to the state's coffer. It was estimated that their spending resulted in a total of $22.27 million of tax revenues to New Hampshire's state and local governments, which was about 0.23% of New Hampshire's state and local government taxes and receipts[3]. Table 5 reports detailed information on government receipts.

Summary

In short, the importance of the contribution that the OHRV riders make to the state's economy cannot be emphasized enough. The national statistics reflect the relative economic significance of the OHRV industry to the state's economy. New Hampshire ranks ninth in the country in terms of the industry's economic production per resident in the state. See Figure 1. Furthermore, the OHRV industry's contribution will likely be even greater in the future. The industry has seen a rapid and steady growth in ATV, UTV, and trail bike registrations in New Hampshire since 2013. See Figure 2.

Also, the OHRV rider spending fuels economic growth in New Hampshire by bringing money from outside the state. According to the data provided to the New Hampshire Fish and Game, 37.9% of the OHRV riders in the state are non-residents. See Table 6. The non-resident share in spending is likely even higher since non-residents are more likely to stay overnight and spend more.

[1]The percentage was calculated using New Hampshire's total employment in 2019, the latest available data, from the U.S. Bureau of Economic Analysis. Accessed 7/31/2021 at https://apps.bea.gov/iTable/index_regional.cfm

[2]The percentage was calculated using New Hampshire's Gross Domestic Product in 2020, the latest available data, from the U.S. Bureau of Economic Analysis. Accessed 7/31/2021 at https://apps.bea.gov/iTable/index_regional.cfm

[3]The percentage was calculated using "the general revenue from own sources" from the U.S. Census Bureau, 2019 State & Local Government Finances for New Hampshire, the latest available data. Accessed 8/2/2021 at https://www.census.gov/data/datasets/2019/econ/local/public-use-datasets.html

2 Scope of the Study

This study aims to understand the relative and overall economic significance of the off-highway recreational vehicle (OHRV) activity in New Hampshire. The state's OHRV activity primarily consists of ATV, UTV, and trail bike riding. Snowmobiling is not included in this study. Also excluded are OHRV rental companies. OHRV rental companies are a significant part of the industry. 13 OHRV rental companies are licensed with New Hampshire Fish & Game and operate in the state[4]. See Table 1 for the list of the rental companies. The companies offer OHRV rental as well as tours. One rental company on the list was interviewed and reported, "it has 12 units that are rented out 90% on weekends and 60% during the weekdays with an annual sale of $300,000." Assuming this is a typical OHRV rental company in New Hampshire, the OHRV rental companies would generate $3.9 million a year.

An online survey was conducted to capture an accurate view of OHRV rider spending. New Hampshire OHRV club members were invited to complete an online survey. Respondents who participated in trail riding in New Hampshire during 2020 were asked to provide detailed spending information by category. While the study omits activity by persons under age 18, it does capture spending made by adults on their behalf and the associated economic contributions. Note that a significant portion of these OHRV riders is out-of-state residents.

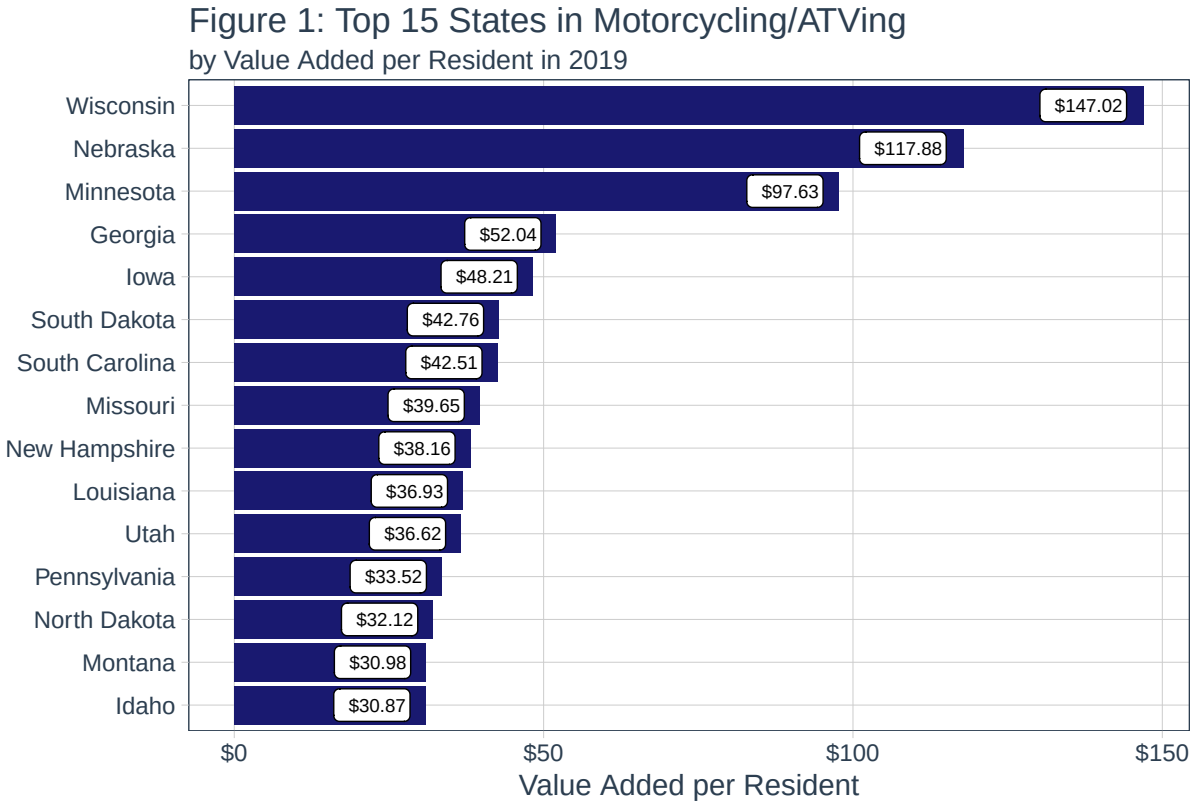
The study also measured multiplier effects of OHRV rider spending using IMPLAN, a standard input/output economic model. The estimated economic value was expressed by employment, labor income, output, and state and local government taxes in New Hampshire.

[4]Accessed 9/13/2021 at https://www.wildlife.state.nh.us/ohrv/rental-agents.html

3 OHRV Industry in New Hamsphire, Overview

The national statistics reflect the relative economic significance of the OHRV rider spending to the state's economy. New Hampshire ranks 9th in the country in terms of the industry's economic production per resident in the state. The industry annually produces $38.16 per resident in New Hampshire.

The economic production was measured by Value Added (also known as Gross Domestic Product at the national level) from the U.S. BEA Outdoor Recreation Satellite Account[5]. The population data were obtained from the U.S. Census Bureau[6]. Note that this data from the U.S. Bureau of Economic Analysis may not be a perfect measure for off-road trail riding that we intend to measure in this study since it includes both off-road and on-road activities. Nonetheless, it should give a sense of how economically significant off-road trail riding is to New Hampshire relative to other states in the country.

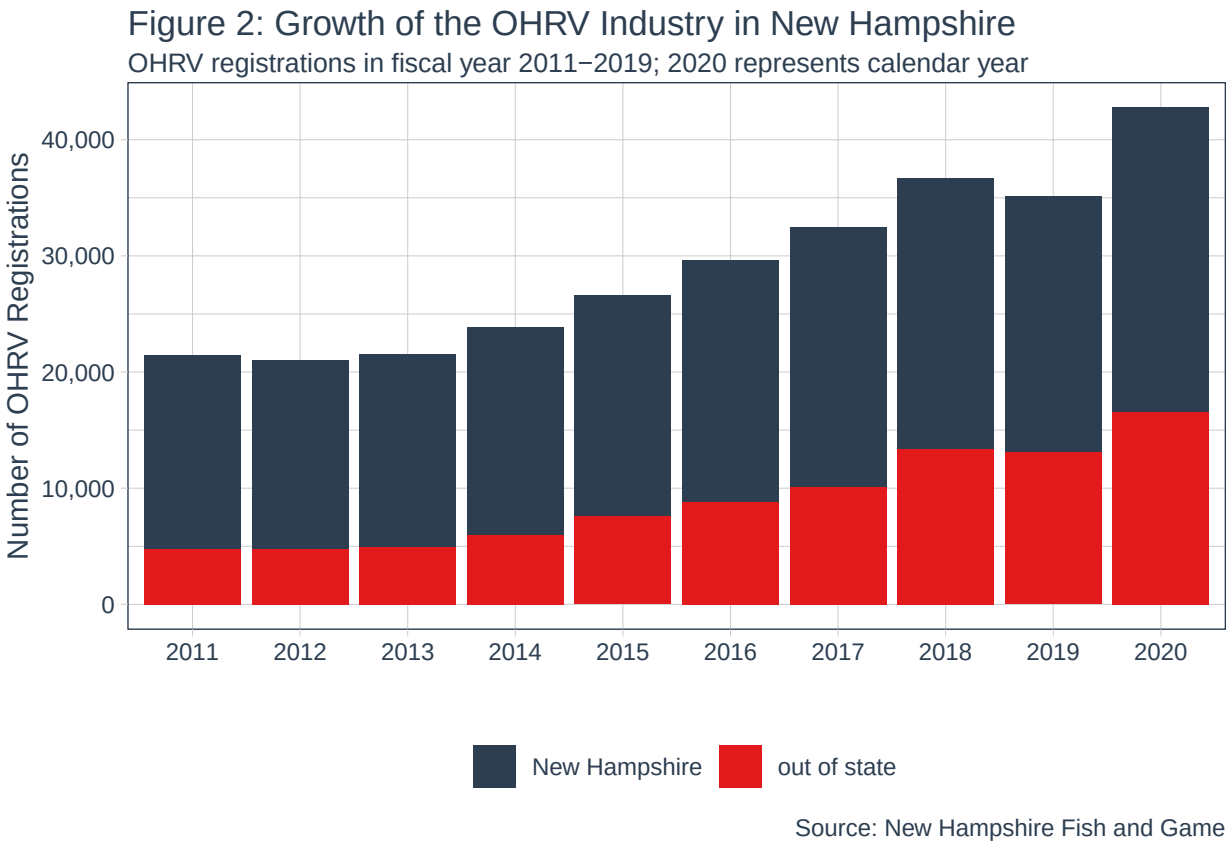


Source: Calculated by the author based on data from the U.S. BEA and the U.S. Census Bureau

[5] Accessed 8/19/2021 at https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&acrdn=9

[6] Accessed 8/19/2021, 2019 American Community Survey 1 year estimate, at https://data.census.gov/cedsci/

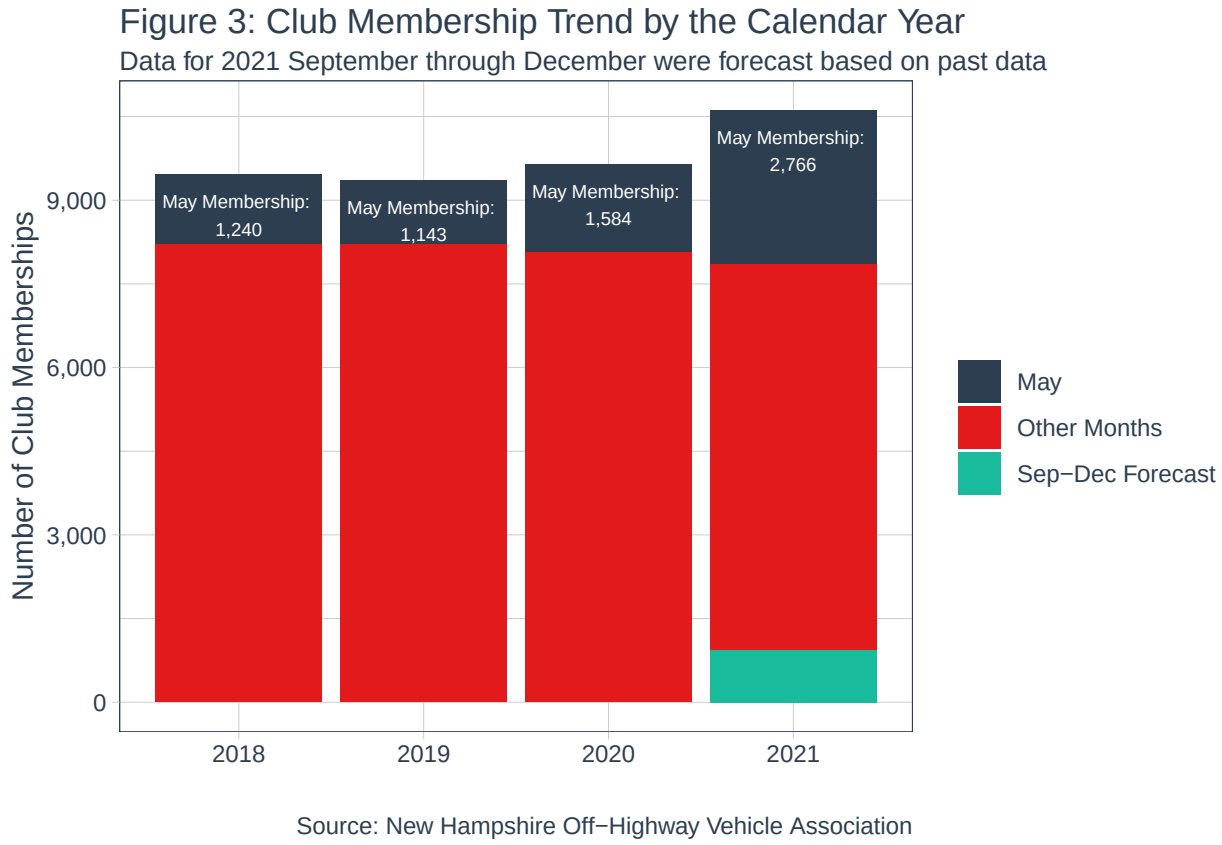
The economic contributions of the OHRV industry will likely be even higher in the future. The industry has seen rapid and steady growth in ATV, UTV, and trail bike registrations in New Hampshire last decade. See Figure 2 below. One may argue that 2020 was out of the norm in the level of OHRV activity due to the Pandemic. However, the year 2020 isn't too far off from the overall long-term growth trajectory. The OHRV activity declined in 2019, dipping from the long-term trend, partially because heavy spring rain delayed the opening of ATV trails in May[7]. The ATV trails are usually open for the season during the Memorial Day Weekend at the end of May. In 2019, however, the ATV trails were not open until later in June because of heavy rains and muddy road conditions. The OHRV club membership data confirm the May decline in the OHRV activity in 2019 from the same months of other years. See Figure 3.



To understand the trend in the OHRV activity in New Hampshire, the author used two different data sources: 1) OHRV registrations from the New Hampshire Fish and Game and 2) OHRV club memberships from the New Hampshire Off-Highway Vehicle Association. Each has its characteristics and together paints a clear view of the OHRV activity in the state. The registration data go back farther, which makes it better in identifying the long-term trend. But it is only available by the state-defined OHRV registration season, not by the calendar year that is the appropriate interval of measurement for summer activities like OHRV. Furthermore, the New Hampshire Fish and Game changed the registration season to 5/1 through 4/30 from 6/1 through 5/31 in 2020. The 2020 registration season was an odd year in transition and short by one month: it covers 6/1/2019 through 4/30/2020, excluding May of 2020. Therefore, it is challenging to understand the OHRV activity in 2020 using the registration data by the registration season.

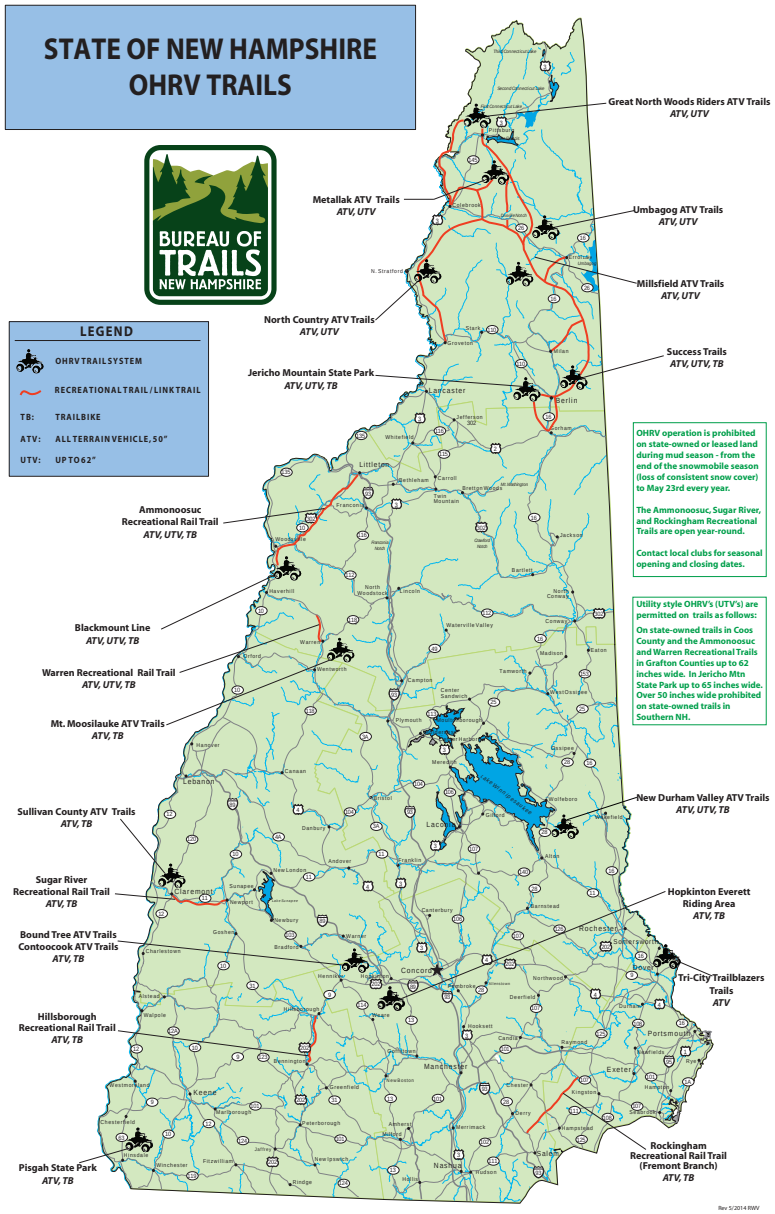
[7]Accessed 9/13/2021 at https://apnews.com/article/61c8d1a1c8724006b3ee7c67782a4b47

To complement Figure 2 that uses registration data with the above-noted drawback, Figure 3 aggregates the monthly club membership data and exhibits the OHRV trend in the state by the calendar year. Note that the club membership data are only available for the past four years and do not include non-member riders. Figure 3 confirms the long-term upward trend identified in Figure 2. Also, it identifies the May dip in the OHRV activity due to the weather-induced delay in the ATV trails opening. Lack of better alternatives in Figure 2, the author calculated the registration data for the calendar year 2020 by aggregating the quarterly data provided by the New Hampshire Fish and Game Department. The study aims to estimate the economic contributions of the OHRV activity in the calendar year 2020.



The economic contribution of OHRV rider spending permeates throughout the state, not limited only to northern rural parts of the state. See the OHRV trail map below. Although the state has more extensive OHRV trails in northern rural areas, it does have OHRV trails throughout the state. In addition, many out-of-state riders enter through the state's southern border with Massachusetts and stop at gas stations and restaurants throughout the state. Also, they likely choose to shop for ATVs and trail bikes in New Hampshire to avoid sales taxes.

Figure 4: Map of New Hampshire OHRV Trails



4 OHRV Industry in New Hampshire, Economic Contributions

The total contributions of OHRV riders in Table 1 were estimated based on the 2019 IMPLAN model. OHRV riders directly spent at motor vehicle and parts dealers, lodging facilities, restaurants, gas stations, grocery stores, and other retail stores (direct effect). Their spending indirectly supported their supply industries in the state by making purchases from them (indirect effect). In addition, workers in the directly and indirectly affected industries spent their earnings in the state's service industries (induced effect). For example, Table 1 shows that the spending by OHRV riders directly created 1,689 jobs in New Hampshire. These 1,689 direct jobs supported an additional 317 jobs in supporting industries, such as accounting, advertising, employment services, and insurance carriers. These 1,689 direct jobs and 317 indirect jobs in the supporting industries together supported an additional 482 jobs in the service industries, such as hospitals, schools, repair and maintenance services, gas stations, restaurants and utility companies. In total, OHRV riders supported 2,488 jobs in New Hampshire in 2020.

Table 1: Summary of Economic Contribution

Impact Type	Jobs	Labor Income	Value Added	Output
Direct	1,689	$71.73M	$105.90M	$165.04M
Indirect	317	$17.88M	$29.17M	$55.09M
Induced	482	$26.90M	$47.71M	$78.01M
Total	2,488	$116.51M	$182.78M	$298.13M

The dollars are expressed in millions of 2020 dollars. Labor income is the sum of employee compensation (wages and salaries plus other compensations) and proprietor income. Value added is the sum of labor income, other types of property income (such as dividends, interest income, rent income, and profits), and taxes on production and imports. Output is the sum of value added and the cost of all the inter-industry purchases required for production.

Table 2 shows the direct impact by OHRV rider spending by industries. For example, OHRV riders spent $124.3 million, and created 248 jobs and $17.3 million of labor income in Motor vehicle and parts dealers .

Table 2: Direct Impact by Retail Spending, Jobs, Labor Income

Sector	Description	Retail Spending	Jobs	Labor Income
402	Retail - Motor vehicle and parts dealers	$124.3M	248	$17.3M
408	Retail - Gasoline stores	$39.8M	89	$3.7M
507	Hotels and motels, including casino hotels	$25.6M	183	$8.4M
508	Other accommodations	$25.6M	236	$11.7M
510	Limited-service restaurants	$22.6M	275	$7.4M
509	Full-service restaurants	$21.2M	296	$9.3M
412	Retail - Miscellaneous store retailers	$14.7M	164	$4.8M
512	Automotive repair and maintenance, except car washes	$4.3M	45	$3.3M
447	Other real estate	$3.9M	20	$0.4M
444	Insurance carriers, except direct life	$2.9M	4	$0.4M
511	All other food and drinking places	$2.6M	36	$1.2M
409	Retail - Clothing and clothing accessories stores	$2.6M	16	$0.5M
504	Other amusement and recreation industries	$2.2M	26	$1.4M
497	Commercial Sports Except Racing	$2.0M	37	$1.3M
503	Gambling industries (except casino hotels)	$1.3M	6	$0.2M
502	Amusement parks and arcades	$0.9M	7	$0.4M
498	Racing and Track Operation	$0.1M	1	$0.1M

Table 3 shows the top 20 industries in terms of employment supported by OHRV rider spending. Their largest employment contribution was to "Full-service restaurants" with 329 jobs, followed by Limited-service restaurants with 297.

Table 3: Top 20 Industries Affected, Employment

Sector	Description	Direct	Indirect	Induced	Total
509	Full-service restaurants	296	8	25	329
510	Limited-service restaurants	275	2	20	297
402	Retail - Motor vehicle and parts dealers	248	1	5	254
508	Other accommodations	236	0	0	236
507	Hotels and motels, including casino hotels	183	0	0	183
412	Retail - Miscellaneous store retailers	164	1	9	175
447	Other real estate	20	57	18	96
408	Retail - Gasoline stores	89	0	4	93
511	All other food and drinking places	36	21	10	68
512	Automotive repair and maintenance, except car washes	45	4	9	58
497	Commercial Sports Except Racing	37	2	1	39
504	Other amusement and recreation industries	26	0	4	30
490	Hospitals	0	0	29	29
409	Retail - Clothing and clothing accessories stores	16	0	7	23
472	Employment services	0	13	7	20
406	Retail - Food and beverage stores	0	1	17	19
469	Management of companies and enterprises	0	15	4	18
483	Offices of physicians	0	0	18	18
476	Services to buildings	0	14	4	18
422	Warehousing and storage	0	15	2	17

Table 4 shows the top 20 industries in terms of labor income supported by OHRV rider spending. Their largest labor income contribution was to employment and benefits in "Retail - Motor vehicle and parts dealers" with $17.76 million, followed by Other accommodations with $11.66 million.

Table 4: Top 20 Industries Affected, Labor Income

Sector	Description	Direct	Indirect	Induced	Total
402	Retail - Motor vehicle and parts dealers	$17.33M	$0.08M	$0.35M	$17.76M
508	Other accommodations	$11.65M	$0.00M	$0.00M	$11.66M
509	Full-service restaurants	$9.26M	$0.25M	$0.77M	$10.28M
507	Hotels and motels, including casino hotels	$8.42M	$0.00M	$0.00M	$8.42M
510	Limited-service restaurants	$7.37M	$0.07M	$0.53M	$7.96M
412	Retail - Miscellaneous store retailers	$4.82M	$0.04M	$0.27M	$5.13M
512	Automotive repair and maintenance, except car washes	$3.29M	$0.28M	$0.67M	$4.24M
408	Retail - Gasoline stores	$3.70M	$0.01M	$0.15M	$3.86M
490	Hospitals	$0.00M	$0.00M	$2.36M	$2.36M
483	Offices of physicians	$0.00M	$0.00M	$2.24M	$2.24M
511	All other food and drinking places	$1.17M	$0.70M	$0.34M	$2.21M
447	Other real estate	$0.45M	$1.26M	$0.40M	$2.10M
469	Management of companies and enterprises	$0.00M	$1.65M	$0.41M	$2.05M
504	Other amusement and recreation industries	$1.41M	$0.03M	$0.20M	$1.64M
497	Commercial Sports Except Racing	$1.30M	$0.06M	$0.02M	$1.38M
444	Insurance carriers, except direct life	$0.40M	$0.27M	$0.43M	$1.10M
472	Employment services	$0.00M	$0.70M	$0.40M	$1.10M
440	Securities and commodity contracts intermediation and brokerage	$0.00M	$0.29M	$0.72M	$1.01M
456	Accounting, tax preparation, bookkeeping, and payroll services	$0.00M	$0.70M	$0.26M	$0.96M
445	Insurance agencies, brokerages, and related activities	$0.00M	$0.45M	$0.30M	$0.75M

Table 5 shows the state and local government taxes and receipts OHRV riders contributed. It collectively generated $22.27 million of tax revenues to New Hampshire's state and local governments from all sources (direct, indirect, and induced effect). It was about 0.23% of all state and local government taxes and receipts[8].

Table 5: Tax and Fee Contribution from Direct, Indirect, and Induced Economic Effect Sources

Category	Tax
Sales Tax	$9.38M
Property Tax	$6.25M
OHRV Registrations	$3.07M
State Liquor Store Sales	$1.34M
Business Tax	$1.11M
Vehicle Fees	$0.08M
Personal Income Tax	$0.08M
Parks and Recreation	$0.04M
Fish Hunt Licenses	$0.03M
Others	$0.89M
Total Tax	$22.27M

Note: ***Sales tax*** includes rooms and meals tax, gasoline tax, alcoholic beverage tax, and tobacco tax. ***Parks and recreation*** includes revenues generated from concession sales and operating revenues (e.g., camping, admission, pavilion/facility, and leases and special use permits). ***Personal income tax*** captures tax on investment income. While New Hampshire doesn't tax on wages and salaries, the state does tax on income received from interest and dividends. According to the 2019 State and Local Government Finances report, New Hampshire collected $122.6 million from individual income tax. ***Others*** include business licenses, documentary and stamp taxes, rents and royalties, special assessments, fines, settlements, and donations.

[8]The percentage was calculated using "the general revenue from own sources" from the U.S. Census Bureau, 2019 State & Local Government Finances for New Hampshire, the latest available data. Accessed 8/2/2021 at https://www.census.gov/data/datasets/2019/econ/local/public-use-datasets.html

5 OHRV Industry in New Hampshire within the context of the Pandemic

One may wonder how much the OHRV activity deviated from the norm during the Pandemic. Is it possible that the reported economic contribution in this study is more than would have been because of the Pandemic? The number of OHRV riders was likely higher than usual as the popularity of outdoor recreational activities increased during the Pandemic. On the other hand, is it also possible that the reported economic contribution is less than would have been because of the Pandemic? The average spending per rider was likely smaller. Riders could not spend as much since many shops were closed, and most events were canceled at the peak of the Pandemic. Therefore, it is worthwhile comparing with findings of other relevant studies that were conducted before the Pandemic.

The question is how out of the norm the estimated OHRV rider spending of $296.5 maybe, if at all. The Outdoor Industry Association reported in 2017 that Americans annually spend $51.52 billion to participate in off-highway recreational vehicle activity. In addition, the U.S. Bureau of Economic Analysis estimated that New Hampshire makes up 0.60% of the U.S. Outdoor Recreational Economy (when measured by Value Added). Then, one could reasonably approximate OHRV rider spending in New Hampshire to be about $310.35 million by multiplying $51.52 billion and 0.60%. In this sense, the reported OHRV rider spending of $296.5 is on the conservative side.

In another recent study, Plymouth State University estimated economic contributions of outdoor recreation activities in New Hampshire using the U.S. BEA Outdoor Recreational Economy Satellite Account[9]. It found that ATVing contributed $268 million of economic output in 2017, including multiplier effects (direct, indirect, and induced). The corresponding estimate reported in this study, $298.13, is 11% larger. This is reasonable considering that ATV, UTV, and trail bike registrations were 32% higher in 2020 than in 2017. Note that the U.S. BEA-based estimate may not be a perfect comparable for off-road trail riding that we intend to measure in this study since it includes both off-road and on-road activities.

[9]Plymouth State University, 2020, "Economic Value of New Hampshire's Working Landscape with a Focus on Outdoor Recreation"

6 Appendix

6.1 Methods

The methodology was primarily drawn from the Outdoor Industry Association's 2017 study[10]. The author estimated the economic contributions of OHRV rider spending in New Hampshire in the following manner.

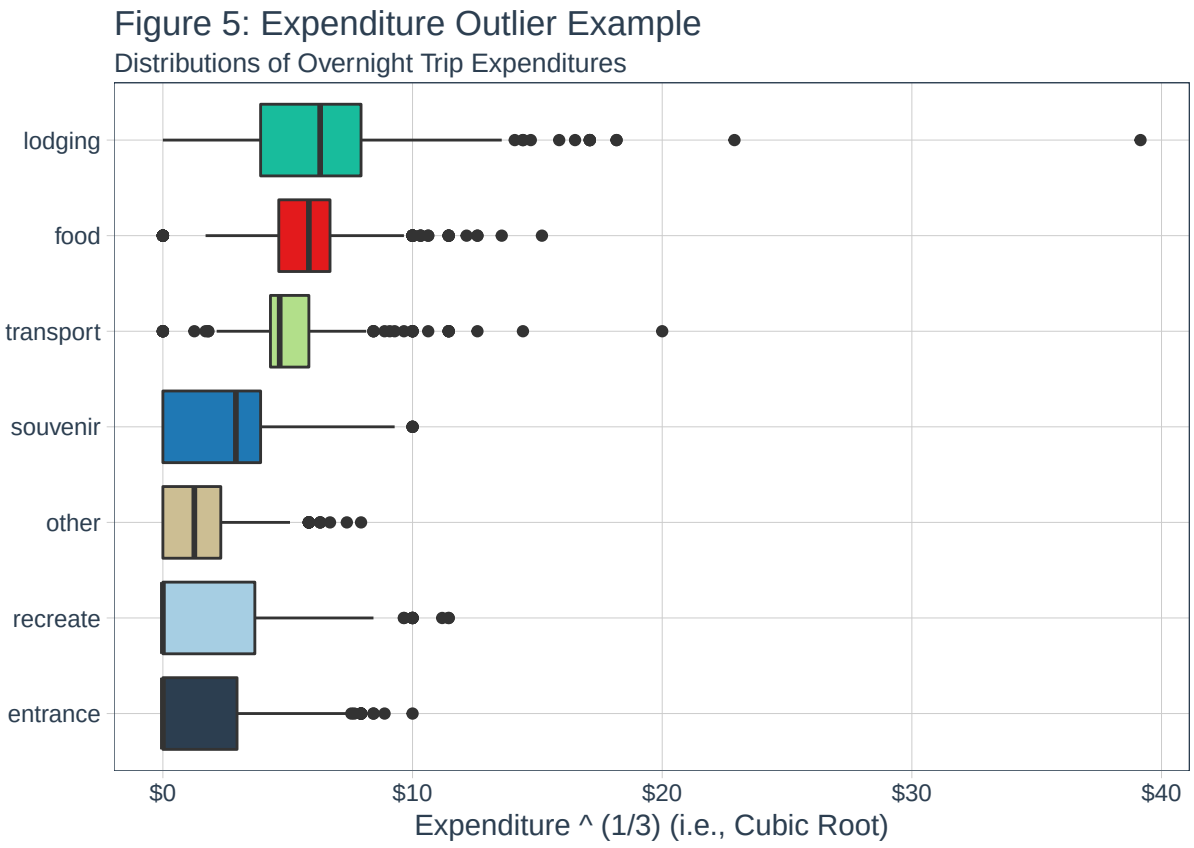
- Step 1: Estimate the average spending per rider by category with an online survey.
- Step 2: Estimate aggregate spending by multiplying the average spending by the number of OHRV riders, which was estimated based on the number of ATV, UTV, and trail bike registrations from the New Hampshire Fish and Game.
- Step 3: Estimate OHRV riders' economic contributions by using the aggregate spending as input for IMPLAN, input/output software.

6.1.1 Online Survey

New Hampshire OHRV club members were invited to complete an online survey to collect information on the OHRV rider spending. A total of 2,098 people completed the online survey between May and June 2021. Of the 2,098 people, 1,523 responses were found to be usable for this study.

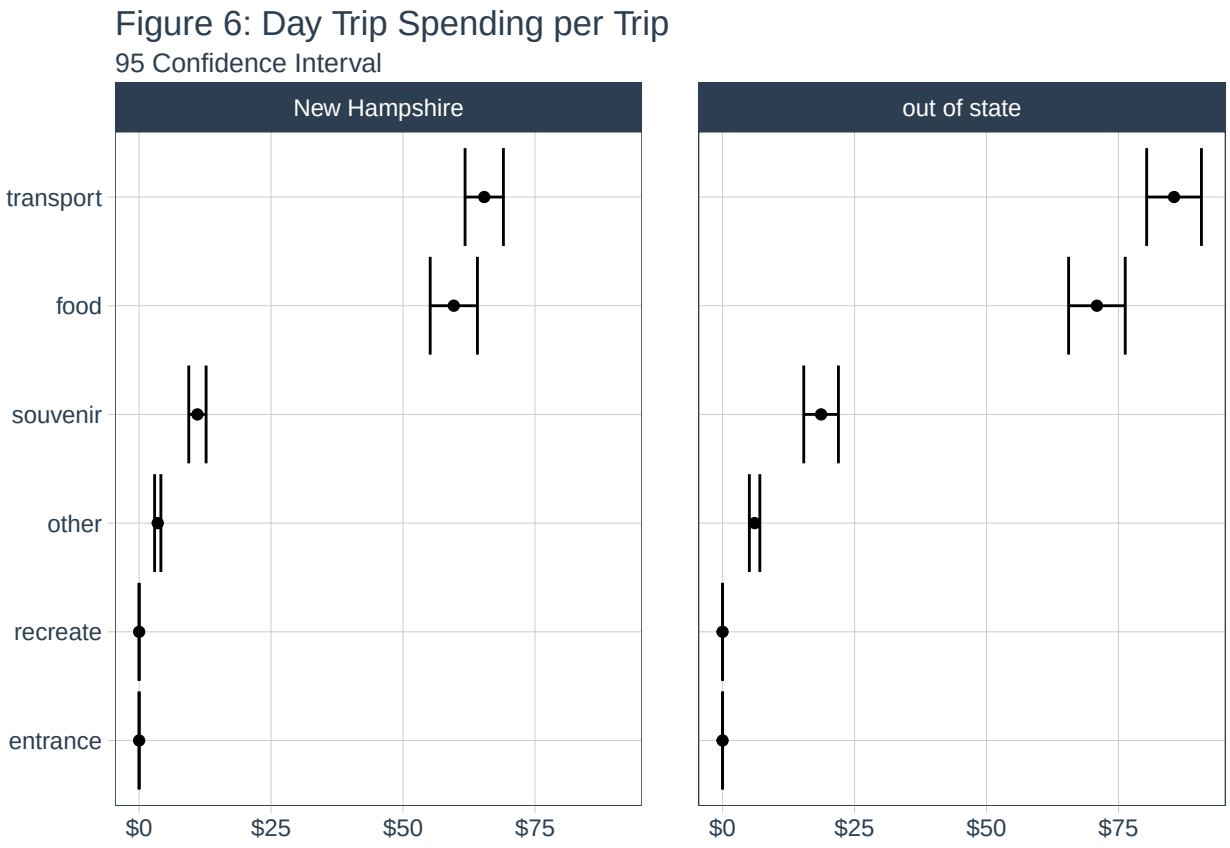
6.1.1.1 Outlier Removal The author took two steps to control the quality of the survey data. First, unreasonable responses were removed (e.g., 300-day long overnight trip). Second, outliers were disregarded after the cubic transformation of spending per category. Outliers are either extremely large values, larger than the median + 1.5 interquartile range (IQR), or extremely small values, smaller than the median - 1.5 IQR. The cubic transformation makes the distribution of spending more normal and makes the selection of outliers more conservative. Figure 5 illustrates these disregarded outliers.

[10] Accessed 7/19/2019 at https://outdoorindustry.org/wp-content/uploads/2015/03/OIA_Recreation_Economy_Contributions_Technical_Report_2017-08-24.pdf



The dots in the figure represent outliers. The dots on the right side of the box are extremely large values, larger than the median + 1.5 IQR. These extremely large values were disregarded when calculating the average expenditure by category. For example, values of $1,000 or more per trip were excluded as outliers in estimating the average overnight trip spending for food. On the other hand, the dots on the left side of the box are extremely small values, smaller than the median - 1.5 IQR. These extremely small values were excluded as well. For example, $0 (i.e., no spending) was excluded as an outlier in estimating overnight trip spending for food.

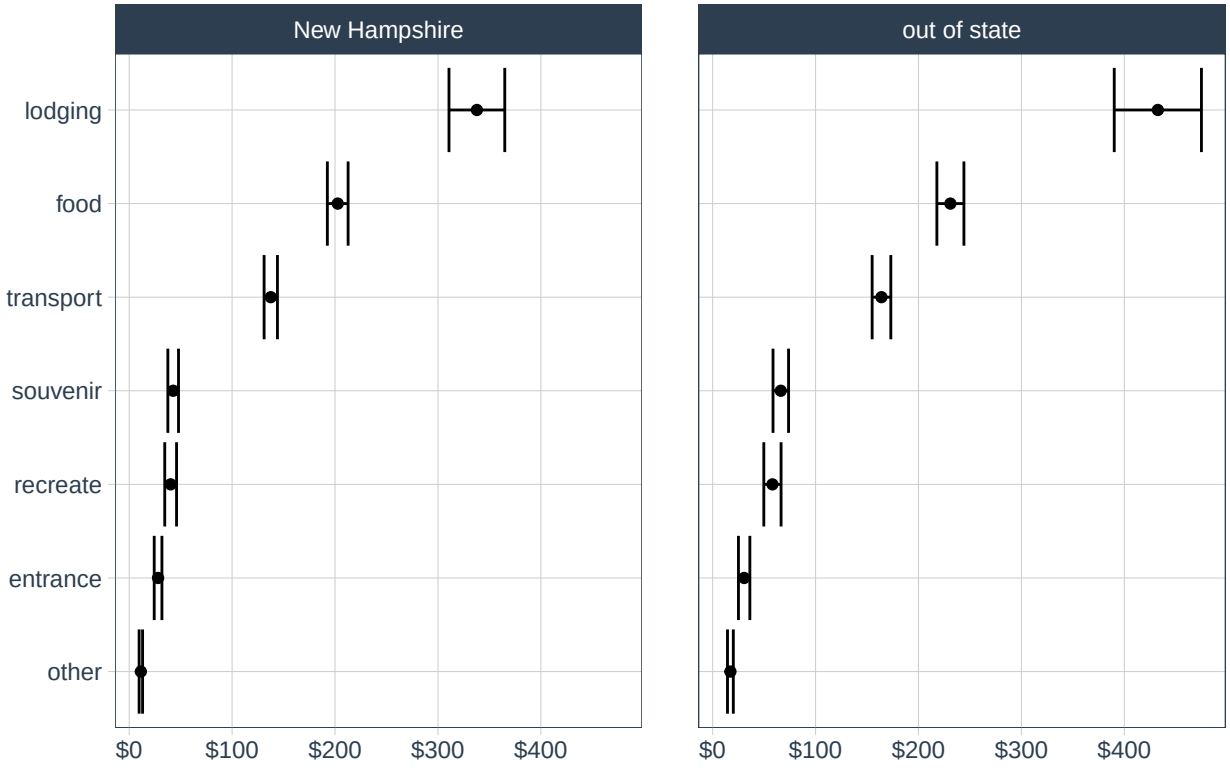
6.1.1.2 Survey Findings Of 1,523 respondents, 950 are New Hampshire residents while 573 are non-residents. The survey shows that New Hampshire residents made 11.5 day trips and 3.5 overnight trips in 2020, while non-residents made 5.2 day trips and 5.5 overnight trips. Resident riders are more likely to take day trips because of the proximity of their home to the OHRV trails, while overnight trips are more likely for non-resident riders.



During day trips, OHRV riders spend most on gasoline and food. Non-residents likely spend more per trip than residents. Understandably, neither group engages in other recreational activities during their day trips.

Figure 7: Overnight Trip Spending per Trip

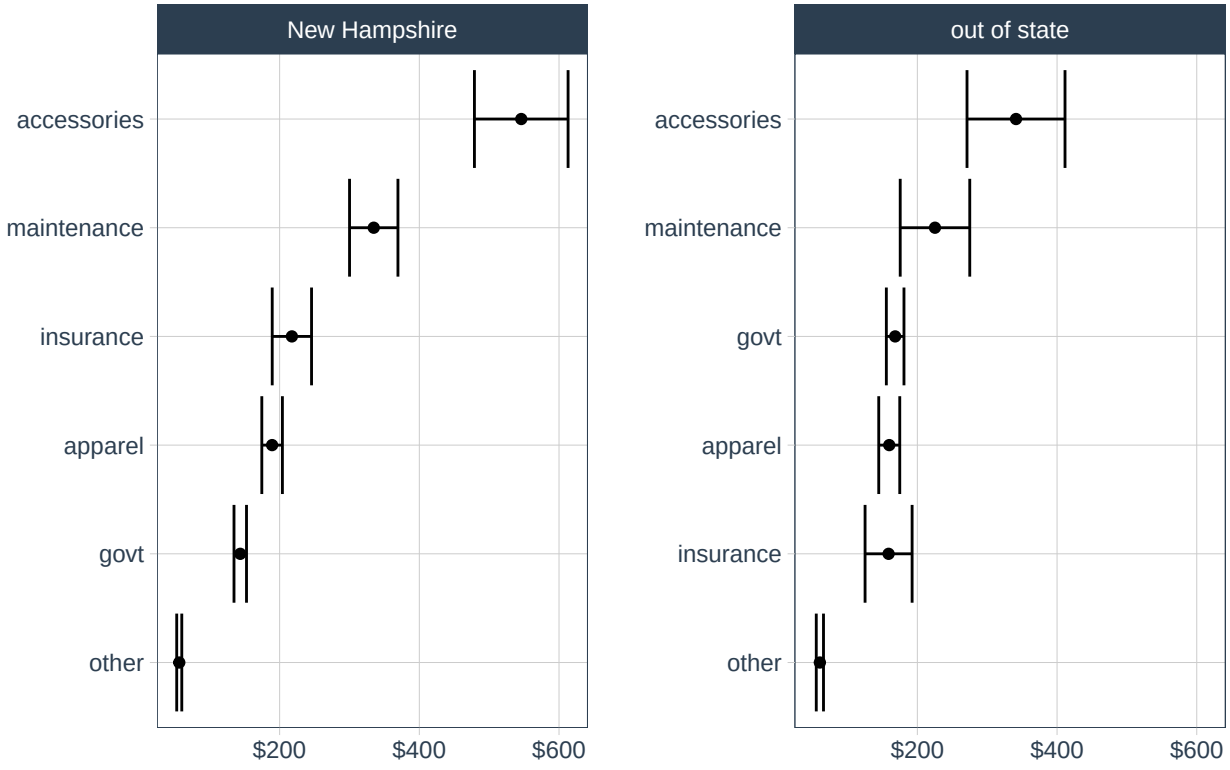
95 Confidence Interval



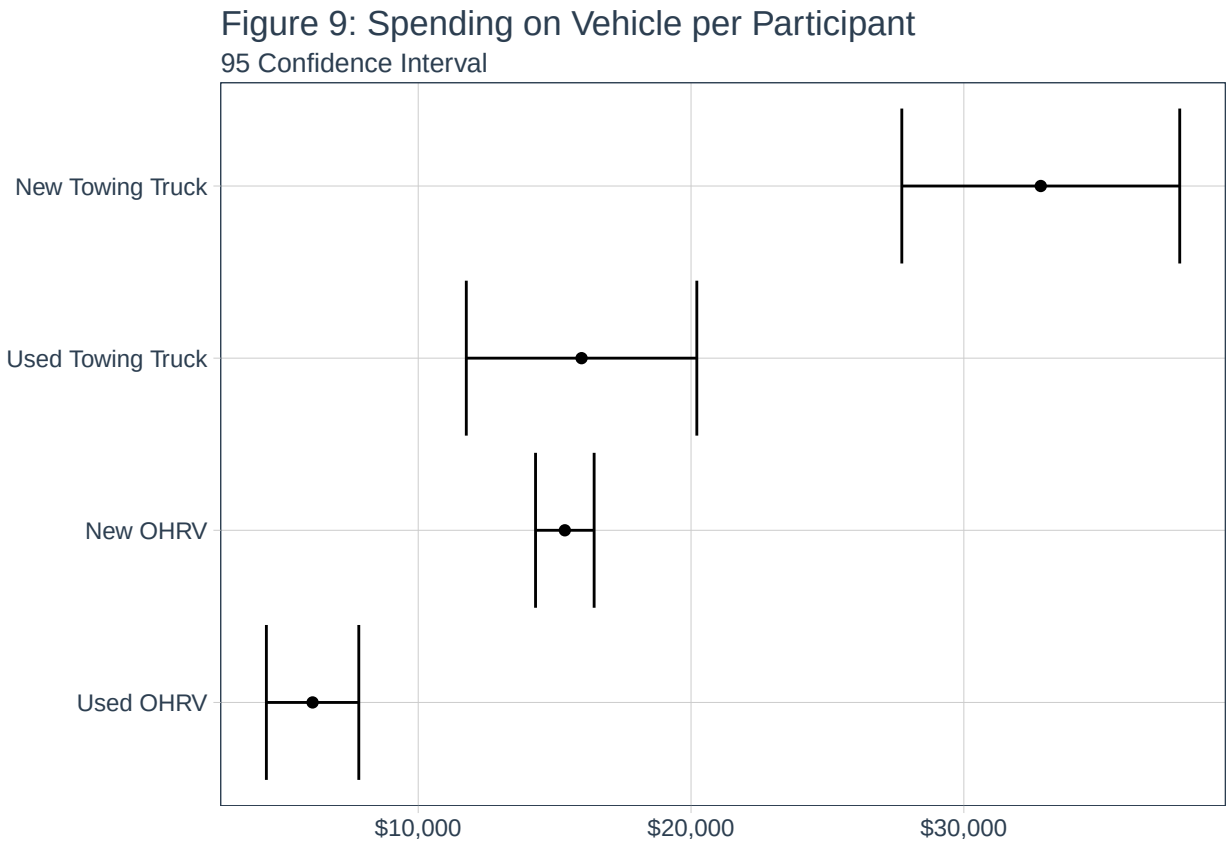
Riders spend more during overnight trips than during their day trips. They also spend on a variety of items during their overnight trips, including other recreational activities (e.g., concerts, amusement parks, and shopping). Lodging and food top the list. Like in day trips, non-residents likely spend more per trip than residents.

Figure 8: Annual Equipment Spending per Participant

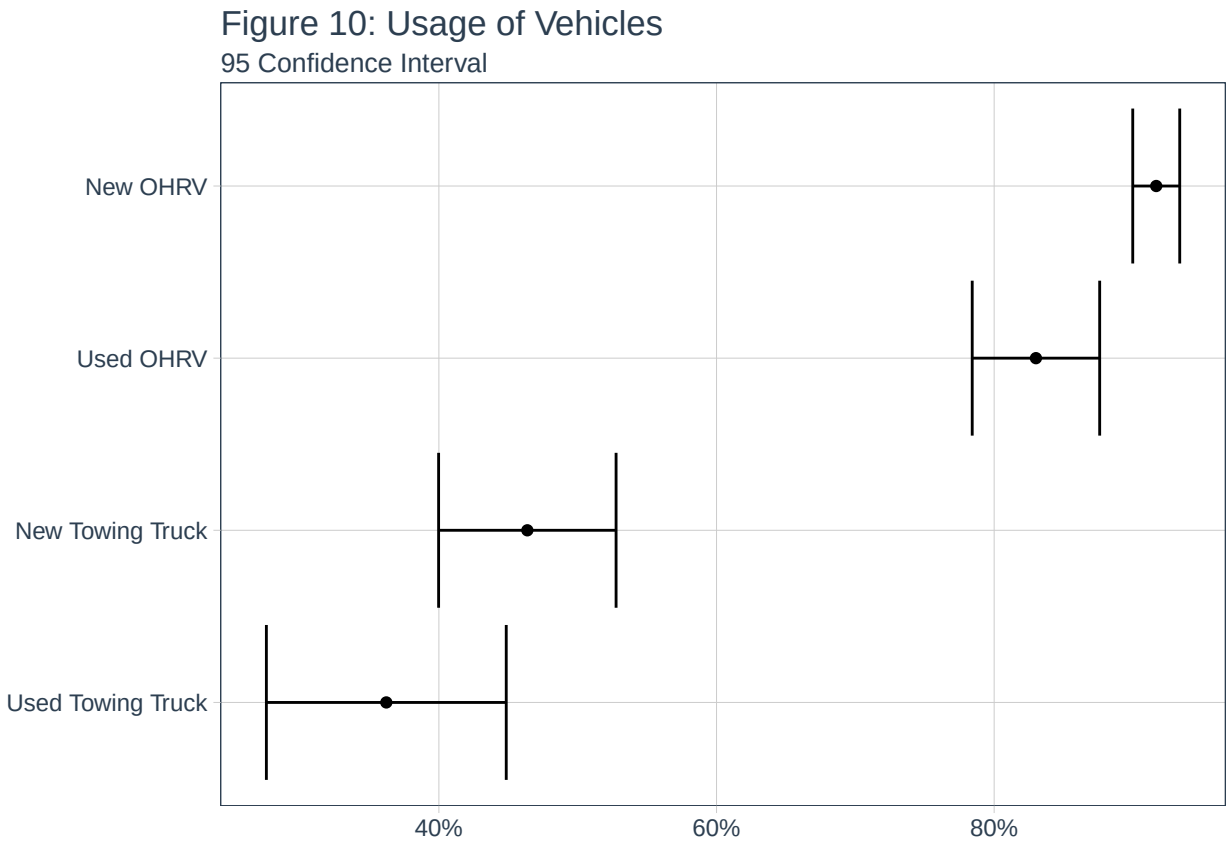
95 Confidence Interval



Regarding spending on equipment and accessories in preparation for the trip, nearly half of the OHRV riders reportedly made purchases in New Hampshire in 2020. 47.5% (451 of 950) of the resident riders made purchases in New Hampshire in 2020, and 46.1% (264 of 573) of the non-resident riders did so. Unlike trip expenditure, New Hampshire residents spend more than non-residents on equipment and accessories. Non-resident riders are more likely to purchase small-expenditure items like accessories and pay for vehicle maintenance in their state closer to their home. An exception is New Hampshire government fees or club memberships since the rates are higher for non-residents.



The survey results showed few variations in vehicle spending between residents and non-residents. So vehicle spending is presented together in the figure above. Of 1,523 respondents, 215 (14.1%) purchased a new OHRV in New Hampshire during 2020, while 113 (7.4%) purchased a used OHRV. Of 1,523 respondents, 115 (7.6%) purchased a new towing truck in New Hampshire during 2020, while 68 (4.5%) purchased a used towing truck. A new OHRV is about $15,000, while a used one is about $5,000. Understandably, there are more variations in the price of towing trucks. A typical new towing truck is likely more than $30,000, while a used one can be had for less than $20,000.



Vehicles can be used for purposes other than off-highway recreational vehicle activity. In estimating the economic contributions of OHRV riders, therefore, vehicle spending should only be considered to the extent that it is used for off-highway recreational vehicle activity. Other irrelevant activities such as commuting, shopping, other outdoor recreational activities (e.g., hunting) should be excluded. 215 respondents who purchased a new OHRV in New Hampshire during 2020 reported that they use the new OHRV for the off-highway recreational vehicle activity 91.7% of the time. 115 respondents who purchased a new towing truck in New Hampshire during 2020 reported that they use the new towing truck for the off-highway recreational vehicle activity 46.4% of the time.

6.2 Procedures

Economic contributions of OHRV riders were estimated in the following order:

1. Estimate the number of OHRV riders
2. Estimate Trips
3. Estimate Expenditures
4. Estimate Economic Contributions

6.2.1 OHRV riders

The number of OHRV riders was estimated by the following formula:

`number of OHRV riders` = `number of ATV/Trailbike registrations` / `avg. number of Registrations per person` [11]

[11] The ATV, UTV, and trail bike registrations data were obtained from the New Hampshire Fish and Game Department

The number of OHRV riders was estimated by dividing the number of registrations by the average number of registrations per person because some riders have more than one vehicle. See Table 6 below. This result should be considered the best possible estimate given all available information. The registrations-based estimate could be smaller than the actual number of riders as someone other than the registered vehicle owner may ride the vehicle. On the other hand, it could also be larger than the true number of riders since a person can pay for registration and not make an OHRV trip to New Hampshire. The comparison with other relevant studies suggests that this registrations-based estimate of OHRV riders should be a reasonable approximation of the reality.

On a side note, the author compiled the ATV, UTV, and trail bike registration data for the calendar year 2020 by aggregating quarterly data that include December 2019. However, the inclusion of December 2019 should have little influence on the outcome since OHRV trail riding is the summer season activity and few registrations take place in the month of December. The New Hampshire Fish and Game Department doesn't track OHRV registrations by calendar year but only fiscal year.

Table 6: Estimating OHRV Riders from Registrations, Calendar Year 2020

State	ATV/Trailbike Registrations	Registrations per Person	OHRV riders
New Hampshire	26,249	1.36	19,301
out of state	16,525	1.40	11,804

6.2.2 Rider Expenditures

Expenditures were estimated in the following three sections:

- Trip-Related Spending: It is measured on a per-trip basis and includes items, such as food & drink, transportation, lodging, souvenirs, etc.
- Equipment & Services: This spending is measured per participant annually. It includes items such as primary equipment, apparel, accessories, services, fees, etc.
- OHRV: Vehicle spending is measured per participant annually. Riders were asked in the online survey the percentage of the usage of the vehicle that was for trail riding, and only this part of the purchase price was counted toward the OHRV's economic contributions.

6.2.2.1 Trip-Related Spending

Trip-related spending was estimated by the formula below.

`trip expenditure = number of OHRV riders * avg. number of trips per rider * Avg. spending per trip`

Since rider spending varies immensely among travel types, OHRV rider spending was estimated by four different trip profiles:

1. In-state Day Trips
2. In-state Overnight Trips
3. Out-of-state Day Trips
4. Out-of-state Overnight Trips

The online survey grouped survey respondents into four trip spending profiles by asking them how many trips they took of each of the four types (in-state day, in-state overnight, out-of-state day, out-of-state overnight). Then, the survey followed up with each respondent who indicated taking one or more of the specified trip types with a question asking how much they spent for a typical trip. The respondents were asked to enter a value for each expenditure category (e.g., lodging, food, gasoline, and souvenir). Figures 6 and 7 report the results.

6.2.2.2 Equipment & Services

Equipment & services spending was estimated by the formula below.

`equipment expenditure = number of OHRV riders * percentage of the riders who bought equipment * avg. spending on equipment per person`

Each qualified respondent was asked to indicate how much money they spent in New Hampshire during 2020 on equipment and services for the off-highway recreational vehicle activity (e.g., apparel, vehicle maintenance, and vehicle insurance). See Figure 8 for the results.

6.2.2.3 Spending on Vehicles

Vehicle spending was estimated by the formula below.

`vehicle expenditure = number of OHRV riders * percentage of the riders who bought vehicle * avg. spending on vehicle per person * avg. vehicle usage`

The survey collected vehicle spending information by four different types of vehicles (new OHRV, used OHRV, new towing, used towing). Separating vehicle spending (and vehicle usage) into new and used categories helps increase the accuracy of estimates because of a significant variation in the price between new and used vehicles. For the same reason, vehicle spending (and vehicle usage) was estimated separately between OHRV and the towing truck.

The survey collected the following information per each of the four vehicle types:

1. percentage of the riders who bought vehicle: The percentage of the OHRV riders who bought a vehicle in New Hampshire during 2020.
2. avg. spending on vehicle per person: The average amount spent by the rider on a vehicle purchased in New Hampshire during 2020.
3. avg. vehicle usage: The percentage of the vehicle usage for OHRV trail riding. OHRVs can be used for non-recreational purposes (e.g., personal transportation and commercial activities). In addition, OHRV can be used for other outdoor recreational activities (e.g., hunting). Usage or expenditures associated with the non-OHRV activity are not legitimate for inclusion in this study and were omitted.

Figures 9 and 10 report the results of these survey questions. Table 6 shows the estimated number of OHRV riders.

6.2.3 Estimating Economic Contributions

The author estimated the economic contributions of OHRV rider spending by using the IMPLAN model, an industry-standard input/output model that estimates multiplier effects of an economic event. Table 7 shows how expenditures were assigned to IMPLAN sectors. Note that an expenditure category was divided into sub-categories, when necessary, using the ratios found in the Outdoor Industry Association's 2017 study[12]. For example, $40.56 million of spending on lodging was equally divided into two separate sub-categories: hotels and campgrounds.

Table 7: Assignment of Expenditure to IMPLAN Sectors

Categories	Sub-categories	Expenditure	IMPLAN Sector
New OHRV	new ohrv	$61.89M	402 Retail - Motor vehicle and parts dealers
Lodging	hotels	$25.56M	507 Hotels and motels, including casino hotels
Lodging	campgrounds	$25.56M	508 Other accommodations
Food	full service restaurants	$21.21M	509 Full-service restaurants
Food	fast food restaurants	$22.56M	510 Limited-service restaurants
Food	all other restaurants	$2.65M	511 All other food and drinking places
Transport	transport	$39.82M	408 Retail - Gasoline stores
New Towing Truck	new towing truck	$35.74M	402 Retail - Motor vehicle and parts dealers
Used OHRV	used ohrv	$11.74M	402 Retail - Motor vehicle and parts dealers
Souvenir	souvenir	$10.82M	412 Retail - Miscellaneous store retailers
Used Towing Truck	used towing truck	$8.04M	402 Retail - Motor vehicle and parts dealers
Accessories	accessories	$6.86M	402 Retail - Motor vehicle and parts dealers
Recreate	sports1	$2.04M	497 Commercial sports except racing
Recreate	sports2	$0.14M	498 Racing and track operation
Recreate	amusements1	$0.85M	502 Amusement parks and arcades
Recreate	amusements2	$1.32M	503 Gambling industries (except casino hotels)
Recreate	other recreate	$2.16M	504 Other amusement and recreation industries
Maintenance	maintenance	$4.29M	512 Automotive repair and maintenance, except car washes
Entrance	entrance	$3.90M	447 Other real estate
Other	other	$3.90M	412 Retail - Miscellaneous store retailers
Insurance	insurance	$2.86M	444 Insurance carriers, except direct life
Apparel	apparel	$2.60M	409 Retail - Clothing and clothing accessories stores

6.3 IMPLAN Model and Data

The model used in this analysis was built by customizing the Impact Analysis for Planning (IMPLAN) regional input-output software. The first input-output model was developed by Dr. Wassily Leontieff to help the United States mobilize to meet the demand of World War II. For his work on input-output models, he won the Nobel Prize in Economic Science in 1973. The input-output model was later applied to regional economies. With the enactment of the National Forest Management Act in 1976, the U.S. National Forest Services needed a systematic tool for evaluating the national forest management plans on local residents and businesses. Hence, the creation of the IMPLAN. The advancement of computer technologies made it possible

[12]Accessed 7/19/2019 at https://outdoorindustry.org/wp-content/uploads/2015/03/OIA_Recreation_Economy_Contributions_Technical_Report_2017-08-24.pdf

to extrapolate, extend, and convert existing data to regional economies using non-survey methods, without the cost of onsite data collection. Today, IMPLAN is widely used for evaluating economic impacts beyond the forest and logging sector. It traces impacts through direct, indirect, and induced economic effects. Direct effect is the initial expenditures, or production, made by the industry experiencing the economic change; indirect effect represents the effects of local inter-industry spending through the backward linkages; and induced effect is the result of local spending of employee's wages and salaries for both employees of the directly affected industry and employees of the indirectly affected industries. "Backward linkages" are the tracking of industry purchases backwards through the supply chain to the direct effect industry. IMPLAN data is constructed primarily from federal government data, including:

- U.S. Bureau of Economic Analysis Benchmark I/O Accounts of the U.S.
- U.S. Bureau of Economic Analysis Output estimates
- U.S. Bureau of Economic Analysis REIS Program
- U.S. Bureau of Labor Statistics Covered Employment and Wages Program
- U.S. Bureau of Labor Statistics Consumer Expenditure Survey
- U.S. Census Bureau County Business Patterns program
- U.S. Census Bureau Decennial Census and Population Surveys
- U.S. Census Bureau Economic Censuses and Surveys
- U.S. Department of Agriculture Crop and Livestock Statistics
- U.S. Geological Survey

6.4 IMPLAN Model Assumptions

All usual assumptions of the input-output model apply in this study. The model incorporates the following:

- **Constant returns to scale**: As all inputs increase by a factor, output increases by the same factor. For example, output doubles if all inputs double.
- **National production coefficients and margins**: An industry is assumed to have identical production functions and margins in all regions in the country.
- **No substitution among inputs**: No substitution among inputs is assumed for simplicity. In practice, firms may look for an alternative for an input that becomes increasingly more expensive, which may happen if its demand increases and/or its supply falls.
- **No constraints to the supply of commodity**

6.5 Definition of Key Measures

1. **Employment**: the annual average number of jobs, including both full- and part-time jobs; for example, 10 jobs for the first half of the year and 20 jobs in the second half results in 15 average jobs for the year.
2. **Labor income**: employee compensation (wages and salaries plus other compensations) and proprietor income.
3. **Value added**: labor income, other types of property income (such as dividends, interest income, rent income, and profits), taxes on production and imports.
4. **Output**: the total value of production, which is the sum of value added and the cost of all the inter-industry purchases required for production.
5. **Multiplier effect**: the cumulative economic activity arising from the fact that the OHRV industry's contribution spreads across the state's economy by creating and supporting jobs, incomes, and taxes. The OHRV industry supports its supply industries in the region by making purchases from them (indirect effect). These supply industries include marketing, accounting, employment services, and insurance carriers. In addition, workers in the OHRV industry and its supply industries spend their earnings in the region's services industries (induced effect), such as hospitals, schools, repair and maintenance services, and utility companies.

6. **Direct effect**: jobs, incomes, and taxes directly created by the OHRV industry (e.g., motor vehicle and parts dealers, restaurants, gas stations, grocery stores, and other retail stores).
7. **Indirect effect**: the economic effects of local inter-industry spending due to the existence of the OHRV industry.
8. **Induced effect**: the economic effects of local spending (usually in services industries) of employee's wages and salaries of the directly and indirectly affected industries.