Washington State
Nonhighway and Off-road Vehicle Activities
Fuel Use Survey

prepared for

Interagency Committee for Outdoor Recreation

by

Hebert Research, Inc.

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Summary Results

The Washington State Nonhighway and Off-road Vehicles Activities (NOVA) Fuel Use Survey involved a year-long mail survey of 7,252 vehicle owners statewide. The survey was conducted between December 16, 2001 and December 15, 2002. Vehicles owners were randomly selected from the Department of Licensing's database of 5.1 million street-licensed and registered off-road vehicles. Vehicle owners were asked about miles driven and fuel used on public roads, back roads and off of roads, as well as about recreational activities associated with use of the vehicle on back roads and off of roads.

The results of the study indicate that of respondents whose vehicles used fuel on back roads or off of roads, 26.6% engaged in hiking, 12.1% in off-road vehicle (ORV) use, 8.5% in cross-country skiing, 6.7% in mountain biking, 2.1% in snowmobiling, and 3.8% in equestrian activities.

A total of 25.6 million gallons of motor vehicle fuel is estimated to have been consumed on back roads or off of roads during the one-year study period. Of this total, 5.1 million gallons (20.0%) are associated with motorized recreational activities (riding dirt bikes, snowmobiles, ATVs and 4X4s) and 7.8 million (30.4%) gallons are associated with non-motorized related activities (hiking, mountain biking, horseback riding and cross-country skiing). An additional 12.7 million gallons (49.6%) were used for "other" recreational activities such as camping, sightseeing, hunting and fishing.

WASHINGTON STATE FUEL USE SURVEY
Final Report
February 2003

TABLE OF CONTENTS

BACKGROUND AND RESEARCH OBJECTIVES

Background

The Washington State tax on gasoline is used to support the construction and maintenance of state roads and highways. In the early 1970s the State Legislature decided that tax paid on gasoline consumed for recreational purposes on roads not supported by state funds ("nonhighway roads"), such as Forest Service or state forest roads, and gasoline consumed for off-road activities should be used to provide facilities and services for these recreational activities. The percentage of fuel attributed to nonhighway road and off-road use and the formula for allocating the resulting funds to state agency recreational programs was based on a study of nonhighway recreational fuel consumption done in 1972-73 and on policy decisions made by subsequent legislatures.

In 2001, the State Legislature requested the Washington State Interagency Committee for Outdoor Recreation (IAC) undertake a new study to measure the proportion of gas tax generated by different types of vehicles operating off-road and on nonhighway roads for various recreational purposes. The Legislature asked IAC to contract with an "independent entity" to conduct the study.

In August of 2001 IAC requested proposals from private research firms across the country. Hebert Research of Bellevue, Washington, was selected to conduct the study based on the firm's experience, credibility and price. The selection was done in consultation with a Technical Advisory Committee, representatives of other affected state agencies, and a six-member committee representing the major interested recreation user groups. This "task force" is described in greater detail in the following section.

Research Objectives

The primary objective of the NOVA fuel use study was to determine the relative portion of motor vehicle fuel tax revenues attributable to vehicles operating off-road and on nonhighway roads for various recreational purposes. The study was to include information regarding:

- Types of vehicles,
- Location of their use,
- Types of recreational activities,
- Types of recreational facilities used, and
- Recreational use of forest roads relative to other, nonrecreational uses.

To provide the Legislature with the information needed to address NOVA tax allocation issues, the study was to be fair, scientifically credible, accurate, and unbiased. At a minimum, the study needed to include:

- A scientifically valid sample that allows drawing statistically valid conclusions about the entire state.
- A response rate of at least 20%.
- Estimates of the proportion of fuel attributed to the major activity groups with accuracy within plus or minus 3-5% with a confidence level of 95%.
- A study methodology that was credible to stakeholders and the Legislature.

METHODOLOGY – STUDY APPROACH

The 2001-02 fuel use survey project began in late fall 2001. The survey design and questionnaire was developed by Hebert Research and IAC staff, with the advice of a technical advisory committee[1], representatives of the affected state agencies (Washington Department of Fish and Wildlife, State Parks and Department of Natural Resources), and representatives of six major recreational user groups[2]. This report will refer to all of the above individuals as the fuel use study "task force."

The initial sampling plan called for mailing out approximately 40,000 survey forms over the course of 12 months to a representative statewide random sample of vehicle owners (taken from the Department of Licensing Vehicle database). This sample size was based on an expected response rate of at least 20%, and large enough to provide minimum sample sizes for individual segments using a stratified sampling frame based on geographic area and type of vehicle (see page 4). To obtain enough vehicle owners with off-road vehicles and other less common vehicles types, a much larger sample would have been required if the stratified sampling approach was not used.

Two different types of questionnaires were developed and pre-tested. The first was called a "fixed gallon" survey, which asked respondents about the last tank of fuel consumed in the subject vehicle and the amount of time taken to use the fuel. The second type was the "diary" survey method, which was the approach ultimately selected for the year-long study after extensive testing. Both two-week[3] and monthly diaries were pre-tested in the field to determine feasibility. The diary drafts were also tested to determine whether asking directly for actual gallons used or miles driven would be preferable. Asking for miles driven means that gallons have to be calculated based on miles per gallon estimates provided by the respondent and from industry data. After reviewing the pre-test results, the staff, technical advisors and user group representatives determined that the two-week diary had the best chance of obtaining an acceptable response rate and that asking directly for gallons used per day would pose more problems than asking for miles driven.

The research design included mailing both the two-week diary and fixed gallon surveys for two months, in order to compare response rates and results. The technical advisory committee and user group representatives preferred the diary survey method, but were concerned whether the diary approach would produce acceptable response rates of 20% or greater. The diary approach ended up with almost as high a response rate as the fixed gallon survey, and based on the favorable features (i.e. more usable data), the diary method was chosen over the fixed gallon approach. By using a two-week diary, the study essentially takes 24 independent samples of fuel use over the course of the 12-month survey timeframe.

[1] Technical advisors were Dr. Dana Moore of Washington State University and Dr. Vince Galucci of the University of Washington. Both are experts in survey design and analysis.
[2] Off-road motorcyclists ("dirt bikes"), hikers, 4X4s, mountain bikers, ATVs, and equestrians
[3] The actual survey time periods were twice per month, or approximately 15 days each; thus, the term "two-week" in this report refers to a ½ month period (1st to the 15th; 16th to last day of month)

Vehicle Categories
The following five categories of vehicles were sampled, corresponding to the major categories within the Department of Licensing's database:

- Passenger cars and sport utility vehicles (SUVs)
- Pickup trucks
- Street licensed motorcycles and mopeds
- Motor homes
- Off-road vehicles (ORVs) including all-terrain vehicles (ATVs), non-street legal four-wheel drive vehicles (4x4s), dirt bikes[4] and other vehicles used on trails and in open riding areas.

Understanding the ORV Vehicle Category
It is important to note that all vehicles in the ORV category were sampled from the statewide database of vehicles *that are not street legal* and are registered with an off-road vehicle (ORV) use permit/tag. All vehicles that can be legally driven on public roads and highways and can also be driven off-road are classified in the passenger car/SUV, truck or motorcycle categories depending on their body type. It is possible for a 4x4 or motorcycle to be driven on back roads or off of roads and have the fuel usage recorded in the calculations, but still be registered as a street-legal vehicle. Throughout this report, whenever ORVs are discussed the reference is to a specific type of vehicle that is not street legal, as opposed to a type of activity. These designations do not affect the accuracy of the fuel use calculations, which are based on the activity selected in the questionnaire – not the vehicle type.

Table 1. Distribution of Vehicles Owned Statewide, November 2001

Vehicle Category	Total Vehicles Owned Statewide
Passenger/Sport Utility Vehicle (SUV)	3,794,286
Pickup Truck	1,033,611
Motorcycle/Moped	121,798
Motor Home	85,445
Off-Road Vehicle (ORV)	61,081
Total	**5,096,221**

[4] The term "dirt bike" is used here to mean a motorcycle registered as an ORV and not licensed for use on streets and highways.

Survey Terminology and Definitions

The main purpose for the fuel use study was to determine the relative portion of the motor vehicle fuel tax revenues that are attributed to vehicles operating "off-road" and on "nonhighway roads." The task force felt that simple terms with clear definitions were needed to specify the road types and/or areas where fuel is consumed. There was also agreement among the task force members that the general public would not understand the term "nonhighway road." Therefore, the term "back roads" was used in place of "nonhighway roads." The survey instrument included written definitions, provided examples of the roads or areas, used symbols and color, and provided a simple graphic to help ensure respondents understanding (see Appendix A for a sample of the questionnaire). The definitions provided were as follows:

> **Highways and Streets ("A").** This includes city streets, county roads, state highways or interstate highways.
>
> **Back Roads ("B").** These are NOT city streets, county roads, state highways or interstate highways. "B" includes roads and routes such as private logging roads, State Department of Natural Resources roads, State and National Forest roads, National Park roads, Department of Fish and Wildlife roads, and roads entering and/or passing through other public lands. Often (but not always) they are unpaved.
>
> **Off of Roads ("C").** Includes trails, open riding areas (dunes and other dispersed ORV riding areas), and competitive ORV areas. Found on both public and private land such as private timber lands, State Department of Natural Resources land, State and National Forests, Department of Fish and Wildlife trails and lands, other public land, and competitive ORV riding areas.

A stratified random probability sample of the 5.1 million state vehicle database was developed, stratified by county size (small, medium and large county groups) and by the five major vehicle types. This total included both street licensed vehicles and vehicles with ORV stickers. A total of 140,000[5] records were selected in November 2001 based on the stratified sample design. The state database of 5.1 million vehicles was already separated into the five major vehicle categories. Each vehicle category was then further divided into three categories, based on county size, prior to selecting the initial probability sample. Thus, there were 15 distinct cells (5 vehicle types for each of the 3 county size categories) within which to draw random samples. Vehicle owners were randomly sampled from each cluster of vehicle and county size in order for the percentage of total vehicles surveyed to match the desired stratified sampling frame of the survey, both by county size and vehicle type. This sub-database was then edited to remove business vehicles and incomplete addresses (the editing process removed 12,600 records or 9% of the original sample). A new random sample of the remaining records in the database was taken for each two-week mailing period, using quotas matching the stratified sampling frame for size of county and vehicle type.

[5] The 140,000 figure was chosen to allow for an unknown amount of editing (i.e. business records) and to ensure that sufficient additional records were available in case changes were required in the sampling frame over the course of the year.

Table 2. Developing the Stratified Probability Sample of Statewide Vehicle Owners

Stage in Developing Sample	Total Vehicles
Total Vehicles in WA State	5,096,221
Randomly Selected Sub-Set	140,000
Edited to Remove Business Vehicles and Incomplete Addresses (subtracted 12,600)	127,400
Survey Forms Mailed to Vehicle Owners Randomly Selected from Edited Database	42,995

In order to ensure that the survey could be generalized to the larger universe of total vehicles, steps were taken to encourage participation from those who do not engage in NOVA recreational activities. This included emphasizing in the cover letter the importance of participation regardless of one's recreational use, and providing a convenient box to check if the vehicle was not used over the period (so the diary did not have to be fully filled out to be returned). The wording of the cover letter, instructions, and a frequently asked questions (FAQ) sheet provided additional assistance and made the survey more user-friendly (See Appendix A for samples). Respondents with questions about the fuel use study or the survey were directed to visit IAC's web site or could call Hebert Research's toll-free number.

METHODOLOGY – STRATIFIED SAMPLING FRAME

A stratified sampling frame is a standard procedure for statewide surveys, in order to make sure that the study is representative of the smaller communities and less common segments of the population. Stratified samples mean that the survey over-samples the smaller segments in order to have sufficient minimum sample sizes for analysis, but then adjusts back to the normal proportions using standard statistical weighting procedures. The sample will then have the same composition as the broader population, but the overall findings will more accurately reflect differences among smaller areas or counties.

By County

The following table shows the three county size categories, number of surveys completed and actual vehicles owned in each. Large counties were those with at least 100,000 vehicles, mid-sized counties had at least 20,000 but less than 100,000, and small counties had fewer than 20,000.

Table 3. Distribution of Vehicles by Large, Mid-Sized and Small County Size Class

Size of County	Total Completed Surveys	Percent of Total Completed Surveys	Total Vehicles	Actual Share of Total Vehicles
Large	3,519	48.5%	4,211,881	82.6%
Mid-sized	2,446	33.7%	758,084	14.9%
Small	1,287	17.7%	126,256	2.5%
Total	**7,252**	**100.0%**	**5,096,221**	**100.0%**

By Vehicle Type

The second type of stratification used was by type of vehicle. The purpose was again to maintain sufficient minimum sample sizes of the less common vehicle categories, assuming that each category had distinct characteristics that needed to be measured.

Table 4. Distribution of Vehicles by Type of Vehicle

Vehicle Class	Total Completed Surveys	Percent of Total Completed Surveys	Total Vehicles	Actual Share of Total Vehicles
Passenger/Sport Utility Vehicle (SUV)	2,862	39.5%	3,794,286	74.4%
Pickup Truck	1,980	27.3%	1,033,611	20.3%
Motorcycle/Moped	694	9.6%	121,798	2.4%
Motor Home	768	10.6%	85,445	1.7%
Off-Road Vehicle (ORV)	948	13.1%	61,081	1.2%
Total	**7,252**	**100.0%**	**5,096,221**	**100.0%**

METHODOLOGY – RESPONSE RATES

Background

Response rates are particularly important in mail surveys, where researchers often obtain rates as low as 5-10 percent, depending on the length of questionnaire, subject matter, and use of incentives. Lower response rates increase the chances of potential bias from what is known as "non-response error," or a skew in the data because those who choose not to respond may differ from those who do respond. In this survey, a target rate of at least 20 percent was considered acceptable by the task force. To improve response rates, follow-up reminder cards were mailed to each potential respondent within 5 days after the form was mailed. The reminder cards were pre-tested initially and the results showed they did achieve an increase in response rates compared to the control group without reminder cards.

Results

Through the 12-month period, the fuel use survey maintained an overall average response rate of 25.5%. All of the months were within an acceptable range of response rates, varying from 19.3% to 31.6%. This relatively high response rate is a good indication that the survey instrument was effective at encouraging participation from a broad base of vehicle owners. The sample was statistically weighted by month to adjust for differences in response rates over the course of the year, using standard weighting procedures. Response rates were generally similar across the different strata (vehicle type and size of county), as shown in the table below.

Table 5. Response Rates by Strata

County Size	% of Mailed Forms	% of Returned Forms	Response Rate
Large	53.4%	48.5%	23.1%
Mid-Sized	28.1%	33.7%	30.5%
Small	18.4%	17.8%	24.6%
Total	**100.0%**	**100.0%**	**25.5%**

Vehicle Type	% of Mailed Forms	% of Returned Forms	Response Rate
Passenger/Sport Utility Vehicle (SUV)	35.6%	39.5%	28.2%
Pickup Truck	28.8%	27.3%	24.2%
Motorcycle/Moped	13.9%	9.6%	17.6%
Motor Home	10.9%	10.6%	24.8%
Off Road Vehicle (ORV)	10.9%	13.1%	30.6%
Total	**100.0%**	**100.0%**	**25.5%**

Table 6 shows the actual counts and response rates for each month. The response rate is based on total returned forms, as opposed to only the usable forms, and it is also based on the number of surveys confirmed to have been delivered (this was established by counting the forms returned as undeliverable). In Table 6 the total forms confirmed to have been mailed each month is called the "valid mailing." Basing response rates on total participation (total forms received) is a standard research protocol. It provides an indicator of the percentage of the population of vehicle owners who received a form and chose to participate by responding with information about their vehicle or, in the case of the unusable forms, about their vehicle status.

As the year progressed, it was noted that an increasing number of vehicle owners in the randomly selected database had changed addresses or sold the vehicle in question. The Department of Licensing was not able to provide the research team with change of address data and for confidentiality reasons an outside vendor was not used to adjust the database. There were 8,453 returned forms, with 7,252 completed usable surveys. Thirty-nine percent of the 1,201 unusable forms received were marked with "sold vehicle." The remaining unusable forms were not filled out and had a message or note written on them. Generally the reason listed was that the individual did not recognize the license plate listed on the cover letter and form. There were no indications in the unusable forms that the survey questionnaire was unclear and very few of the calls to Hebert Research were regarding confusion about the survey form itself.

Table 6. Monthly Returns, Completed Interviews and Response Rates

Month	Total Surveys Mailed	Surveys without valid addresses	Valid Mailing (Surveys mailed to working addresses)	Surveys Returned	*Response Rate
Dec. 2nd Half	1,666	116	1,550	365	**23.5%**
January	3,333	208	3,125	888	**28.4%**
February	3,333	211	3,122	985	**31.6%**
March	3,333	223	3,110	663	**21.3%**
April	3,333	610	2,723	625	**23.0%**
May	3,333	842	2,491	480	**19.3%**
June	3,833	1,274	2,559	565	**22.1%**
July	3,833	1,117	2,716	726	**26.7%**
August	3,333	987	2,346	601	**25.6%**
September	3,333	1,095	2,238	623	**27.8%**
October	4,333	1,296	3,037	804	**26.5%**
November	4,333	1,360	2,973	866	**29.1%**
Dec. 1st Half	1,666	474	1,192	262	**22.0%**
Total	**42,995**	**9,813**	**33,182**	**8,453**	**25.5%**

**"Response rate" = number of surveys returned divided by the valid mailing (number of forms mailed to working addresses)*

Hebert Research monitored response rates and returned questionnaires with the goal of obtaining at least 500 net usable surveys per month. Following the lower May returns, 500 additional forms were mailed per month in June and July. In October and November, an additional 1,000 forms per month were mailed to ensure sufficient monthly sample sizes. As mentioned above, samples were statistically weighted by month so that in the final analysis each month contributed equally to the final results.

Table 7. Total Forms Returned, Unusable Forms and Net Usable Surveys by Month

Month	Total Surveys Returned	Unusable Surveys: Marked "Sold Vehicle"	Other Unusable Surveys: Did not Complete	Total Unusable Survey Forms	Net Usable Surveys Entered in Database
Dec. 2nd Half	365	14	40	54	311
January	888	61	90	151	737
February	985	72	104	176	809
March	663	43	54	97	566
April	625	12	14	26	599
May	480	0	1	1	479
June	565	12	16	28	537
July	726	37	75	112	614
August	601	36	56	92	509
September	623	42	62	104	519
October	804	50	76	126	678
November	866	56	106	162	704
Dec. 1st Half	262	31	41	72	190
Total	**8,453**	**466**	**735**	**1,201**	**7,252**

METHODOLOGY – CONVERTING MILES TO GALLONS

In order to maximize the accuracy of miles per gallon estimates, the survey respondents were asked to classify their vehicle into additional categories beyond the five initial vehicle types. SUVs were separated from passenger cars, pickup trucks were separated into compacts and full size models, and off-road vehicles were divided into several sub-categories. Table 8 describes these divisions.

Table 8. Estimates of Vehicles in Washington State by Additional Categories

Vehicle Categories Used for Estimating Miles Per Gallon	Share of Total Vehicles	Estimated Total Vehicles Owned
Passenger car	64.0%	3,263,457
SUV	10.4%	530,829
Compact pickup truck	8.3%	424,174
Full size pickup truck	12.0%	609,437
Motorcycle/moped	2.4%	121,798
Motor home	1.7%	85,445
Dirt bike	0.5%	26,280
ATV	0.6%	31,962
4x4 or Other Off Road	0.1%	2,840
Total	**100.0%**	**5,096,221**

Note: These figures were based on the actual total vehicles owned in the five major categories and the survey responses to the question about specific category of vehicle owned

A very large percentage of vehicle owners surveyed were able to provide estimates of their vehicle's miles per gallon, as the following table indicates. The methodology for estimating gallons used involved dividing miles reported for the three road types by the reported miles per gallon for the corresponding road type. For those who were not able to estimate miles per gallon, the averages were used for the sub-category of vehicle (see Table 10).

Table 9. Percent of Respondents who Estimated Their Vehicle's Miles per Gallon by Type of Road And Major Vehicle Category

Vehicle	Streets & Highways ("A")	Back Roads ("B")	Off of Roads ("C")
Passenger cars & SUVs	93.9%	79.9%	48.5%
Truck	94.7%	89.7%	71.9%
Motorcycle	92.2%	89.7%	90.0%
Motor home	95.1%	84.6%	NA
Off-road vehicle	NA	89.2%	92.2%

Note: The vehicle categories which have an "NA" in a given type of road are those for which very few vehicle owners were able to provide an estimate due to a lack of usage of that type of road (such as motor homes driving off of roads or dirt bikes driving on public streets). For the

same reason, the percentage of passenger car owners giving estimates on off-road mileage was lower than for other vehicle types. Also, many owners gave estimates of miles per gallon even though they did not use their vehicle on that type of road during the survey period.

The following table lists the average miles per gallon reported by surveyed vehicle owners, divided by the three types of roads. These averages were based on all who were able to provide a miles per gallon estimate for their vehicle, regardless of whether they used that vehicle on each type of road. These averages were used to calculate the number of gallons consumed by the smaller segment of owners that used fuel on a given road type but could not provide miles per gallon estimates. Estimates given by owners that did not use a given road type were statistically similar to those given by owners reporting miles driven, so the decision was made to use the overall average miles per gallon figures based on the larger sample of all owners providing these estimates.

Table 10. Average Miles per Gallon from Survey, By Vehicle and Type of Road

Vehicle	Avg. MPG on Streets & Highways ("A")	Avg. MPG on Back Roads ("B")	Avg. MPG Off of Roads ("C")
Passenger car	23.76	21.02	18.70
SUV	18.27	15.34	12.04
Compact truck	20.89	17.86	14.41
Full size truck	14.47	11.94	10.46
Motorcycle	43.17	38.82	30.59
Motor home	10.42	9.42	NA
Dirt bike	NA	30.71	29.16
ATV	NA	22.51	20.68

The table on the following page shows a comparison between the survey averages and published government fuel consumption data for the same vehicle types. The averages were generally very comparable, and differences could be explained from different mixes of vehicle ages, sizes and weights, engines, etc. The fact that such a high percentage of owners could provide estimates of miles per gallon, and the similarity of these numbers to official published statistics, supports the accuracy of this methodology.

Table 11. Comparison of Survey Averages with U.S. Industry Averages, Streets & Highways

Vehicle Type	Average MPG from Survey on Streets & Highways ("A")	Published Industry Averages
Passenger car[6]	23.76	22.00
SUV[7]	18.27	18.73
Compact truck[8]	20.89	20.94
Full size truck[9]	14.47	15.04
Motorcycle[10]	43.17	50.05
Motor home[11]	10.42	7.40

Sources:
U.S. ENVIRONMENTAL PROTECTION AGENCY (see footnotes)
U.S. DEPARTMENT OF TRANSPORTATION (see footnotes)

[6] PASSENGER CAR: Department of Transportation, Bureau of Transportation Statistics, "National Transportation Statistics, 2001, Table 4-11, Passenger Car and Motorcycle Fuel Consumption and Travel," Spring 2002; average is an estimate that represents all ages of passenger cars, all makes and models and includes miles driven on all road types
[7] SUV: Environmental Protection Agency, "27th Annual Mileage Estimates for 2002 Model Year Cars," 10/9/02; average was calculated based on an average of all models of new 2002 SUV vehicles, and represents an average of the EPA city and EPA highway figures reported for these vehicles
[8] COMPACT TRUCK: Environmental Protection Agency, "27th Annual Mileage Estimates for 2002 Model Year Cars," 10/9/02; average was calculated based on a sample of 39 new 2002 light truck models
[9] FULL SIZE TRUCK: Environmental Protection Agency, "27th Annual Mileage Estimates for 2002 Model Year Cars," 10/9/02; average was calculated based on a sample of 36 new 2002 full size truck models
[10] MOTORCYCLE: Department of Transportation, Bureau of Transportation Statistics, "National Transportation Statistics, 2001, Table 4-11, Passenger Car and Motorcycle Fuel Consumption and Travel," Spring 2002; average is an estimate that represents all ages of motorcycles, all makes and models and includes miles driven on all road types
[11] MOTOR HOME: Department of Transportation, Bureau of Transportation Statistics, "National Transportation Statistics, 2001, Table 4-13," Spring 2002; average is an estimate that represents all ages of motor homes with 6 tires (smallest motor homes not included) and includes miles driven on all road types

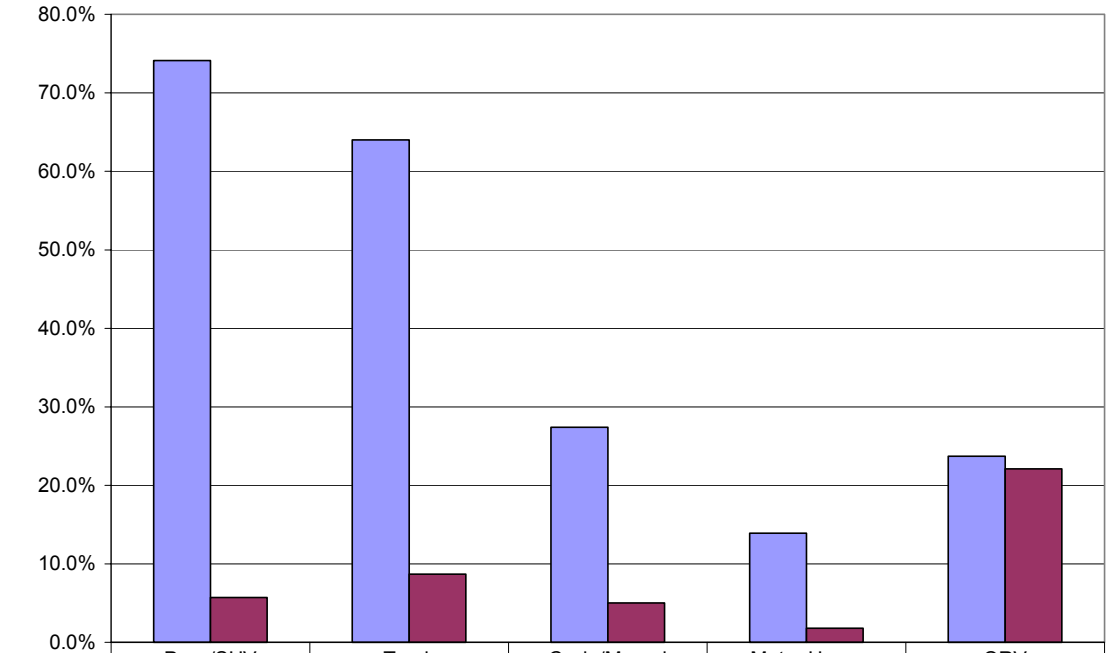
FINDINGS – PERCENT THAT USE FUEL IN TYPICAL TWO WEEK DIARY PERIOD

Passenger cars, SUVs, and pickup trucks were by far the most likely to be used during a typical diary collection period. On average, nearly three out of every four surveyed passenger car/SUV owners reported they used fuel during their two-week survey period. Motor homes were the least likely to be used during the typical survey period. Nearly one out of four off-road vehicles (ORV) were used in an average two-week period throughout the year.

Back Roads and Off of Roads Use

On average, the percentages of all vehicle owners surveyed who reported using fuel on Back Roads ("B") or Off of Roads ("C") during the two-week period ranged from 1.8% for motor homes to 22.1% for vehicles in the ORV (not street licensed) category.

Figure 1. Percent of Vehicles Using Fuel on Any Roads and Those Using Fuel on Back Roads or Off of Roads During Two-Week Survey Period



	Pass/SUV	Truck	Cycle/Moped	Motor Home	ORV
Any Use	74.1%	64.0%	27.4%	13.9%	23.7%
B & C	5.7%	8.7%	5.0%	1.8%	22.1%

FINDINGS – FUEL USED ON BACK ROADS AND OFF OF ROADS (B&C)

The results of this study show that an estimated 25.6 million gallons are used each year either on "B" or "C" (Back Roads and Off of Roads). This represents approximately 1% of the gasoline sold in the State of Washington in fiscal year 2002. This estimate was based on several calculations. First, it required converting miles reported on "B" and "C" categories to gallons, using the miles per gallon estimates previously discussed. Then, all gallons reported used on "B" and "C" were summed for the entire sample and the average gallons used on these roads was applied to the larger universe of vehicles statewide that used these roads. Finally, the total "B" and "C" fuel used was calculated for "motorized," "non-motorized" and "other" activity types.

All respondents that used fuel on "B" or "C" were asked to then check a list of activities associated with that use or else mark "other." In the few cases where both motorized and non-motorized activities were marked and the vehicle was not an off-road vehicle, the fuel reported was divided evenly between the two activity classes. Fuel reported by off-road vehicle owners on "B" or "C" roads that also participated in non-motorized activities as part of their trip was counted only as motorized.

- **Motorized Activities** included snowmobiling and off-road vehicle (ORV) activities
- **Non-Motorized Activities** included hiking/backpacking, mountain biking, cross-country skiing/snowshoeing, and equestrian activities

There were no statistically significant differences between months for overall fuel used, but as would be expected, fuel use on Back Roads ("B") or Off of Roads ("C") was higher during the summer months. Overall, during a typical two-week period, 6.5% of all owners reported using fuel on Back Roads or Off of Roads. The percentage of vehicles using fuel on either "B" or "C" during a typical 2-week survey period averaged 10.4% during the warmest July-August summer months, 4.9% between January and April and 5.6% between October and December. This shows that there is considerable use of vehicles on a year-round basis on "B" and "C".

Motorized recreational activities were associated with 20.0% of the 25.6 million gallons, while non-motorized activities were associated with 30.4%. The largest proportion was related to "other" activities such as sightseeing, hunting, fishing, camping (using back roads), picnicking, firewood gathering and berry picking. Hebert Research conducted a number of follow-up calls to fuel use survey respondents asking about these uses and confirmed that those who marked "other" in the survey fell into these activity types rather than actually doing one of the listed motorized or non-motorized activities and not knowing how to answer the questions. These other uses are listed in Table 14.

The following table provides the estimated number of gallons used and the percentage shares of the total fuel used on Back Roads and Off of Roads (maximum margin of error of 3-5 percent).

Table 12. Estimated Gallons of Fuel Used by Type of Activity

Activities Related to Fuel Consumed on Back Roads and Off of Roads	Estimated Total fuel used on Back Roads and Off of Roads	Estimated Percentage of Total Fuel Use on Back Roads and Off of Roads	Range of Percentages at the 95% Confidence Level
Motorized Activities (ORV and snowmobiling*)	5,111,945	20.0%	14.8%-25.2%
Non-motorized Activities (hiking, mountain biking, cross-country skiing, and equestrian)	7,781,277	30.4%	26.5%-34.3%
Other Use of Back Roads (i.e. sightseeing, hunting, fishing, wildlife viewing)	12,713,906	49.6%	46.4%-52.8%
Total Back Roads and Off of Roads Fuel Use	**25,607,128**	**100%**	-

**Note: Fuel attributed to snowmobiling is for the fuel consumed in vehicles driving on non-highway Roads and not for the fuel used for powering the snowmobile.*

Follow-up Interviews*

Because of the large percentage of vehicle owners that selected "other" as their primary activity (49.6%), follow-up interviews were completed with 40 of those vehicle owners. It was felt that follow-up interviews were needed to understand the types of "other" activities the vehicle owners were participating in. The follow-up interviews indicated that a small segment of those who marked only "other" as a primary activity (see examples in Table 14) also participated in motorized and non-motorized activities as part of their trips or outings. A total of 2.6% of these owners mentioned also participating in a motorized activity and another 7.9% mentioned also participating in a listed non-motorized activity in addition to their primary "other" activity. These gallons attributed to "other" activities were left in the "other" category.

* *The sample for follow-up interviews came from survey respondents that volunteered to participate in phone interviews by providing their phone numbers.*

FINDINGS – PARTICIPATION IN RECREATIONAL ACTIVITIES

Of all the vehicle owners that used fuel on back roads and off of roads, 58% participated in one of the six primary activities identified on the questionnaire. Table 13 provides a summary of the breakout of the vehicle owners who engaged in each of the activities listed on the survey questionnaire. A sample of those who did not engage in these activities but checked "other" were asked about the types of activities in which they participated in the follow-up telephone interviews (see Table 14). *Note: multiple responses were accepted.*

Table 13. Primary recreational activities engaged in by vehicle owners using fuel on "B" and "C"

Major Listed Activity Type	Percent of Those Using Fuel on Back Roads or Off of Roads
Hiking	26.6%
Off-road use (ORV)	12.1%
Cross-country skiing	8.5%
Biking	6.7%
Snowmobiling	2.1%
Equestrian	3.8%

**Note: While a total of 58% participated in one of the 6 listed activities, multiple responses were accepted so the percentages in the table add to more than 58%.*

Table 14. "Other" activities engaged in by vehicle owners using fuel on "B" and "C" (based on follow-up interviews with respondents)

"Other" Activity Engaged In	Percent of Those Using Fuel on Back Roads or Off of Roads
Hunting	7.9%
Driving - just passing through	6.6%
Driving for pleasure	6.6%
Sightseeing	5.3%
Camping	4.0%
Fishing	4.0%
Driving for work	2.7%
Picnicking	2.7%
Firewood gathering	2.7%
Boating	2.7%
Gathering – berries, mushrooms, etc.	1.3%
Other activities	9.2%

Note: Percentages in Table 14 are based on 40 follow up interviews with respondents so the margin of error is significantly higher than in the first table.

FINDINGS – FACILITIES USED

Thirty-six percent of those who used fuel on back roads and off of road indicated having also used one of the facilities listed in the following table. Of those who indicated they used a facility, the single most common type was trails/trailheads, at 68.7%. Roadside attractions were used by 35.5% and campgrounds were used by 28.7%. *Note: multiple responses were accepted so the totals will add to greater than 100%.*

Table 15. Facilities Used – All who Used Fuel on Back Roads or Off of Road

Facilities Listed by Those Using Fuel on "B" or "C" Roads and Trails	Percent of Those Using Fuel on "B" or "C" Roads
Listed a facility	35.9%
Did not list a facility	64.1%

Facilities Used	Percent of Those Using Fuel on "B" or "C" Roads Who Listed a Facility
Trails/trailheads	68.7%
Roadside attractions	35.5%
Campgrounds	28.7%
Dispersed ORV riding areas	19.3%
ORV sports parks	13.0%
Interpretive facilities	10.6%

Table 16. Facilities Used - Respondents that engaged in Motorized Activities

Facilities Used	Percent of Motorized Users
Trails/trailheads	58.7%
Dispersed ORV riding areas	53.8%
ORV sports parks	46.2%
Campgrounds	23.8%
Roadside attractions	10.8%

Table 17. Facilities used - Respondents that Engaged in Non-Motorized Activities

Facilities Used	Percent of Non-Motorized Users
Trails/trailheads	98.4%
Roadside attractions	30.2%
Campgrounds	24.1%
Interpretive facilities	15.6%

Table 18. Facilities used - Respondents that Used Fuel in "Other" Activities

Facilities Used	Percent of Those Engaging in "Other" Activities
Roadside attractions	72.1%
Campgrounds	48.2%
Interpretive Facilities	4.7%
Trails/trailheads	0.5%

APPENDIX A –

- **Cover Letter**
- **Sample Questionnaire**
- **Frequently Asked Questions (FAQs).**

Interagency Committee For Outdoor Recreation

360/902-3000
360/902-3026 (fax)
email: info@iac.wa.gov

Salmon Recovery Funding Board

360/902-2636
360/902-3026 (fax)
email: salmon@iac.wa.gov

STATE OF WASHINGTON

OFFICE OF THE INTERAGENCY COMMITTEE
1111 Washington Street SE
PO Box 40917
Olympia, WA 98504-0917

Date

Name
Address

RE: Vehicle license number _____

The Washington State Legislature recently asked our office to conduct a scientific survey on how much gas people use for certain vehicle activities. We would like to ask for your help with this survey.

Your vehicle was randomly selected for this survey. The information you provide will be strictly confidential, and will be seen only by an independent consultant for statistical purposes. The State will not be able to connect your answers with your name or registration.

Your participation is very important. To keep overall survey costs down, we are sampling a few thousand vehicles among all the millions of registered vehicles. Your answers will give a 'snapshot' of this vehicle's fuel usage. When combined with other vehicle owners' answers during the next year, we can get a statewide profile of vehicle fuel usage. Your cooperation is very important to us.

What we are asking of you is to provide some brief information for the registered vehicle listed above for the half month, on the form we have included. There is also a postage-paid reply envelope.

Although this is an official state study, our office has selected an independent firm – Hebert Research of Bellevue, WA – to collect the data and develop the statistical results. Hebert Research is helping ensure we are using the most current methods and that your answers will remain confidential.

If you have any questions about this project or the survey form, please feel free to call Hebert Research at 1-800-869-7035, or visit our web site at www.wa.gov/iac/iacsurvey.html.

Thank you for your assistance.

Laura Johnson

LAURA JOHNSON
DIRECTOR

Hebert Research, Inc.
13629 Bel-Red Road
Bellevue, WA 98005
1-800-869-7035
fuelstudy@hebertresearch.com

STATE OF WASHINGTON FUEL USE SURVEY

This survey measures fuel use by vehicle. We selected your vehicle at random. Please answer the following questions only for vehicle license number [INSERT LICENSE #]

1. **How do you describe the vehicle that has the license # [INSERT LICENSE NUMBER]** *(Please check one)*

Street Licensed		Not Street Licensed (vehicles with an ORV sticker)	
☐ Passenger car	☐ Full Size Pick-up Truck	☐ Motorized dirt bike	☐ ATV (such as 3 wheel or quad)
☐ SUV	☐ Motorcycle	☐ 4x4 (for example, a Jeep)	☐ Other Off-Road Vehicle
☐ Compact Pickup truck	☐ Motor Home		

☐ **CHECK IF YOU DID NOT USE THIS VEHICLE BETWEEN [DECEMBER] [1] AND [DECEMBER] [15]**
PLEASE MAIL THE SURVEY IN (your response is very important!)

2. ***INSTRUCTIONS:*** **Using the following table, please keep track of the days when you used this vehicle and the approximate number of miles you traveled each day. Please check the MAIN activities you engaged in, while using fuel on either B or C. Only check "other" if none of the listed activities applied to you.** *(See map below or detailed road definitions on back)*

Please record for the ½ Month period between [DECEMBER] [1] and [DECEMBER] [15], 2001

	NUMBER OF MILES TRAVELED			IF **B** OR **C** PLEASE CHECK THE **MAIN** ACTIVITIES OR MAIN REASONS FOR USING ***BACK ROADS*** AND/OR ***OFF OF ROADS***						
December	HIGHWAYS AND STREETS **A**	BACK ROADS **B**	OFF OF ROADS **C**	*(1)* Snowmobiling	*(2)* ORV (Motorcycle, 4X4, ATV)	*(3)* Hiking or Backpacking	*(4)* Mountain Biking	*(5)* Cross Country Skiing/Snow Shoeing	*(6)* Equestrian	*(7)* Other* (See note below)
1				☐	☐	☐	☐	☐	☐	☐
2				☐	☐	☐	☐	☐	☐	☐
3				☐	☐	☐	☐	☐	☐	☐
4				☐	☐	☐	☐	☐	☐	☐
5				☐	☐	☐	☐	☐	☐	☐
6				☐	☐	☐	☐	☐	☐	☐
7				☐	☐	☐	☐	☐	☐	☐
8				☐	☐	☐	☐	☐	☐	☐
9				☐	☐	☐	☐	☐	☐	☐
10				☐	☐	☐	☐	☐	☐	☐
11				☐	☐	☐	☐	☐	☐	☐
12				☐	☐	☐	☐	☐	☐	☐
13				☐	☐	☐	☐	☐	☐	☐
14				☐	☐	☐	☐	☐	☐	☐
15				☐	☐	☐	☐	☐	☐	☐

Other – all other activities, including sightseeing.

3. **If you checked any of the above activities, please check which facilities you used.** *(Check all that you used)*

☐ Trails/Trailheads
☐ Campgrounds
☐ Roadside Attractions (picnic areas, viewpoints, etc.)
☐ Dispersed ORV Riding Areas (dunes, Riverside State Park, etc.)
☐ Interpretative Facilities (trails, visitor centers, etc.)
☐ ORV Sports Parks

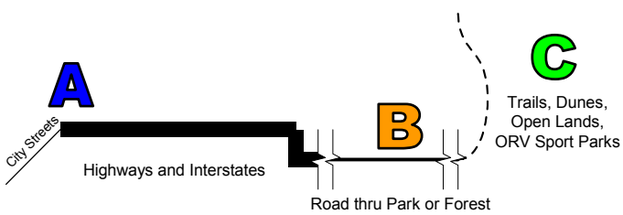
4. **Please do your best to estimate approximately how many miles per gallon you get in the following areas.**
(Enter only for areas where fuel was used by ***this*** vehicle)

A _____ Miles per Gallon on **Highways and Streets** — This includes city streets, county roads, state highways or Interstate highways.

B _____ Miles per Gallon on **Back Roads** — These are roads thru Parks or Forests and are usually unpaved. These are NOT city streets, county roads, state highways or Interstate highways.

C _____ Miles per Gallon **Off Of Roads** — Includes trails, open riding areas (dunes and other dispersed ORV riding areas), and competitive ORV riding areas.

Determining Road Classification



[OPTIONAL] In the event we need to contact you for a follow up, please give us your first name and the best phone number to reach you at:

First Name _____

Phone Number (_____)_____ ☐ Day ☐ Evening

Thank you for completing this survey! Please return this form in the enclosed self-addressed, postage-paid reply envelope.

HEBERT RESEARCH, INC. 13629 Bel-Red Road NE; Bellevue, WA 98005

Road Definitions and Examples

What are the definitions of the various roads?

A ***HIGHWAYS AND STREETS.*** This includes city streets, county roads, state highways or interstate highways.

B ***BACK ROADS.*** These are NOT city streets, county roads, state highways or interstate highways. "B" includes roads and routes such as private logging roads, State Department of Natural Resources roads, State and National Forest roads, National Park roads, Department of Fish and Wildlife roads, and roads entering and/or passing through other public lands. Often (but not always) they are unpaved. *Among those that are paved are the roads that lead to Paradise and Sunrise in Mt. Rainier National Park, Hurricane Ridge in Olympic National Park, and Windy Ridge in the Mt. St. Helens National Volcanic Monument.*

C ***OFF OF ROADS.*** Includes trails, open riding areas (dunes and other dispersed ORV riding areas), and competitive ORV riding areas. Found on both public and private land such as private timber lands, State Department of Natural Resources land, State and National Forests, Department of Fish and Wildlife trails and lands, other public land, and competitive ORV riding areas. *NOTE: Miles should only be reported for this category if the fuel was actually used FOR THIS VEHICLE while on these trails and land. If you or others in your household engaged in an activity on these trails or lands but it was non-motorized, or if you engaged in motorized off-road activities but in a different vehicle, then please do not record any miles in Category C.*

Question 2 – Diary

If you fill in miles on **B** or **C** please check the main activities you engaged in or the main reasons why you were traveling on those roads. If you didn't engage in any of the activities in columns 1-6, then check "Other" (Column 7). This column is for all other activities, including sightseeing.

	NUMBER OF MILES TRAVELED			IF B OR C PLEASE CHECK THE **MAIN** ACTIVITIES OR MAIN REASONS FOR USING ***BACK ROADS*** OR ***OFF OF ROADS***						
December	HIGHWAYS AND STREETS **A**	BACK ROADS **B**	OFF OF ROADS **C**	*(1)* Snowmobiling	*(2)* ORV (Motorcycle, 4X4, ATV)	*(3)* Hiking or Backpacking	*(4)* Mountain Biking	*(5)* Cross Country Skiing/Snow Shoeing	*(6)* Equestrian	*(7)* Other* (See note below)
1	10			☐	☐	☐	☐	☐	☐	☐
2	10			☐	☐	☐	☐	☐	☐	☐
3	25	15		☐	☐	☐	☐	☐	☑	☐
4				☐	☐	☐	☐	☐	☐	☐
5	10			☐	☐	☐	☐	☐	☐	☐
6	10			☐	☐	☐	☐	☐	☐	☐
7	10			☐	☐	☐	☐	☐	☐	☐
8	10			☐	☐	☐	☐	☐	☐	☐
9	10			☐	☐	☐	☐	☐	☐	☐
10				☐	☐	☐	☐	☐	☐	☐
11	40	10		☑	☐	☐	☐	☐	☐	☐
12	10			☐	☐	☐	☐	☐	☐	☐
13	10			☐	☐	☐	☐	☐	☐	☐
14	10			☐	☐	☐	☐	☐	☐	☐
15	10			☐	☐	☐	☐	☐	☐	☐

Example

**Other – All other activities, including sightseeing.*

Explanation
- This vehicle was primarily used for commuting to work. However, on December 3rd the vehicle was used to drive 25 miles on city streets or Interstates and then another 15 miles on a Forest Service road. The driver then went horseback riding.
- On December 11th, the vehicle was used to drive 40 miles on city streets or Interstate roads and then another 10 miles on back roads. The driver then went snowmobiling.

Question 4 – How many miles per gallon (mpg) do you get in the following areas?
Please write down the average miles per gallon your vehicle uses on the following roads. You only need to write down the mpg if you use your vehicle on that type of road or terrain.

Sample

A 20 Miles per Gallon on **Highways and Streets**

B 14 Miles per Gallon on **Back Roads**

C _____ Miles per Gallon **Off Of Roads**

Example

Sample calculation – to calculate miles per gallon, take the distance traveled and divide by the fuel used.

For instance, if on highways and streets you normally travel 300 miles on a 15 gallon tank, your average MPG is **300/15 = 20 MPG**

Please calculate your MPG separately for each type of road or off road operation of this vehicle.

If you have additional questions, please look at the Frequently Asked Questions insert. Additional questions should be forwarded to Hebert Research at (800) 869-7035 or check out the web site: www.wa.gov/iac/iacsurvey.html

FREQUENTLY ASKED QUESTIONS

Where did you get my license plate number?
We obtained your license plate number directly from the Washington State Department of Licensing, which has a joint agreement with the Washington State Interagency Committee for Outdoor Recreation (IAC) to facilitate this important research study. Your vehicle was randomly selected from 5 million vehicles in the State of Washington and your response is important, regardless of how often you use your vehicle and where you use it.

What is the purpose of this research project?
This research is designed to measure the use of motor vehicle fuel in the State of Washington on different types of roads and trails. The Interagency Committee for Outdoor Recreation (IAC) is going to use the results to provide guidance to the Legislature regarding funding levels for many different kinds of programs and facilities. These recommendations must be based on accurate fuel usage from all types of vehicle owners including those who do not engage in any recreational activity or who do not use their vehicle at all during the time period we are asking about.

Why are you asking about my activities?
We are also asking about the most common types of activities that you engage in that directly affect the roads or trails you travel on. This will help us to understand how fuel use relates to recreation as well as other activities.

How long is this study going to last?
This is a year long study for the State of Washington. Data will be collected throughout the year and final results will be presented to the State Legislature in December 2002. The State is counting on the cooperation of respondents from all across Washington State. The final results depend on the participation of those randomly selected in each mailing. It is critical we hear from you because you represent thousands of motorists during the specified time of year.

Why can I only report on one vehicle?
The sample is based on vehicles, not on people, so we are pulling the sample at random to represent all vehicles in Washington State. The results will then be generalized to the larger population of vehicles, by each type of vehicle. We need your cooperation to report ***only*** on the vehicle we've asked for, because the survey accuracy is based on obtaining thousands of "snapshots" of fuel usage for specific vehicle types and times of the year.

How was Hebert Research chosen?
The State Legislature required the Interagency Committee for Outdoor Recreation (IAC) to contract with an independent research company to conduct this study. The IAC requested proposals from private research firms across the country. The research firm selected was based on experience, credibility and price.

How confidential is this study?
All the information you provide will remain completely confidential. Only aggregate data will be presented to the Legislature. All those who handle your data and information are bound by strict confidentiality agreements.

Do I have to give my name and phone number?
No. However, if you are willing to participate in a short phone follow-up, you can give us your phone number and Hebert Research *may* contact you.

Who can I contact if I have any questions?
Should you have any questions regarding this study, you can contact Hebert Research directly at (800) 869-7035 and ask for the fuel study contact. Additionally, if you have any further questions, please check out the Interagency Committee for Outdoor Recreation's website at www.wa.gov/iac/iacsurvey.html.

How can I make sure that I have correctly labeled the type of road?
Please review the map and description provided on the survey form. If this is unclear to you, then you can contact Hebert Research for clarification. The telephone number is (800) 869-7035 and ask for the fuel study contact.

Thank you!

HEBERT RESEARCH, INC.