MIXED-USE SAFETY ON RURAL FACILITIES IN THE PACIFIC NORTHWEST

Consideration of Vehicular, Non-Traditional, and Non-Motorized Users

FINAL PROJECT REPORT

by

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16. Abstract

In the United States, one in 12 households does not own a personal automobile, and approximately 13 percent of those who are old enough to drive do not. Trips by these individuals are being made in many other possible modes, creating the need to "share space" among many forms of travel. The goal of this project was to improve safety and minimize the dangers for all transportation mode types as they travel in mixed-use environments on rural facilities by developing and using engineering and education safety measures. To that end, this report documents three specific efforts by the project team. First, they conducted a comprehensive literature review of mixed-use safety issues with consideration of non-motorized and non-traditional forms of transportation. Second, they conducted a novel analysis of trauma registry data. Third, they developed, executed, and analyzed the Pacific Northwest Transportation Survey with an eye toward understanding the safety perceptions of mixed-use users. Most notably, they findings indicated that ATVs (and similar non-traditional-type vehicles) are used on or near roads 24 percent of the time and snow machines are used on or near roads 23 percent of the time. There are significantly more (twice as many) ATV-related on-road traumas in connected places than in isolated places in Alaska, and three times more traumas in highway connected places than in secondary road connected places. Comparably, bicycles were involved in 449 on-road traumas between 2004 and 2011 whereas ATVs were involved in 352 on-road traumas. Users of all modes who received formalized training felt safer in mixed-use environments than those who reported having no training at all.

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LIST OF ABBREVIATIONS

AIC	Akaike Information Criterion
AK	Alaska
AKDOT&PF	Alaska Department of Transportation and Public Facilities
ANOVA	Analysis of Variance
ATV	All-Terrain Vehicle
BAC	Blood Alcohol Content
BLR	Binomial Logistic Regression
MANOVA	Multivariate Analysis of Variance
NETS	New England Transportation Survey
NHTS	National Household Transportation Survey
NMT	Non-Motorized Transportation
NTV	Non-Traditional Vehicle
OHV	Off-Highway Vehicle
USDOT	United States Department of Transportation

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CHAPTER 1. INTRODUCTION

1.1. Problem Statement

In the United States, one in 12 households does not own a personal automobile and approximately 13 percent of those who are old enough to drive do not (USDOT, 2009). Trips by these individuals are being made in many other possible modes, creating the need to "share space" between many forms of travel. Travel on mixed-use roads and facilities places varying modes of travel that have disparate capabilities and performance in close proximity to each other. This jeopardizes the safety of users in the mixed-use environments in several ways. In many rural locations, particularly those with recreation possibilities, this often creates conflicts between motor vehicles, non-traditional vehicle modes (e.g., all-terrain vehicles and snow machines), and non-motorized transportation modes (e.g., bicycles, pedestrians, and dogsleds) because separated facilities are simply not available. All-terrain vehicles (ATVs) alone account for approximately 100,000 injuries in the United States, while snow machines contribute over 14,000 injuries and 200 deaths annually.

In many cases, formalized facilities and roadway crossings for non-traditional and non-motorized modes do not exist, which jeopardizes the safety of those users. ATVs and snowmachines are often the only travel option and fulfill basic mobility needs for remote and isolated locales (e.g., villages and tribal lands). The difficulty of regulating and enforcing laws and rules for non-traditional modes exacerbates the issue by allowing poor behavior and operating practices to go unchecked and forces some towns to consider outright bans on ATV use (Carpenter, 2014). Non-traditional vehicles are also frequently used by "underage" operators, who may lack proper training and be unaware of safe and lawful operation practices.

These factors create a pervasive and systemic nationwide safety issue. Although the overall magnitude of the problem is beginning to be understood with better records of fatalities and injuries, we lack the proper knowledge to develop strategic and targeted engineering and policy decisions. Better data on these non-motorized and, in particular, non-traditional transportation modes are needed on miles traveled, the nature and frequency of mode use, and the characteristics and locations of injuries and fatalities (similar to those gathered for motor vehicle travel on highways) in rural areas so that problem areas can be better identified and safety issues more appropriately addressed.

1.2. Background

The use of vehicles either intended for recreational purposes or designed for the extraction/cultivation of natural resources (e.g., agricultural and mining equipment) in proximity to and on facilities that are designed for automobiles or non-motorized transportation (NMT), i.e., bicyclists and pedestrians, is a significant issue in many rural areas. Conflicts arise that jeopardize users' safety when these non-traditional vehicles (NTVs) occupy spaces that were not intended for their use. First, NTVs are not of the same size, do not have the same performance, and do not have the same safety mechanisms as personal automobiles or other conventional vehicle types. This creates issues related to visibility, reduced safe sight distances, and occupant protection. Second, the speeds at which recreational NTVs operate create unsafe situations when they are driven in close proximity to slower and more vulnerable non-motorized users. Conversely, there is also an issue between NTVs and faster motor vehicles.

ATVs, one type of NTV, are designed for off-road use, and most states prohibit their use on public facilities. However, many deaths on ATVs are still occurring on public roads, where the likelihood of fatality is much higher. The increasing number of facilities being created for vehicles, bicyclists, and pedestrians in rural areas directly competes with space that would have otherwise been available for recreational NTVs. This has resulted in the three following unfavorable situations occurring: 1) an increase in the number of recreational NTVs being operated on public roads; 2) an increase in the number of recreational NTVs being operated close to non-motorized users near or on public facilities; and 3) an increase in the unauthorized operation of recreation NTVs on private property. The first two are of particular concern in regard to safety because they increase exposure rates for the more vulnerable party (see figure 1.1).

(a) (b)

Figure 1.1. Examples of unauthorized and unlawful use of NTVs on public facilities in (a) Wasilla, Alaska (Carpenter, 2014) and (b) Fairbanks, Alaska

1.3. Objectives

This research addressed issues associated with providing safe accommodation, limiting the improper use of public rights-of-way, maintaining mobility, and informing future guidelines for the design, education, and enforcement of mixed-use rural facilities. Four specific objectives were identified as integral pieces of this research effort.

First, this research sought to determine the characteristics of NTV and NMT crashes in five rural area types: edge, traditional/main street, gateway, resource dependent (agriculture and mining), and tribal/village/isolated locations. Although previous research in this area showed that most fatal and serious injuries involving NTVs occur in rural areas, a better understanding is needed of rural subsets in order to achieve targeted design, policy, and education strategies. In order to develop effective strategies, it is important to first categorize the roadway conditions where mixed-use accidents and incidents are most prevalent.

Second, this research documented the state-of-practice related to the motivation for the use, extent, and magnitude of safety-related issues, as well as deficiencies in fatality/injury reporting methods for NTVs and NMT on mixed-use facilities. Understanding motivations for use, particularly for NTVs, is central to understanding some of the key questions surrounding safety on mixed-use facilities. We considered the following reasons why a user might decide to use a non-traditional mode of travel: purely recreational; a lack of other transportation options, the belief that it is cheaper than vehicular modes; the appeal of utilitarian/multi-use vehicles; or a revoked driver's license as a result of driving/operating under the influence of other traffic violations. Having a better understanding of these underlying motivations will serve to improve our ability to more appropriately address safety concerns.

Third, and directly tied to the first objective, this research critiqued and identified deficiencies in injury/fatality reporting for crashes involving NTVs and NMT on rural mixed-use facilities.

Non-reports and reports with insufficient data were of most concern, particularly those for public roads or mixed-use facilities. Having complete (or near-complete) data is critical to creating a coherent picture with which to better understand the safety problem associated with non-motorized and non-traditional modes of transportation.

Lastly, and more generally, this research improved the definition of “mixed-use facility” in a rural context by more robustly identifying the types of non-traditional and non-motorized forms of travel and considering the spaces and areas where specific conflicts occur both between and within these forms of travel. Ultimately, the outcome of this research will be to improve safety and minimize the dangers in mixed-use transportation environments on select rural roadway conditions. These aforementioned objectives will serve to inform the development of engineering and education safety measures that will increase operator awareness.

CHAPTER 2. LITERATURE REVIEW

The use of transportation modes designed for recreation (i.e., ATVs and snowmachines) or crop management purposes (i.e., agricultural vehicles) on, adjacent to, or near public transportation facilities designed for automobiles, motorcycles, bicycles, and/or pedestrians causes potential safety risks to all users because of the mix of inconsistent sizes and varying travel speeds. Most non-traditional modes are smaller (i.e., ATVs) or larger (i.e., agricultural vehicles) than traditional vehicles, are not capable of the same performance measures, and lack the same safety features. This literature review focused on the non-traditional modes used in the statistical analysis, which were ATVs, agricultural vehicles, bicycles, snowmachines, and dogsleds. Several studies and reports have examined the role of non-traditional modes in crashes in a mixed-use environment and on public facilities.

ATVs are designed for recreational and off-road use and in most states are illegal to use on public facilities. However, the largest number of ATV fatalities occur on paved roads (Garland, 2014). An investigation into the differences in fatality and injury crash rates of ATVs on paved roads, unpaved roads, and off-road examined data from 1982 through 2012. The results showed that riding an ATV on a paved or unpaved road was significantly more dangerous than off-road riding (Pavilion, 2015). An average of 144 children and 568 adult ATV-related fatalities occur nationwide each year, and the fatality and injury rates have been increasing in recent years (Topping and Garland, 2012).

A major part of the need to improve safety for non-traditional mode users is the safety risk for underage operators. One study on ATV safety stated that "users seemed to accept the risk of children riding adult-sized quad bikes, as this was seen as preparing children to use and respect such vehicles as they grew up on the station or farm. These findings represent key aspects of what makes quad bike safety a wicked problem: the inconsistencies in concepts of safety and attitudes toward safe riding practices indicate confusion about these machines" (McBain-Rigg et al., 2014).

Updated safety features and facility designs to reduce the risk of injuries and crashes for non-traditional mode users have had some success. One such study was conducted to find ways to improve safety for slow-moving vehicle such as ATVs, agricultural vehicles, and construction equipment. It concluded that in ATV/moped rural crashes, 17 percent of drivers were under 15 years old and 60 percent were under 24 years old. For agricultural vehicles, the most common type of collision, was a rear-end collision with 30 percent of those crashes occurring while vehicles were making left turns. For crashes that included agricultural vehicles, the agricultural vehicle was at fault for about 40 percent of rural multiple vehicle crashes (Kinzenbaw, 2008).

Previous projects have researched crash data to find the causes of and types of crashes that involve slow-moving, non-traditional modes. One such study investigated agricultural vehicle crashes in North Carolina to find possible ways to reduce crash rates. In 1999, the rate of fatalities in agriculture was 22.3 per 100,000 workers, and approximately 18 percent of those deaths were due to crashes on public roadways. This study found that a large proportion of agricultural vehicle crashes occurred while the agricultural vehicle was making a left turn and another automobile was passing. The study's recommendations included requiring all agricultural vehicles to have a slow-moving emblem on the back of the vehicle while on public roadways and to educate farmers on ways to reduce these crashes (Lacy et al., 2003). Another study found that 43 percent of crashes that involved agricultural vehicles were rear-end collisions that occurred when both vehicles were driving straight. The second most frequent type of crash (24 percent) was when a vehicle was passing a left-turning agricultural vehicle. About 26 percent of those crashes had operators under the age of 16 years (LeGarde, 1975).

Little research was found on snowmachine and dogsled or dog-powered safety on both private and public roadways. However, one study found that snowmachines contribute to approximately 200 fatalities and 14,000 injuries annually. The leading causes of snowmachine accidents are alcohol impairment, excessive speeds, and driver inexperience (Pierz, 2003).

For bicyclists, approximately 25 percent of all deaths and injuries occur on rural highways (Federal Highway Administration, 2010). This value demonstrates the importance of non-traditional transportation mode safety. More specifically, in rural areas, fatal and injury crash rates are higher than in other areas, with some rates being up to twice as high in rural settings than in urban settings (Peek-Asa et al., 2007). Although bicyclists are not particularly common on rural roads, when they are present they must maneuver alongside high speed traffic and large vehicles. Large shoulders and smoothly paved shoulders were recommended to allow a cushion of space between mixed modes of travel (Federal Highway Administration, 1998). Another publication concluded, with regard to bicycle and pedestrian crashes, that "rural two-lane roads had the greatest needs for safety improvements due to their high raw crash frequencies and crash rates per vehicle-mile." Some recommendations provided were to add paved shoulders, sidewalks, roadway lighting, pedestrian signals, marked pavement space for bicyclists, and barriers (Federal Highway Administration, 2010).

2.1. Mixed-Use Context

Many trails, paths, or roadways are designed for a specific mode or modes of transportation (e.g., typically automobiles, bicyclists, and pedestrians). Additionally, any travel way not specifically designated for a particular mode then becomes mixed-use by omission of regulation. These mixed-use modes (as previously discussed) include dogsleds, snowmachines, and ATVs. In addition to use on trails, ATVs and other “off-highway” modes are used on roadways, thereby causing some roads to become incredibly mixed-use as well. This use can exist in the form of outright travel of the roadways (figure 2.1a), or crossing a road where a trail intersects the roadway (figure 2.1b). Often these trails and roads are in remote areas and lack adequate signage to indicate user right-of-way or other safety advisories such as speed limits. However, in more urban and maintained areas some signs (figure 2.2) that indicate right-of-way and trail sharing can be found. This is not to say that all trails or road crossings are adequately marked in urban areas, and enforcement of etiquette is up to community members rather than trail officials.

Figure 2.1. Example of (a) ATV use on a highway in Copper Center, Alaska, and (b) NTV use adjacent to the highway and through an intersection in Fairbanks, Alaska.

Figure 2.2. Example of signs indicating (a) the nature of and appropriate modes on a multi-use trail and (b) modal-based right-of-ways

2.2. Motivations for NTV Mode Use

On the basis of our review literature and anecdotal evidence, there appear to be three primary reasons why people use NTV modes of transportation: economy, efficiency, and lifestyle. In terms of economy, the more cost effective a mode is the more desirable it is. In rural areas of Alaska, gasoline and diesel fuel are expensive; it was an average of $7 per gallon in 2015 and has reached as high as $10 per gallon. In comparison, prices in the contiguous United States were about $2.30/gallon in 2015 (Grove, 2015, Demer, 2015). Because of these high fuel costs Alaskans are reducing the number of trips they take even for subsistence activities. From 2004 to 2014 travel distance for subsistence trips decreased by 60 percent, and the number of trips decreased by 75 percent (Brinkman, et al., 2014).

Non-motorized and NTV modes of transportation are more fuel efficient than conventional automobiles. This efficiency is vitally important not only because of the cost of fuel, but also because of the long distances that must be covered without access to a fuel station. NTV modes get, on average, 45 mpg, which is about 2.5 times more fuel efficient than a conventional motor vehicle (ATV Connection, 2017). With a tank size of approximately 4.25 gallons, most ATVs can get close to 200 miles on a single tank of gas.

NTV modes of transportation are better at navigating the varied terrain found in the Alaskan wilderness. NTV modes are also quite multi-purpose in nature and can be used for anything from getting the mail or a jug of milk at the store to hauling a moose or caribou out of the backcountry. Many Alaskans use dogs and dogsledding as a way to accomplish tasks such as hauling wood, transportation, resource harvesting, racing, and trapping. These dogs eat about 37 percent of the subsistence-caught salmon in Alaskan communities (Andersen, 1992). Modes such as snow machines and ATVs are more closely related to traditional dog-powered modes. They also offer the same kind of mobility over uneven and unmaintained terrain (Andersen, 1992). Even people who have lived in and around populated places such as Fairbanks and Anchorage still enjoy trails to more remote areas for recreation and hunting. Alternative modes are often needed to reach remote destinations, track game for long distances, or even to haul meat if a hunting trip is successful. Non-motorized NTV modes of transportation consist of a large group that includes culturally relevant modes of transportation such as dogsleds (figure 2.3a), as well as more modern hybrids such as skijoring and bikejoring (figure 2.3b).

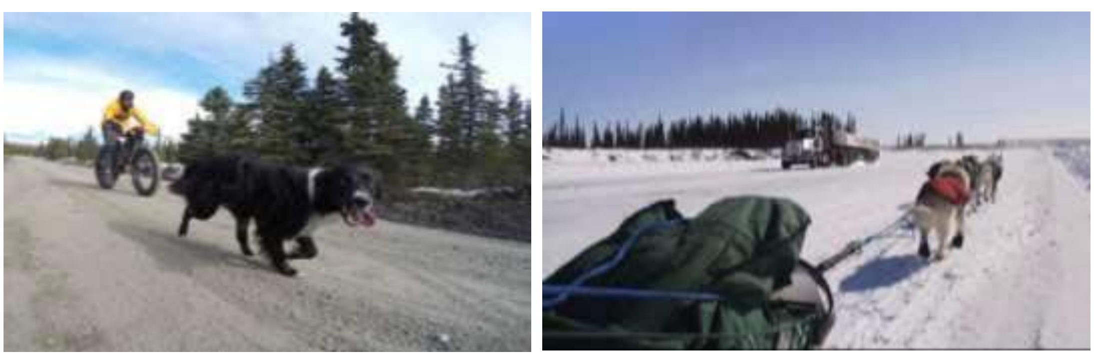


Figure 2.3. Examples of non-traditional and non-motorized transportation in the form of (a) bikejoring and (b) dogsledding (i.e., mushing).

In most areas of the United States, “unconventional” vehicles comprise such a minor portion of the traffic stream that they do not merit consideration as primary mode of transportation. However, in the State of Alaska (and quite possibly other international countries, particularly those in circumpolar regions) the use of these NTV forms of transportation often surpasses those of more conventionally considered non-motorized forms of travel (i.e., bicycles, pedestrians, and sometimes even automobiles). For example, there have been years when, historically, the number of fatalities on or near roadways associated with the use of snowmachines was higher than that of personal automobiles (Landen, 1999). The motorized NTV forms of transportation have been slowly incorporated into several Alaskan cultures out of necessity beginning in the 1960s and 1970s (Brinkman , et al., 2014). They have evolved into the recreational vehicles of today that, despite their name, often remain the only forms of transportation usable in rural areas of Alaska (figure 2.4). For example, Bethel, Alaska, has specific a definition for an ATV: a vehicle with three or more low-pressure, flotation-type tires, as designed by the manufacturer or altered, to be used as an off-road recreational vehicle (AS 45.27.390).

Figure 2.4. Examples of ATV use on roads in (a) McCarthy, Alaska, and (b) Nome, Alaska.

In the last year several events brought into question the safety of ATVs and other NTV modes being used on roads as primary transportation. A woman was killed when struck by an ATV in Akiachak, Alaska, (figure 2.5) while walking along a roadway (Klint, 2016). Bethel, Alaska, implemented stricter enforcement of no ATVs or snowmachines on roads, subsequently issuing two dozen tickets (see figure 2.6) in the span of a week (Demer, 2016). Another article described a confrontation between an automobile driver and an ATV driver in which the automobile driver felt it was his responsibility to enforce the speed limit and no-ATV-on-roads policies (Dubowski, 2017). Lastly and most recently, an ATV driver was killed (see figure 2.7) after his ATV departed the Denali Highway to avoid colliding with an automobile (Boots, 2017). These articles illustrate the need for further research and study into these modes and how they interact with existing transportation infrastructure and conventional modes of transportation.

Akiachak woman dies when struck by ATV

Author: Chris Klint   Updated: October 3, 2016   Published October 3, 2016

A 76-year-old pedestrian was killed in the Western Alaska village of Akiachak late Friday when she was struck by an all-terrain vehicle, Alaska State Troopers said.

Figure 2.5. New article of ATV-related death in Akiachak, Alaska.

Sudden crackdown on four-wheelers quiets Bethel streets and upsets residents

Author: Lisa Demer Updated: October 10, 2016 Published October 10, 2016

BETHEL — In the space of just days, a crackdown targeting four-wheelers and snowmachines on the streets in the rural Southwest Alaska hub of Bethel changed life for many.

The Bethel City Council on Sept. 27 passed two enforcement measures. Streets grew quiet. In the first week, Bethel police wrote more than two dozen tickets carrying $50 fines for four-wheelers illegally on the streets.

Figure 2.6. News article of ATV-related policy disputes in Bethel, Alaska.

Anchorage man killed in ATV crash on Denali Highway

Author: Michelle Theriault Boots Updated: August 27 Published August 27

An Anchorage man was killed in an ATV crash on the Denali Highway Saturday, the Alaska State Troopers said.

Song Her, 50, of Anchorage, was riding westbound on the highway at Mile 92 of the road when his ATV "left the roadway and rolled down an embankment," troopers wrote in an online dispatch.

Troopers were told the ATV driver appeared to be trying to avoid a vehicle, said troopers spokesperson Megan Peters.

Figure 2.7. News article of ATV operator death on the Denali Highway in Alaska.

2.3. NTV Mode Safety

NTVmodes of travel are not as regulated as conventional modes. There are no requirements for permits, operating licenses, or training of any kind. An estimated 77 percent of injuries suffered while operating an ATV are attributed to drivers under the age of 35, and 21 percent are attributed to drivers under the age of 16 (Garland, 2014). Even though ATVs are not permitted on most roadways, 62 percent of ATV-related deaths between 1985 and 2009 resulted from on-road crashes. The number of on-road deaths has increased to 3 times more likely than off-road deaths related to ATVs since 1998 (Denning et al., 2012). A large number of ATV users (94 percent) ride with more than one person (Jennissen, et al., 2012). From 1993 to 1994 the numbers of injuries, deaths, and hospitalizations related to snowmachine use were higher than those for on-road vehicles (Landen et al., 1999). As of 2003 snowmachines were responsible for approximately 200 deaths per year and 14,000 injuries (Pierz, 2003). ATVs and off-highway vehicles (OHVs) are not currently being studied by the Alaska Department of Transportation and Public Facilities (AKDOT&PF); however, ATVs and snowmachines were regarded as having a "significant safety issue" in 2003 (AKDOT&PF, 2013).

2.4. Non-Reporting of Crashes

Non-reporting of crashes can be an issue when authorities try to determine the quantity and frequency of crashes in an area. Many states require that people report a crash if there was an injury or if the damage was over a certain amount such as $1,000 (Landers, 2016). However, this requirement does not mean that all crashes with an injury or large expense are reported. Hospital records can be helpful in capturing data for non-reported crashes, but there are still many crashes that are not reported, and so data concerning injuries and crashes can often depict lower numbers than actual occurrences in a region or state (Federal Highway Administration, n.d.). Part of the research presented in this thesis includes analyzing trauma data from hospitals in Alaska.

Because of non-reporting of motor vehicle crashes, it is sometimes necessary to use resources such as trauma registry data collected at hospitals. Unfortunately, in a state like

Alaska, approximately 80 percent of all healthcare providers practice in and near Anchorage. This means that the remaining 20 percent (~300) physicians are spread across the state's remaining half million square miles. With such limited access to healthcare providers, it is likely that even the trauma registry does not have a complete picture of traumas in Alaska (Alaska Federal Health Care Partnership, 2010). The primary issue with non-reporting is that it limits the availability of good, robust data from which we can make design/policy-based decisions. This fact directly supports the decision to use multiple sets of data in this research to better understand transportation safety issues.

2.5. Other Surveys

Very few surveys have investigated the hazards of mixed traffic, (i.e., automobiles, bicycles, ATVs, etc. operating in some proximity to each other). Of those that have been conducted, more focus has been given to automobile and bicycle/pedestrian interactions than to NTV modes. One such survey aimed to examine "the comprehensibility of three traffic control devices" related to automobiles and bicycles (Hess and Peterson, 2015). While this interaction is important to study, there is still the need to better understand other interactions such as those between automobiles and ATVs. The New England Travel Survey (NETS) asked questions related to proximity to town centers and certain aspects of connectivity; however, it did not address mixed-use scenarios (Coogan et al., 2010). The National Household Travel Survey (NHTS) asked questions related to trip purposes, types of transportation used (though no NTV modes were mentioned), and times of day/days per week that people traveled (U.S. DOT, 2009). The NHTS also did not ask questions about mixed use.

Although there have been surveys and data on safety and fatalities of ATV and snow machine users, to the best of our knowledge there has been no survey on the frequency or extent of their use (i.e., yearly miles traveled) or how much of this is utilitarian and/or occurring on pubic roadways. Similarly, no studies were found that have addressed the interaction of non-motorized and nonconventional forms of transportation in a mixed-use context.

2.6. Existing Policies

A wide range of policies and laws concern where NTV motorized modes such as ATVs and snowmachines are allowed to travel, what safety features these modes should have, and what safety equipment should be worn while operating these modes. For example, in the state of Alaska ATVs and snowmachines are permitted on roadways in order to cross a highway, or when traversing a bridge or culvert, but only to the far right edge of the road or when road conditions are impossible because of snow or ice accumulation (see Alaska statutes 8.15.010 –18.15.130 for a full list). However, in Nome, Alaska, it is expressly prohibited for off-highway vehicles to be operated on highways, and unlawful use on the roadway is subject to a fine and a mandatory court date. The fines vary from $50 for the first offense, to $75 for the second offense, to $150 for the third offense. Bethel, on the other hand, has a more lenient policy allowing ATVs to operate on city roads if they comply with certain conditions, such as staying on the correct side of the lane of traffic, not passing other moving vehicles, not weaving in and out of traffic, not operating in a careless or reckless manner, and weighing under 1,500 pounds, including cargo.

Kotzebue, Alaska, has determined that no one under the age of 16 will be allowed to operate an ATV, snowmachine, or other similar mode, and all vehicles must be insured for road use and registered with the Alaska DMV. Kotzebue also has a fine scale for offenders: $25.00 for the first offense up to $100.00 for the fourth or any subsequent offences. Failing to stop at a stop sign is a more serious offense and caries a fine of $110. The Haines Borough has similar regulations but also has a more detailed document that defines the types of modes, required papers, and operational rules (Haines Borough, 2014). In general, the rules, regulations, and even availability of documentation such as maps vary widely, depending on each individual place.

There are not any absolute commonalities between places, so ATV and snowmachine users need to look up the regulations for their area before operating on or near roadways. The laws for bicycles are relatively straightforward. Bicycles operating in the road are subject to the same laws and responsibilities as any other vehicle in the roadway. Cyclists are not allowed to carry passengers except for bicycles equipped with extra seats or small children in backpacks. A bicycle may not be pulled by a motor vehicle. Bicycles should ride in the same direction as traffic and use hand signals to notify other vehicles of their intended direction changes (AK DOT, 2003). There are not a lot of explicit consequences for not following bicycling laws, but in general a $25 fine is common.

Pedestrians are expected to obey all traffic control devices. Pedestrians are not permitted to cross roadways except at designated crosswalks. Lastly, pedestrians are not allowed to solicit rides or work in a way that may be distracting to drivers. Pedestrians are encouraged to wear bright colors and reflective gear for safety (Inderrieden, 2015). If a pedestrian crosses a street not at a crosswalk or against the light at a crosswalk, the actions will result in a $25 or $40 fine, respectively. There are currently few to no laws restricting dog mushing use; however, recently the Matanuska-Susitna Borough enacted regulations to protect historically dog-friendly trails and ensure that mushers are able to keep their dogs at home without receiving noise complaints from neighbors (Hollander, 2016).

Certain areas of Alaska have either user restrictions for safety reasons or user requirements. For example, sidewalks are restricted to non-motorized travel only. However, other areas such as the trails in the Goldstream Valley in the northern region of the Fairbanks North Star Borough allow all modes of transportation, and the varied modes often work in harmony, with snowmachines and dog mushers compacting and widening those trails, and skiers further improving the texture of the terrain. These trails often cross roadways, but because of designated crossing areas the risk of being hit by another mode of transportation is likely more limited than if there were not designated crossings.

Helmet laws also vary depending on geographic location. Many states (e.g., Alaska) do not require helmets for any activity. However, some communities such as Bethel require minors to wear helmets for all activities, including bicycling, and operating ATVs. Other communities, such as Nome, strongly recommend wearing a helmet when riding an ATV but do not require their use. See the map for United States helmet regulations (figure 2.8). About half of the states (most of them with large rural areas) do not require helmets to be worn while bicycling or any other activities (except for motorcycling).

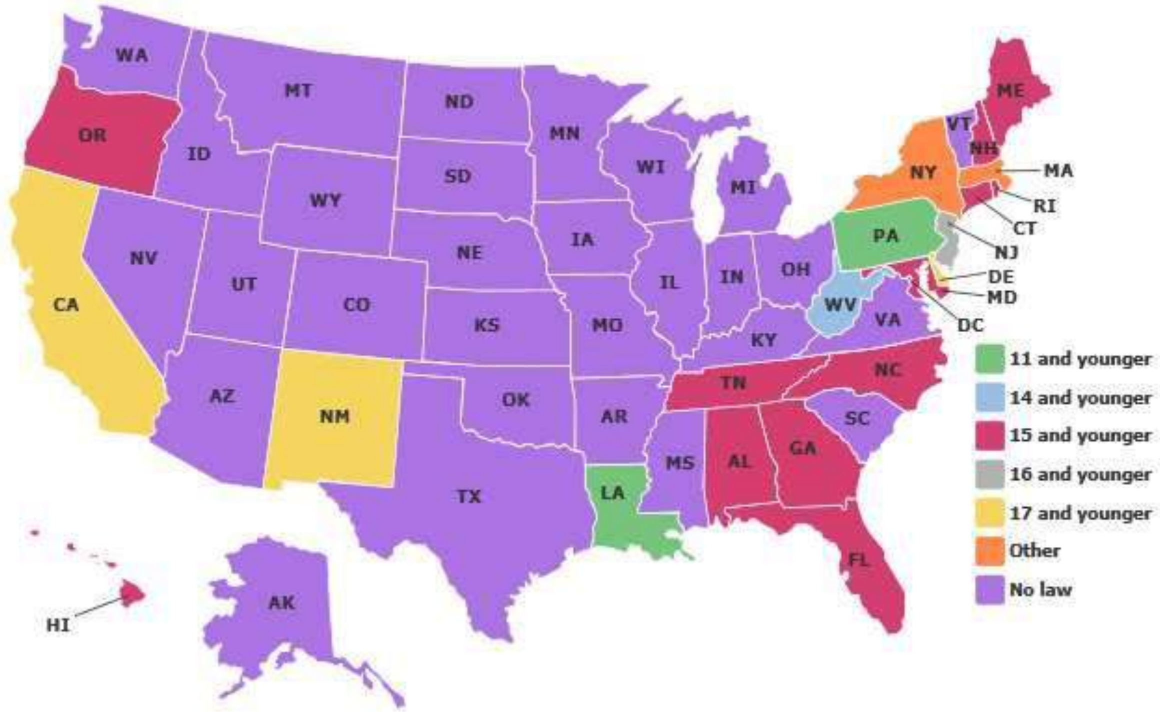


Figure 2.8. Bicycle helmet regulation by state[1]

2.7. <u>Conclusion / Research Need</u>

Because of the rural nature of much of the Pacific Northwest and varied cultures across the states therein, understanding NTV transportation methods, especially on and near roadways, is important. Both NTV and conventional modes of transportation are used in urban and rural areas. However, in isolated regions where automobiles are sparse or nonexistent, NTV modes serve as the only modes of transportation. There are clear safety concerns regarding the use of NTV modes in conjunction with conventional and non-motorized transportation modes. These safety concerns are exacerbated by a lack of data to inform design and policy. The existing policies for transportation mode use widely vary depending on the location of the NTV modes. This can lead to confusion and frustration on the part of users.

This study is essential because it addresses previously ignored modes of transportation both in terms of design and legislation. To better understand these modes, their needs, and the safety impacts, further study should be done on this topic. In order to achieve this objective, region-wide safety efforts should consider all modal users. This research presents a starting point by collecting and organizing data on NTV and non-motorized use in the states of Alaska and Idaho.

[1] Institute for Highway Safety – Bicycle Helmet Use (August 2018) http://www.iihs.org/iihs/topics/laws/bicycle-laws

CHAPTER 3. MIXED-USE INJURY DATA

Traditionally, limited data about NTV-type incidents have been available through departments of public safety. Although data for non-motorized (e.g., bicycle and pedestrian) incidents are slightly better reported, many incidents go unreported or limited information is available regarding each event. Here, we present a summary of the Trauma Registry from the State of Alaska with the hopes of providing more insight into these injury-related events.

The Alaska Trauma Registry is a system used to track the most seriously injured persons in Alaska, along with the treatment (if appropriate) received at an acute care facility. The data have been tracked for all 24 of Alaska's acute care hospitals since 1991. The primary purpose of the registry is to evaluate quality of care and to develop, execute, and evaluate injury prevention programs. In order to be included in the trauma registry, patients must be

- admitted to an Alaska hospital;
- held for observation;
- transferred to another hospital or declared dead in the emergency department; and
- a person for whom contact occurred within 30 days of the injury.

Typical injuries may include trauma, poisoning, suffocation, and the effects of reduced temperature, which may have occurred as the result of a myriad of events/causes. Trauma Registry data are confidential and protected under Alaska Statute 18.23.010-070. All trauma registry personnel and those requesting trauma registry data are required to sign a confidentiality statement. The trauma registry data is completely anonymous and does not include patient, physician, hospital, clinic, or ambulance service identifiers.

3.1. Obtaining Trauma Registry Data

The Alaska Trauma Registry data were obtained by filing a request form via e-mail with the Department of Health and Social Services to help fill in current data gaps from non-reporting of crashes related to modal safety. An "Injury Surveillance Data Elements List" was filled out to select specific variables of interest (e.g., place, cause, blood-alcohol content (BAC), etc.), and two forms had to be signed. The first was a "Release of Information Policy" and the second was a "Confidentiality Statemen.t" The trauma data were the compilation of data from 2004 to 2011 of hospital records of traumatic injuries. A traumatic injury is defined as a physical injury of sudden onset and severity that requires immediate medical attention. The raw data were not in a form that could be easily analyzed.

The raw data comprised a total of 367,326 records, each with 26 individual fields of corresponding information. The columns "placespec" and "injcause" were used because they had data that seemed most relevant to this study. The variable "placespec" reported the specific place where the trauma occurred (e.g., at home, an intersection, the wilderness, etc.). The variable "injregion" was used to identify the spatial location in Alaska where the trauma occurred (e.g., Fairbanks, Anchorage, Kotzebue, etc.). The variable "injcause" indicated the thing or type of event that caused the trauma. This column was important because it identified the mode being used in the case of a transportation-related trauma event (e.g., ATVs, snowmachine, automobile, bicycle, pedestrian).

3.2. Organizing Trauma Registry Data

First, the data needed to be sorted by injury cause to eliminate non-transportation mode causes for injuries, and then by the place where the trauma occurred. However, because there were so many different and misspelled entries for injury places the entries needed to be sorted into categories. For example road was spelled out the following ways: On roadway, road, raod, road-icy, road–icy conditions, road/highway, road/street, roads, roadway, roadway in front of home, roadway/intersection, roadside, and rural road. These categories can be seen in table 3.1 and were developed by manually reading through each unique place of injury. Note the category titled "arctic man." This is a sporting event in Alaska where people race snowmachines while pulling people on skies. During the process of categorizing the places, there would often be several types of spellings/misspellings for the same place or location. Not all of the spelling variations were correct spellings, and others were abbreviations. The categories made it possible for further analysis to be performed on the data. There was one additional category called "unusable" which referred to places that did not fit into any category or were unintelligible.

Table 3.1. Trauma data subcategories

Road	Road Name Near Road Road Type Intersection Address Mile Posting
Other Transportation Infrastructure	
River / Water	
Rural Non-Road	
Arctic Man	
Parking Lots	
Public Area/ Parks	
Path / Trail	
Racing / Track	
Personal Property	
City/ Town	
Private/ Commercial Property	
Other / Unknown	
Blanks	

Once the data had been organized into categories, counts could be performed for various transportation modes. The transportation modes selected from the "injcause" were ATV, snowmachine, bicycle, pedestrian, animal powered, and motor vehicle (automobile). Because all of the possible "placespec" descriptions were categorized, the data could be sorted by mode, and then counts for the number of times a descriptor occurred in a category. Percentages of total traumas by mode were calculated to show the ratios of various trauma locations using various transportation modes. The data were further consolidated into trauma events that occurred on/near roads, on paths/trails, and off road.

3.3. Trauma Registry Results by Category

Motor vehicles had the most traumas, with about 2.5 times more traumas than ATVs. ATVs had a total of 1,352 traumas, 347 of which occurred on or near roads (based on previously defined categories). Both bicycles and pedestrians had higher numbers of traumas for road categories: 451 and 417, respectively. The difference was about 20 percent higher than those of ATVs. Snowmachines had the next highest number of total traumas at 983, with only 172 of those happening on on-road categories. Animal powered modes had the fewest number of total traumas and road traumas, with 113 and 5, respectively (table 3.2).

Figure 3.1 depicts the distribution of traumas by mode for three different road categories. There was a clear trend of roads having more traumas than either highways or intersections. ATVs had the second highest number of road traumas at 345, with automobiles having the highest value for roads and all other trauma categories. Snowmachines had the next highest number of road traumas at 186, with bicycles close behind at 168, then pedestrians at 133, and lastly animal- powered modes with 3 road traumas. Second to automobiles, pedestrians had the highest number of highway traumas at 26, followed by ATVs and bicycles with 17 and 16 traumas, respectively.

Snowmachines had 11 on-highway traumas, and animal-powered modes did not have any traumas on highways. Automobiles, pedestrians, and bicycles had the highest numbers of traumas at intersections: 118, 23, and 13, respectively. In contrast, NTV modes had fewer traumas at intersections.

Table 3.2. Trauma data summary by category.

		ATV	Snowmachine	Bike	Pedestrian	Animal Powered	Motor Vehicle (Automobile)
Road	Road Name	45	22	34	25	0	309
	Near Road	4	4	9	9	1	6
	Road Type	275	139	368	326	3	2319
	Intersection	12	5	35	46	0	227
	Address	3	0	2	8	1	18
	Mile posting	8	2	3	3	0	99
Other Transport. Infrastructure		11	1	5	4	0	15
River / Water		47	79	2	3	2	8
Rural Non-Road		319	301	7	11	2	22
Arctic Man		0	16	0	1	0	0
Parking Lots		4	1	9	25	0	15
Public Area/ Parks		39	22	24	2	4	7
Path / Trail		42	51	52	8	4	9
Racing / Track		37	12	9	0	1	16
Personal Property		65	24	56	36	27	44
City/ Town		4	7	3	1	0	5
Private/ Commercial Property		20	6	8	21	12	21
Other / Unknown		26	15	23	6	3	123
Blanks		391	276	167	33	53	91
Total Traumas		1352	983	816	568	113	3354

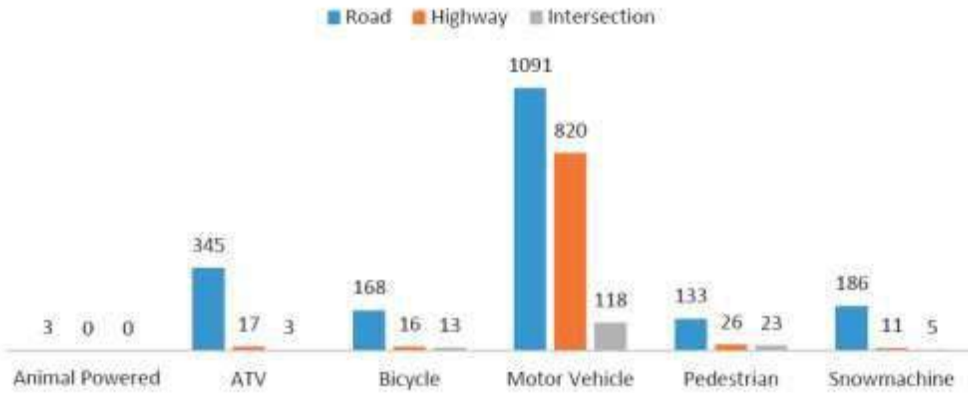


Figure 3.1. Trauma counts by mode and on-road location.

3.4. Trauma Registry Results by Location

Of the 355 populated places (according to the US Census Bureau) in Alaska, 258 places are connected to other places by various means. Only five places are connected by highways alone. The majority of places are connected via roads and trails. Places connected by highways have a lower average percentage of native Alaskans than those connected by roads, approximately 8 percent and 34 percent, respectively.

Alaska has 97 places that are not connected to any other places by a road, trail, or highway. Only three places have all three transportation infrastructure types. The highest average percentages of native Alaskan people can be found in isolated places that either only have trails or do not have any recorded transportation infrastructure. Places that are isolated but have secondary roads have an average of 56 percent native population, and isolated places with highways have the lowest percentage of natives at 14 percent on average. Many of these isolated places are not near the primary road network. Additionally, these isolated places are also not near the trail network. Almost half of the isolated places do not have any transportation infrastructure at all.

There was a significant difference ($p = 0.012$) in the number of ATV traumas between connected and not-connected areas (table 3.3). There were more than twice as many ATV traumas on average in connected places than in not-connected places. There was also a significant difference ($p = 0.005$) between connected subcategories for all ATV traumas. Highway-connected places had about 3 times as many ATV traumas as secondary road-connected places (table 3.4). There was also a significant difference ($p = 0.017$) in the number of snowmachine traumas between highway and secondary road connected places. There were roughly 4.5 times as many snowmachine-related traumas in highway-connected places. For not-connected places, the most traumas occurred on highways as well, then on secondary roads, then on trails, and lastly not on roads at all. The other modes did not have any significant results for all traumas (table 3.5 through table 3.8). For on-road traumas, there were no significant results. However, for on-road ATV traumas there was a marginally significant difference ($p = 0.070$) between places connected by highways and places connected by roads (table 30).

Table 3.3. Comparative statistics for all trauma data by mode and GIS for connected vs. not-connected places

Transportation Mode & Trauma Location	Connected		Not-Connected		STAT	
	Mean	Std. Error	Mean	Std. Error	t-test	p-value
All ATV Traumas	7.23	1.492	3.12	0.568	2.576	0.012**
All Snowmachine Traumas	4.18	0.881	2.710	0.689	1.314	0.191
All Bicycle Traumas	8.47	5.060	1.140	0.395	1.445	0.154
All Pedestrian Traumas	6.54	4.560	1.290	0.395	1.147	0.256

** Indicates $p \leq 0.05$

Table 3.4. Comparative statistics for all trauma data by mode and GIS for connected places, data by network connectivity

Transportation Mode & Trauma Location	Connected						STAT	
	Highway		Secondary Roads		Trails			
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	t-test	p-value
All ATV Traumas	10.56	2.468	2.96	0.654	No Data		2.978	0.005**
All Snowmachine Traumas	5.91	1.355	1.96	0.855			2.463	0.017**
All Bicycle Traumas	14.44	8.926	0.84	0.423			1.522	0.138
All Pedestrian Traumas	10.59	8.088	1.36	0.712			1.137	0.264

** Indicates $p \leq 0.05$

Table 3.5. Comparative statistics for all data by mode and network availability

Transportation Mode & Trauma Location	Not-Connected								STAT	
	Highway		Secondary Roads		Trails		None			
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	F-test	p-value
All ATV Traumas	5.00	2.864	3.55	0.982	2.88	0.766	1.69	0.463	2.227	0.070*
All Snowmachine Traumas	0.80	0.374	3.48	1.260	2.47	0.986	1.63	0.446	0.818	0.516
All Bicycle Traumas	9.00	4.764	0.73	0.280	0.53	0.298	0.38	0.155	0.830	0.509
All Pedestrian Traumas	7.60	4.411	1.20	0.442	0.65	0.209	0.25	0.194	0.548	0.701

* Indicates $0.05 < p \leq 0.1$

Table 3.6. Comparative statistics for on-road trauma data by mode and connectivity

Transportation Mode & Trauma Location	Connected		Not-Connected		STAT	
	Mean	Std. Error	Mean	Std. Error	t-test	p-value
On-Road ATV Traumas	2.28	0.580	1.67	0.394	0.875	0.383
On-Road Snowmachine Traumas	0.81	0.267	1.03	0.388	-0.464	0.643
On-Road Bicycle Traumas	5.81	3.794	0.83	0.322	1.306	0.197
On-Road Pedestrian Traumas	5.16	3.805	0.87	0.297	1.123	0.266

Table 3.7. Comparative statistics for on-road trauma data by mode and connectivity

Transportation Mode & Trauma Location	Connected						STAT	
	Highway		Secondary Roads		Trails		t-test	p-value
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error		
On-Road ATV Traumas	3.19	0.983	1.12	0.307	No Data		2.007	0.052*
On-Road Snowmachine Traumas	1.16	0.414	0.36	0.282			1.589	0.118
On-Road Bicycle Traumas	9.81	6.713	0.68	0.34			1.359	0.184
On-Road Pedestrian Traumas	8.41	6.756	1.00	0.523			1.093	0.283

* Indicates 0.05 < p ≤ 0.1

Table 3.8. Comparative statistics for on-road trauma data by mode and network availability in not-connected places

Transportation Mode & Trauma Location	Not-Connected								STAT	
	Highway		Secondary Roads		Trails		None		F-test	p-value
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error		
On-Road ATV Traumas	2.20	1.158	1.98	0.710	1.59	0.522	0.81	0.332	0.481	0.750
On-Road Snowmachine Traumas	0.00	0.000	1.28	0.692	1.14	0.697	0.31	0.176	0.584	0.675
On-Road Bicycle Traumas	7.20	4.055	0.50	0.203	0.35	0.191	0.19	0.101	0.724	0.577
On-Road Pedestrian Traumas	5.60	3.415	0.78	0.319	0.35	0.170	0.19	0.136	0.508	0.730

Figure 3.2 through figure 3.5 spatially illustrate the values presented in table 3.3 through table 3.8. All ATV traumas that occurred in places that were connected to other places are shown in figure 3.2. The map shows the ATV traumas that occurred in places connected by highways (green) and the ATV traumas that occurred in places connected by roads (blue). Traumas that occurred in areas connected by secondary roads were spread out in the North Slope, Western Alaska, Bristol Bay, and South East regions of the state, while the traumas that

occurred in places connected by highways mainly occurred in the Interior, Cook Inlet, and Prince William Sound areas of Alaska. The traumas that occurred in connected areas, especially those connected by highways, were mainly located inland, whereas the traumas that occurred in not-connected places (figure 3.3) were located along the coastal regions of Alaska. The sizes of the circles indicate the number of traumas that occurred in a particular place. The larger the circle, the more traumas that occurred in that location.

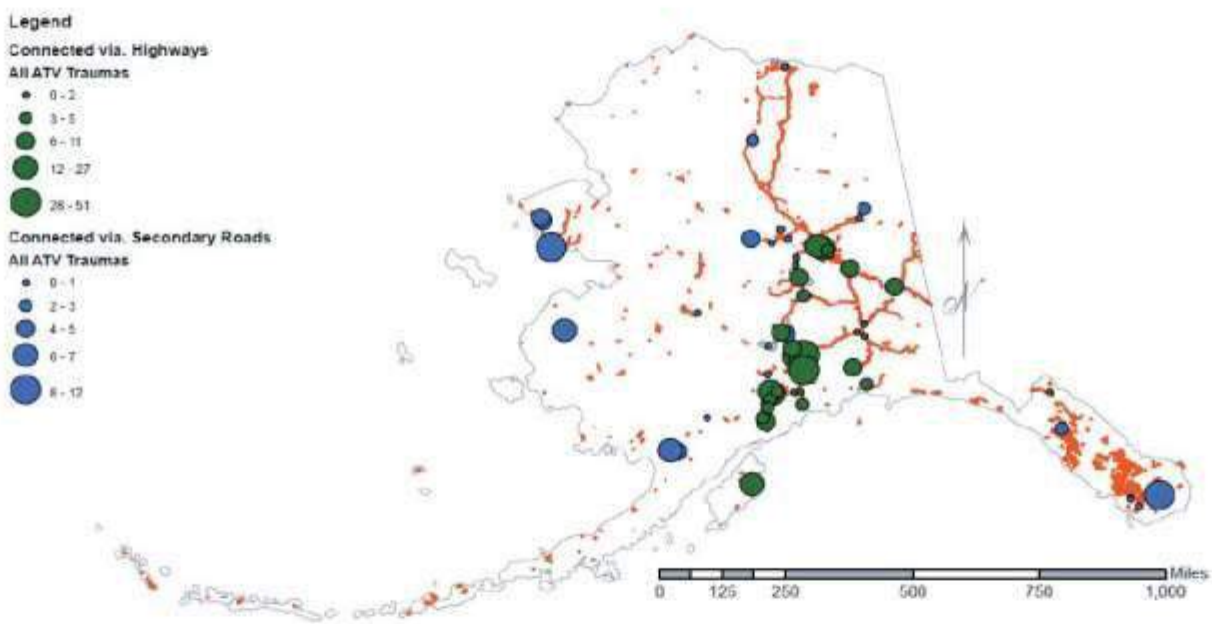


Figure 3.2. ATV traumas by location and network connectivity type

Places depicted in figure 3.3 may have some transportation network data within their borders, even though these networks do not connect to any other places, such as places that have highways (red), roads (orange), trails (yellow), or no network data (purple). Again, the sizes of the circles indicate the number of traumas that occurred in a particular place. The larger the circle, the more traumas that occurred in that location. The traumas were mainly along the coastal areas of Alaska, namely the North Slope, Northwest Arctic, Western Alaska, Bristol Bay, Aleutians, and Southeast.

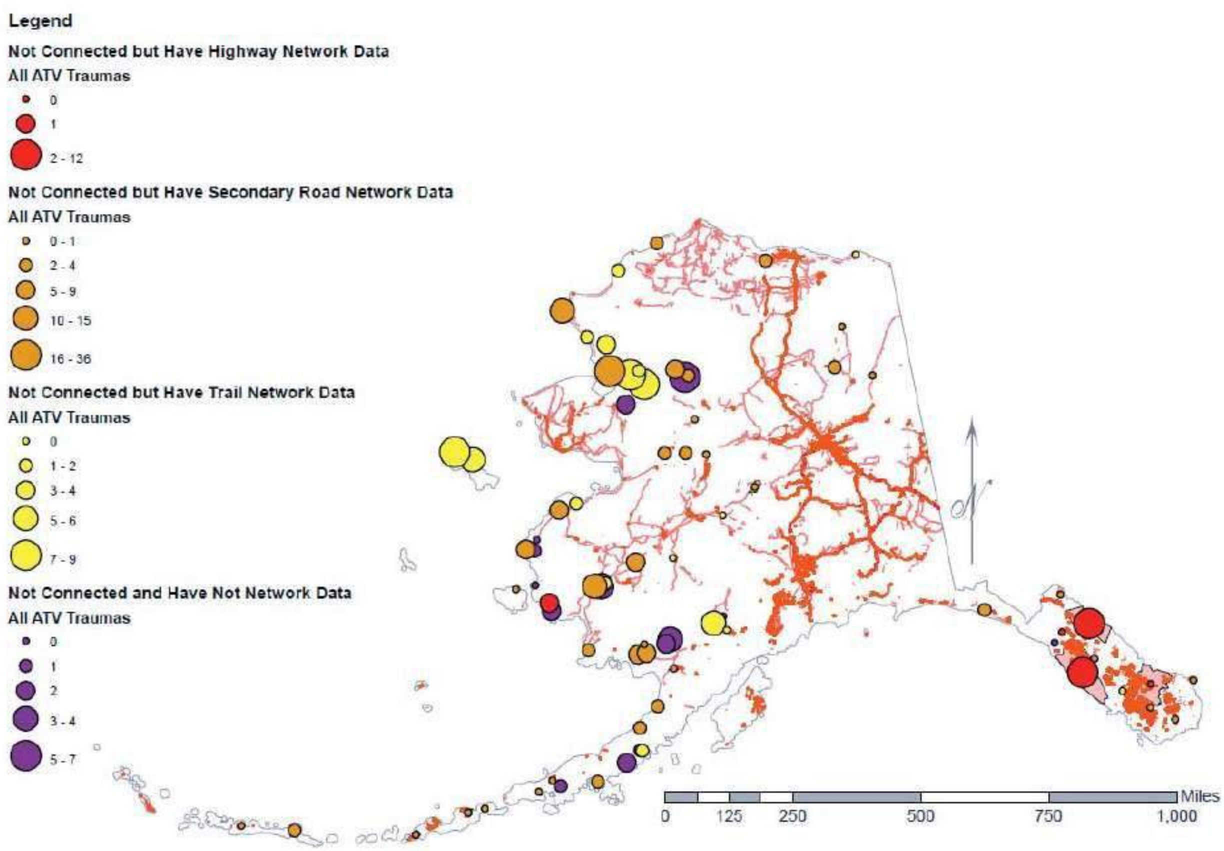


Figure 3.3. ATV traumas by location and network availability

Figure 3.4 depicts all snowmachine traumas that occurred in connected places. The map shows the snowmachine traumas that occurred in places connected by highways (green) and by roads (blue). The snowmachine traumas in places connected by highways most often occurred in the Interior, Cook Inlet, or Prince William Sound areas of Alaska. The snowmachine traumas in places connected by secondary roads occurred all over the state, but most often in the North Slope, Western Alaska, or Bristol Bay areas of the state.

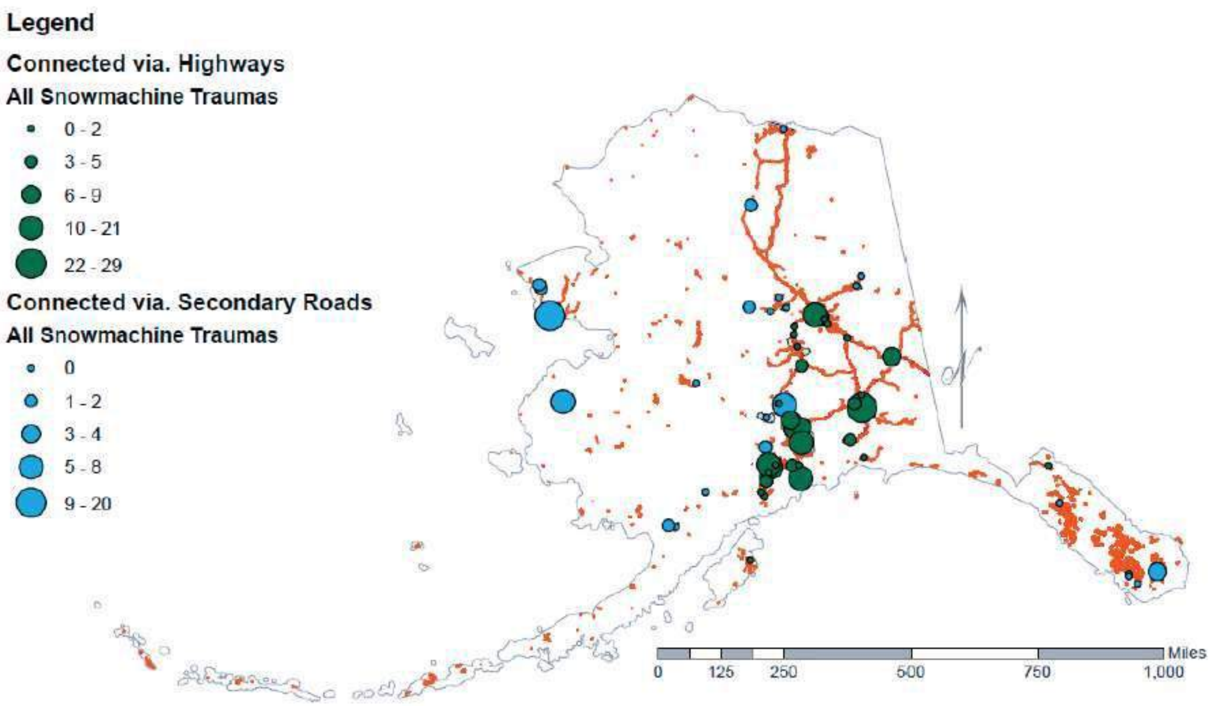


Figure 3.4. Snowmachine traumas by location and network connectivity type

Figure 3.5 depicts all on-road ATV traumas that occurred in places that are connected to other places. The map shows the ATV traumas that occurred in places connected by highways (green) and by roads (blue). On-road ATV traumas in places connected by highways most often occurred in the Interior or Cook Inlet areas of Alaska. The on-road ATV traumas in places connected by secondary roads occurred all over the state, but the highest trauma numbers were in the Northwest Arctic, Bristol Bay, and Southeast Alaska regions, with a few other locations in the North Slope and Interior areas.

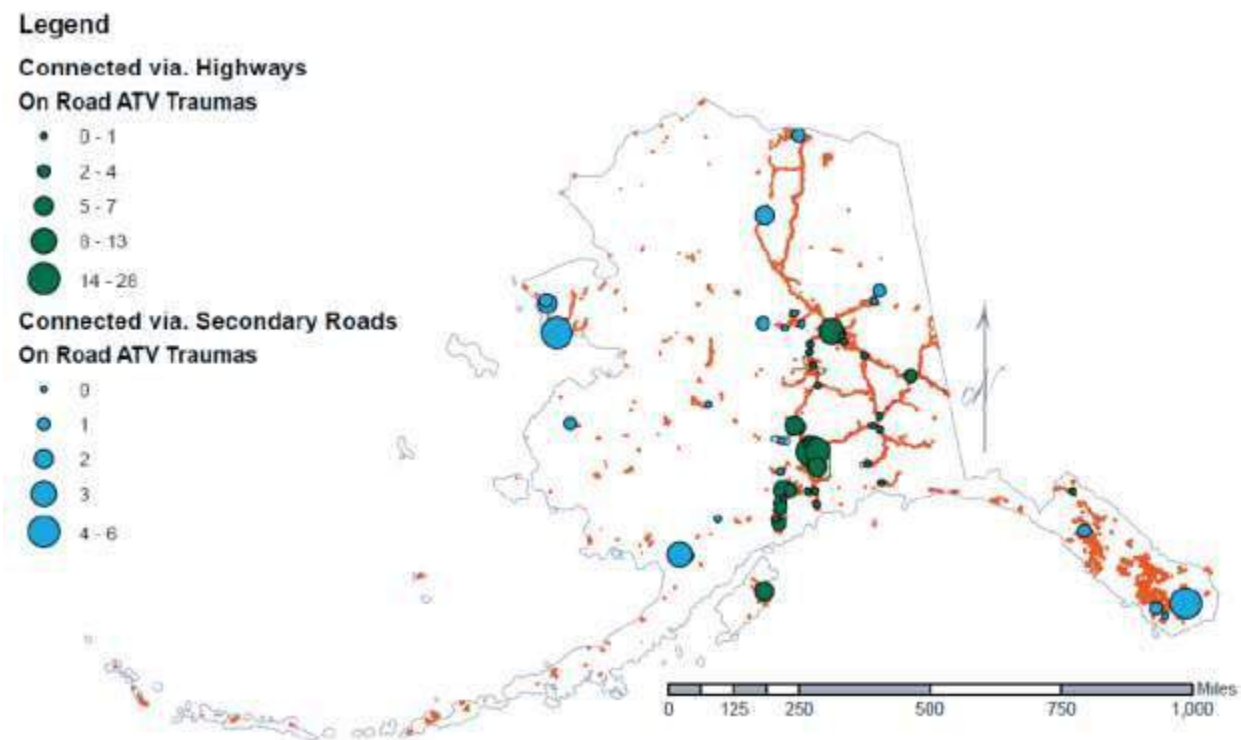


Figure 3.5. On-road ATV traumas by location and the networks that connect those places

CHAPTER 4. SURVEY DEVELOPMENT

A regional survey was developed to assess and compare the travel behaviors and user perspectives of both NTV and non-motorized users in mixed-use context, specifically for rural areas. The survey sought to capture data related to driver or operator demographics, perceptions on safety, attitudes when traveling in a mixed-use environment, and travel data (weather, time of year, trip purpose, etc.).

In the beginning stages of this project, the traditional and non-traditional transportation modes that were considered included, but were not limited to ATVs, golf carts, agricultural vehicles, walking/exercising pedestrians, bicycles, skateboards/longboards, segways, snowmachines (also referred to in other regions as snowmobiles), dog sleds, cars/trucks, semi-trucks, and RVs/motorhomes. This list was synthesized and prioritized on the basis of the user groups and the prevalence of use in Alaska and Idaho, based on general knowledge and anecdotal evidence. The modes selected for inclusion into the final survey included cars or trucks (automobiles), motorcycles, bicycles, ATVs, snowmachines (snowmobiles), dogsleds (dog-powered modes), and agricultural vehicles.

To reduce the distribution time and eliminate possible respondent issues, an online survey software and questionnaire tool was chosen as the engine for conducting and distributing the mixed-use survey. SurveyMonkey was used because of its advanced coding logic capabilities, reputation, and overall public familiarity and trust. When developing the survey, other surveys with similar demographics, context, and motivations were referenced. These surveys included the New England Transportation Survey, the National Household Travel Survey, and the 2009 Vermonter Poll. The New England Survey revealed the importance of having clear and brief section banners to keep respondents informed throughout the survey (Coogan et al., 2010). This survey also demonstrated effective ways to present questions, such as matrix questions that minimized text length for similar questions. The National Household Travel Survey served as an example on formulating survey questions into a manner that would then be efficiently transformed into usable data for analysis, such as including the specific mode in each question (Federal Highway Administration, 2009). In the 2009 Vermonter Poll, background computer coding logic showed how a survey could evolve as the respondent answered questions and progressed through the survey (University of Vermont, 2009).

The coding logic from the 2009 Vermonter Poll was used as an example to create the mixed-use survey. This logic removed questions or sections that did not apply to the respondent. For example, mode-specific questions were eliminated for each respondent if they never used that corresponding mode on, adjacent to, or near a roadway. In doing so, the overall length of the survey was reduced, which decreased the likelihood that a participant would abandon the survey before completion. Additionally, because respondents were not provided further irrelevant questions, the likelihood of those questions being answered falsely or ignored was reduced. Because of the decision to incorporate the coding logic, the survey was restricted to electronic distribution.

The questions formulated were grouped into specific topic areas and were based on either the gaps in the current literature or researcher interests. The topic areas included the following: household/residence characteristics, vehicle ownership, commute characteristics, frequency of vehicle/mode use, usage characteristics, mode education/training, recreational versus utilitarian use, road types used, safety perception, safety gear, crash questions, crash reporting, and respondent characteristics.

During the development of the survey, numerous revisions of the survey were performed. The revision process included conducting in-house reviews and testing, along with requesting coworkers and classmates to complete and review the survey. Upon reaching an iteration of the survey that seemed suitable, a pilot survey was sent out to colleagues in the transportation civil engineering field to acquire feedback on the survey's appearance, flow, understandability, and quality. The feedback from the pilot survey provided a perspective of how people outside the project perceived and understood the survey. The reviews and feedback showed areas in the survey that needed cleaning up. This included reducing the total number of survey questions, adjusting the order of questions, adding concise text at the start of different sections in the survey, and providing a simple picture of the mode in the beginning of each mode's section.

These changes helped to decrease the likelihood of incomplete responses, eliminate respondents' confusion, and thoroughly inform the respondents on the topic in question. Figure 4.1 shows the final survey structure. The final version of the survey is provided in Appendix A.

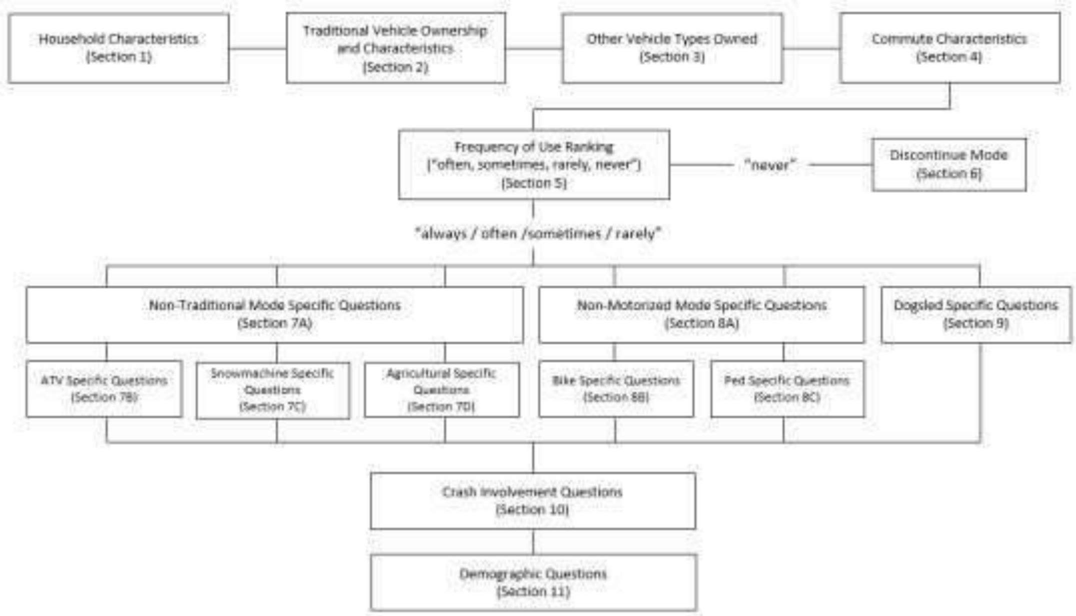


Figure 4.1. Pacific Northwest transportation survey structure

4.1. Survey Characteristics

The survey included an initial page of text that described the survey, its intent, and the survey drawing process, along with the contact information of the survey creators and basic instructions for navigating the survey. The complete survey included 206 questions. The targeted time for respondents to complete the survey was approximately 20 minutes.

4.2. Household/Residence Characteristic Questions

Specific questions were asked os survey respondents regarding their type of residence, the types of homes surrounding their place of residence, and whether they resided in a rural or urban locale. For those living in a rural area, a follow-up question was asked to determine which specific type of rural category best represented their home location. The rural subcategory options followed the EPA's Smart Growth designations and included edge, traditional main street, gateway, resource dependent, and remote (Mishkovsky et al., 2010).

Specific questions were also asked to determine household size and if adequate parking, sidewalks, or walking paths were available near each respondent's home. The results to these questions were also used to determine relationships among personal travel behavior, transportation mode usage, and safety perceptions.

4.3. Mode Ownership, Commute Characteristics, and Frequency of Use

In order to quantify personal travel distance and mode preferences, each respondent was asked to provide one-way commute distance to work and the distance to the nearest town center.

Questions pertaining to the transportation mode used most often for trip purposes including work, school, shopping, entertainment, and grocery shopping, along with frequency of use, were also asked, and the options for transportation modes were car or truck (for automobile), motorcycle, bicycle, ATV, snowmachine, dogsled, and agricultural vehicle. The frequency of use questions were framed to include the phrase "on or near the roadway" so that the survey focused on interactions of the chosen transportation mode while on or near these public facilities. Each household identified how many of each mode type they owned, and the results of the ownership questions helped link the use of transportation mode with mileage, hours of operation, and frequency of use. The frequency of use question was used to determine whether a person would receive follow-up question about that particular mode. If they answered "never" to having used a certain mode on or near roadways, the questions related to that mode were omitted from the remainder of the survey.

At the end of the section, a question asked whether a mode was omitted and if so, a follow-up question was asked about the mode and its measurable usage. This question was created to ensure that other mode types not identified during the survey development were captured.

4.4. Usage Characteristics

This section focused on the usage of the transportation modes as a part of this mixed-use study since information on this subject is lacking. Specific questions were asked to determine the mileage, hours of operation, monthly usage, trip length, and number of years engaged. These questions were asked to determine the relationship between usage and user-perceived safety while traveling on or near a roadway in or out of mixed traffic. In the mileage, hours of operation, daily usage, and years engaged questions, survey respondents were given ranges of miles, hours, days, and years to select from, respectively.

The questions and ranges provided were based specifically on the mode in question to accommodate for the likely differences in mileage of certain modes; for example, travel distances were expected to vary between a car/truck user and a walking/exercising pedestrian. The ranges were broader and encompassed larger values for modes such as motorcycles and cars/trucks and were narrower and lower in numeric value for modes such as bicycles and walking/exercising pedestrians. The results from these questions were used to establish the relationship between usage and how users learned to operate the mode.

4.5. Education and Training/Licensing

This section focused on the learning methods used by respondents to operate a transportation mode. The methods were recognized as a possible variable that affected user behavior, safety perception, frequency of use, crash occurrences and reporting, use of safety gear, and reasons for use. As a result, a question was asked to determine the method of education or training the user received for each mode. The options included self-taught, received training from friend or relative, and organized training.

4.6. Reasons for and Nature of Mode Use

There is a lack of knowledge on both the reasons for using and methods of using NTV modes. Specific questions were asked to determine whether a mode was used for primarily recreation, utilitarian, or both, and what types of activities were included. A question asked if the mode was used for activities such as commuting, exercise, and errands. The results from these questions were used to determine a relationship between where, when, or why these modes were being used and their perception of safety in mixed traffic.

To account for the scarcity of documented information on the use of dog sled or dog-powered modes as transportation, individuals who used this mode were asked a series of follow-up questions focused on racing, skijoring, bikejoring, mushing, and carting activities.

4.7. Road Types, Walking Paths, Bike Paths Used, and Trail Access

This section focused on the road types, walking paths, and bike paths used by NTV transportation modes. Specific questions were asked to determine whether NTV mode users operated on, adjacent to, or near roadways, walking paths, and bike paths. To understand how people access trails, questions were asked on the availability of, methods for accessing, and distance travelled to reach trails. To ascertain travel patterns of bicycle users, survey respondents were asked whether there were bike paths, bike lanes, or shared-use paths within a quarter mile of where they lived. If so, a follow-up question asked whether respondents would not use bike paths or bike lanes. These results were used to establish a relationship between roadway/path usage and user safety perception.

4.8. Safety Perception

This section focused on the safety perceptions of survey respondents while operating a NTV transportation mode in mixed traffic conditions, since safety perception can affect how one operates a mode. It was recognized that if an NTV mode user felt unsafe, they might have altered choices when operating a mode. For example, a user riding a bicycle in the bike lane might choose to ride on the sidewalk if he or she felt unsafe riding in mixed traffic. Specific questions were asked about operating NTV modes in mixed traffic and about how various road characteristics changed users' perceptions of safety. The road characteristic options included signage that cautions automobile drivers that NTV and non-motorized vehicles may be present, pavement markings that section off an area for NTV and non-motorized vehicle use, wider lanes, wider shoulders, and lighting.

The results of these questions were used to determine the relationship between the effects of certain road characteristics and how users learned to operate the mode, the relationship between comfort level with mixed traffic and how users learned to operate the mode, and the relationship between user comfort in mixed traffic and where on or near the road users traveled.

4.9. Safety Gear

This section focused on the use of safety devices when operating a given travel mode. Individuals are not always required to wear or utilize safety gear when traveling on one of the transportation modes included as part of this mixed-use study. As a result, questions were asked to determine the extent of usage and determine whether there was a correlation between the use of safety gear and how safe users felt when traveling on or near the roadway and with or without the presence of mixed traffic. Individuals were asked to specifically identify how they made themselves more visible, and the options included wearing bright colors, wearing fluorescent or reflective clothing, wearing other lights on oneself or other belongings, using additional reflectors, or accessorizing with flags or other similar objects. Survey respondents were asked whether this usage applied during the daytime, nighttime, or during both times, and how often they wore a helmet.

These safety gear results were used to establish two key relationships. The first relationship was between the method of learning and how users applied or addressed safety during the mode operation. The second relationship was between the method of learning and how users perceived their safety in mixed traffic.

4.10. Crash Questions

This section focused on crashes involving at least one NTV transportation mode. It was recognized that detailed crash data are lacking for the NTV modes examined in this study. As a result, two sets of specific questions were asked to determine crash characteristics, locations and causes. The first set asked about crashes that involved at least one traditional and one NTV mode, and the second set asked about crashes that specifically involved two NTV modes. These questions were asked to help determine areas of hazard for both traditional and NTV transportation modes.

4.11. Crash Reporting

This section focused on unreported crashes experienced by the survey respondent on public property while operating an NTV transportation mode. It was recognized that a potentially large number of NTV mode crashes go unreported. These unreported NTV mode crashes could hide trends about underage user crash statistics, mode specific crash rates, and injury and property damage statistics. As a result, specific questions were asked to determine how many crashes were unreported and the crash characteristics of unreported NTV crashes. These questions asked what modes were involved, if any operators under 16 years of age were involved, and why the crash was left unreported.

The results of these questions were used to develop a relationship between unreported crashes and the perception of safety in mixed traffic. It was recognized that there could be sensitivity associated with a crash that a respondent may have been involved in, so they were given the option to not answer any of the questions in this section.

4.12. Respondent Characteristics

Questions were asked to determine the respondent's employment status, occupation, job category, age, sex, marital status, highest education level, annual household income, state of residence, zip code, and whether they had a driver's license. The results from these questions were used to attempt to establish a relationship between different demographics and their perception of safety in mixed traffic. At the end of the survey, respondents were provided with a comment box to allow for general comments, feedback about the survey, and any additional information the respondent desired to provide.

4.13. Survey Distribution

The chosen target audience of the survey were people likely to use NTV and non-motorized forms of transportation and those living in rural areas. To this end, survey outreach efforts specifically targeted these groups of individuals. This was done to gather a significant sample of these users without getting a largely disproportionate number of respondents who had no contact with NTV modes. A list of public and private organizations, businesses, and clubs, primarily in Alaska and Idaho, that were associated with these target groups was generated by the research team (see Appendix Y). These groups were contacted by email and by phone and asked if they would be willing to distribute a web link to the survey using their contacts list. Those who responded were then sent an email with the survey link and were asked for confirmation when the link was shared.

As an incentive to participate in the mixed-use survey, respondents could enter their contact information into a random drawing that awarded $25 Amazon.com gift cards to 20 respondents. The survey questions and methods were reviewed and approved by the University of Idaho’s and University of Alaska Fairbanks’ institutional review boards (see Appendix C).

CHAPTER 5. RESULTS

A total of 480 individuals provided responses to the online survey between August 22 and October 31, 2016. Of the 480 respondents, the number of valid responses from Alaska and Idaho totaled 214 and 206, respectively. The remaining responses were either invalid (no matching or incorrectly entered zip code or state), provided no state or zip code, or represented individuals from other states. Since this research focused on Alaskan and Idahoan data, those results were not incorporated. The following sections discuss the survey results.

5.1. Demographics

Respondents were asked to provide their age, sex, occupation, annual household income, and highest achieved level of education. The age distribution of respondents (figure 5.1) showed that Alaskans tended to be younger, with a higher percentage in the 31-40 and 41-50 age groups, whereas Idahoans fell into the older age groups of 51-60 and over 60 years of age. The sex distribution of respondents (figure 5.2) for male and female was approximately 46 percent and 53 percent for Alaska, respectively, and 70 percent and 30 percent for Idaho, respectively.

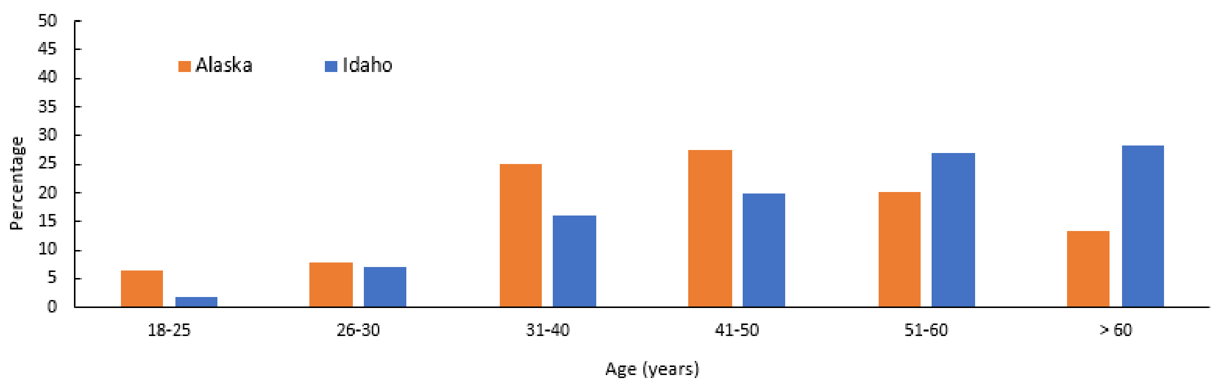


Figure 5.1. Respondent age distribution

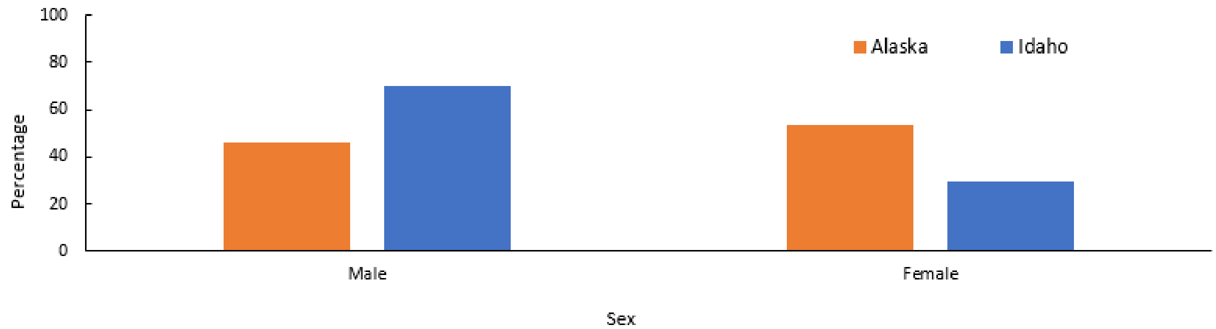


Figure 5.2. Respondent sex distribution

The respondents' employment type, household income, and education are shown in figure 5.3 through figure 5.5. In general, most indicated that they were salaried/employed. A higher percentage of respondents was retired in Idaho than in Alaska. Alaska had a higher representation of respondents in the >$125k income category and those stating they had obtained a graduate or professional degree.

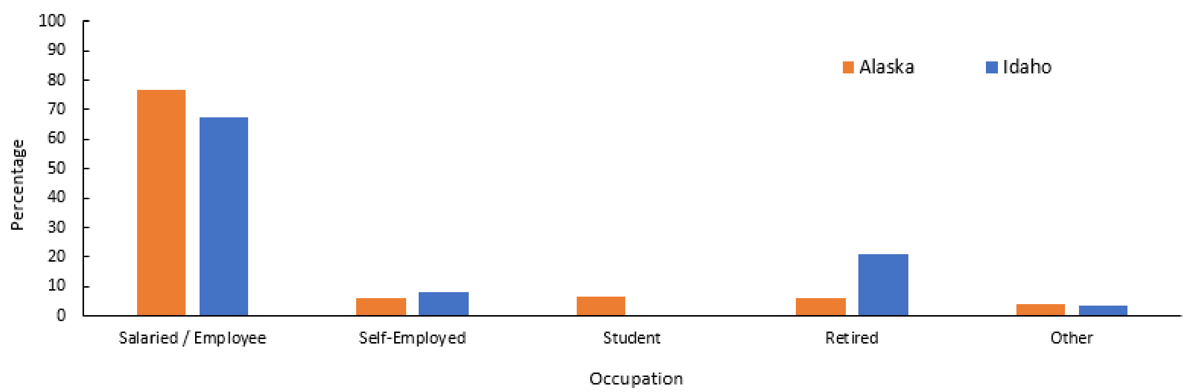


Figure 5.3. Respondent occupation distribution

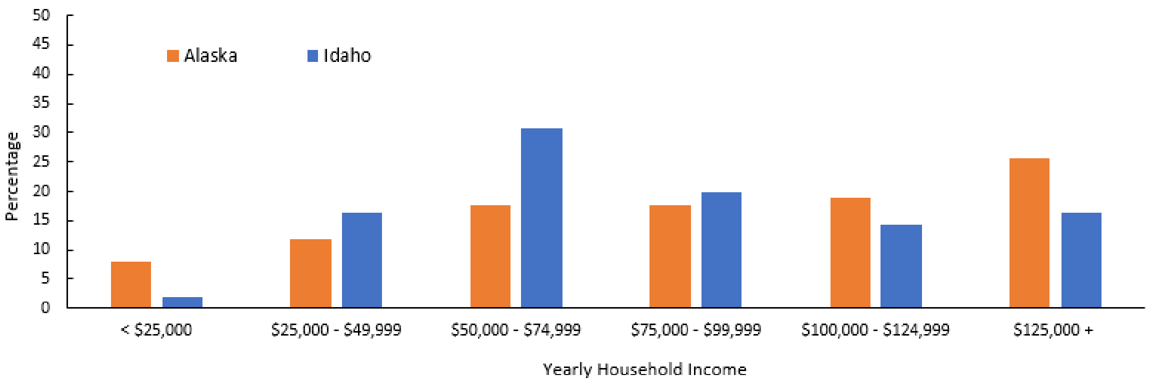


Figure 5.4. Respondent household income distribution

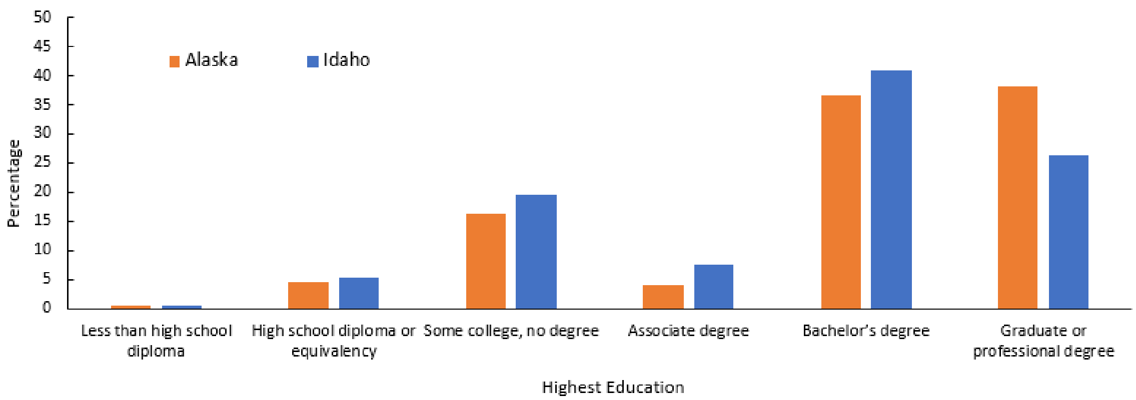


Figure 5.5. Respondent education distribution

5.2. Household Locale

Respondents were asked to identify their residential area type as one of the following:

a. Rural area (open land with few homes and buildings)

b. Urban area (region in or surrounding a city).

Of respondents from Alaska, 57 percent self-reported as living in a rural residential area, whereas in Idaho, only 28 percent self-reported as living in a rural residential area (figure 5.6). In comparison, approximately 15 percent of the United States population is classified as living in a rural area.

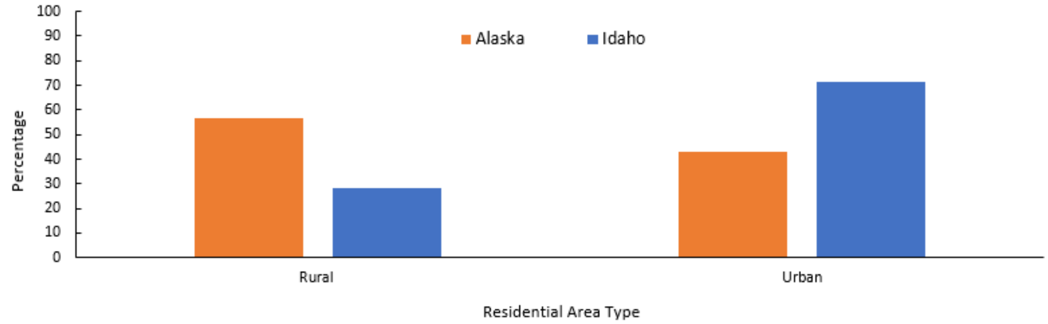


Figure 5.6. Residential area type by state

The rural residential area type can be broken down into five subtypes: edge, traditional main street, gateway, resource development, and remote. A majority of the respondents from Alaska (34 percent) and Idaho (39 percent) classified themselves as living in an edge-type environment (figure 5.7). In Idaho, the resource-dependent subtype represented the second highest category at 28 percent, but this category was only identified by 8 percent of Alaskans. Alaska had five times more gateway respondents than Idaho.

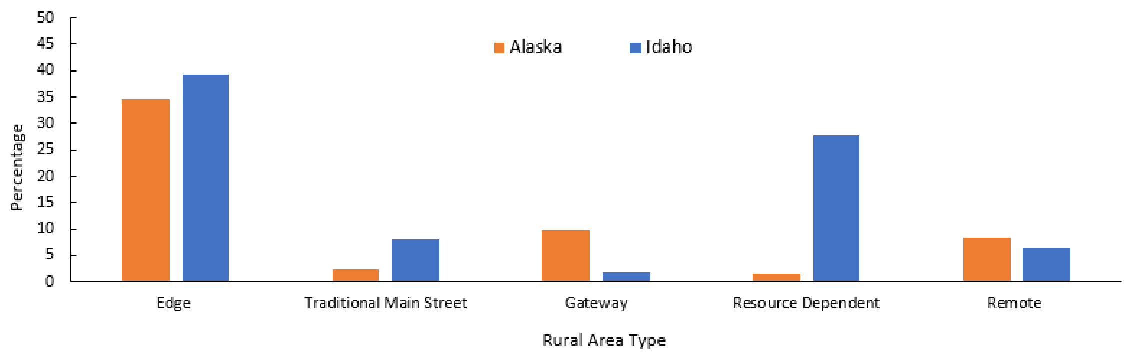


Figure 5.7. Rural area type by state

Of the stated work commute distances, a majority of the respondents, including 72 percent from Alaska and 54 percent from Idaho, lived within 15 miles of their work site (figure 5.8). In Alaska, nearly 34 percent lived between 1 and 5 miles from work, and approximately 38 percent lived between 6 and 15 miles away. In Idaho, 27 percent lived between 1 and 5 miles, 28 percent lived between 6 and 15 miles, and another 15 percent lived 16 to 30 miles away.

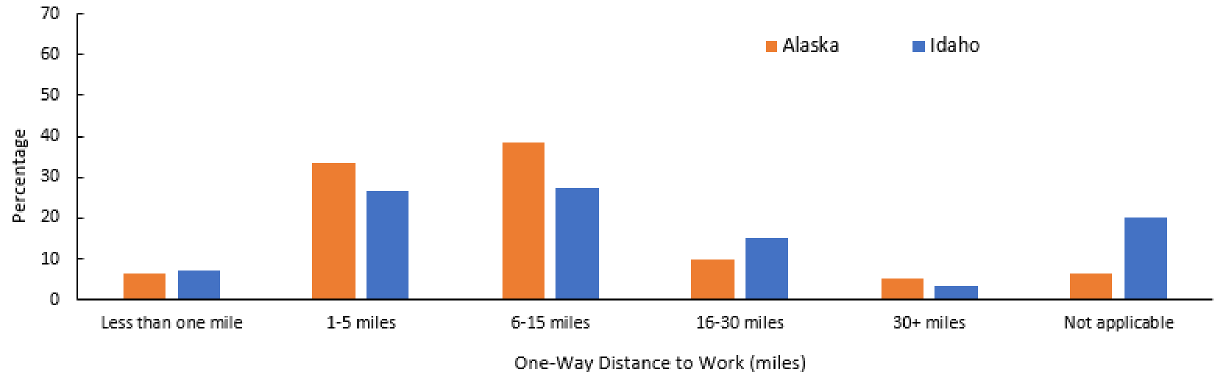


Figure 5.8. Work commute distance by state

The approximate distance from primary residence to the nearest town center was stated by each respondent. The majority of respondents lived between 1 and 15 miles from the nearest town center, 82 percent for Alaska and 81 percent for Idaho (figure 5.9). Unlike the stated work commute distance, very few respondents selected “not applicable.” This indicates that home proximity to town center was a more reliable variable for making comparisons to other questions from the survey related to safety perceptions or travel behaviors.

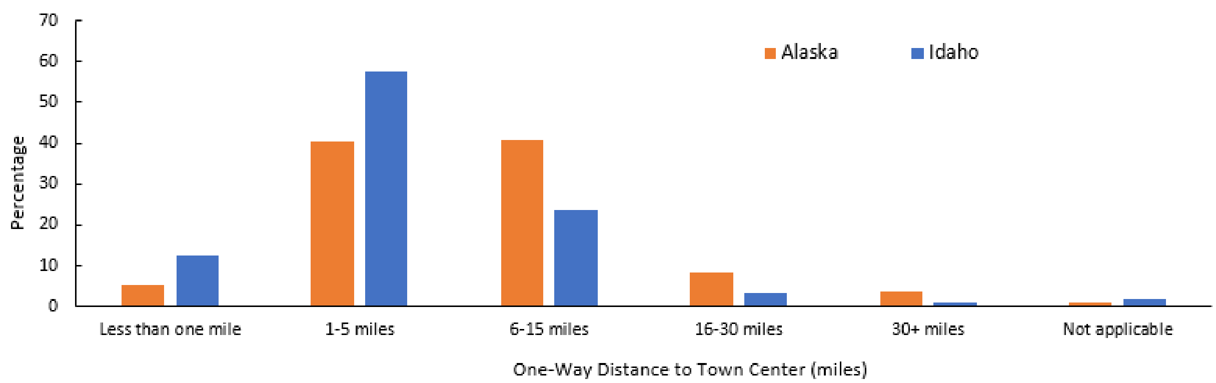


Figure 5.9. Home proximity to town center by state

5.3. Vehicle Ownership and Use

As discussed in Section 4.3, a series of questions were asked on vehicular ownership and the nature of the use of those particular modes. These questions were used to determine whether the participant would receive more in-depth questions pertaining to each mode. Figure 5.10 and figure 5.11 show the household vehicular ownership for Alaska and Idaho, respectively.

Alaska had a higher representation of snowmachine and dogsled users, whereas Idaho had more agricultural vehicle ownership. Both states had relatively equal ATV and bicycle ownership.

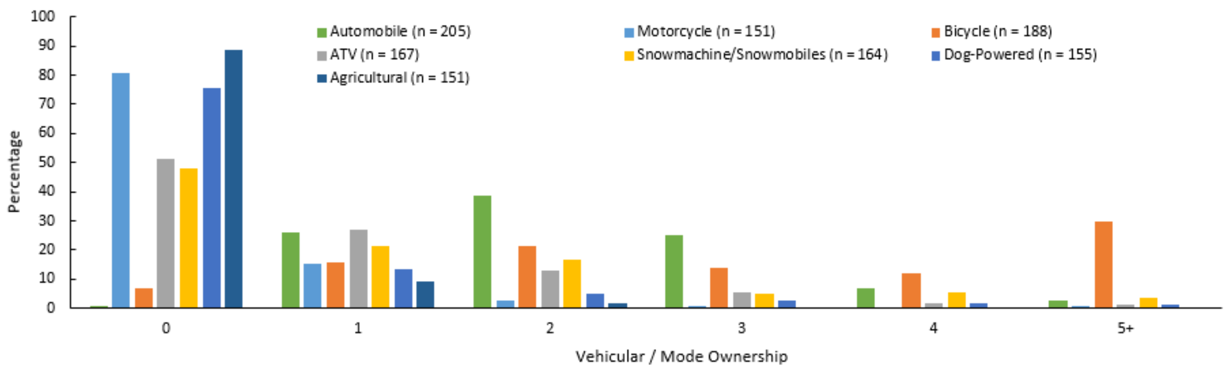


Figure 5.10. Household vehicle ownership in Alaska

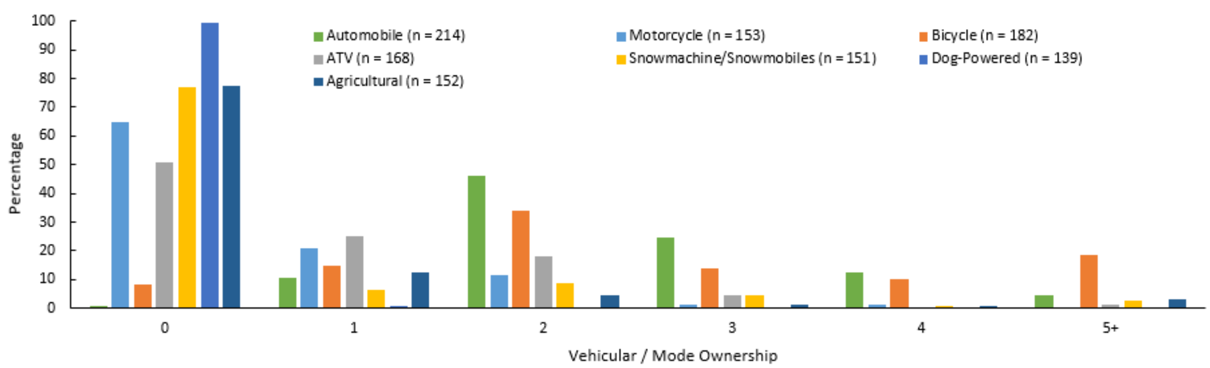


Figure 5.11. Household vehicle ownership in Idaho

Figure 5.12 shows the results of the question pertaining to whether the respondent used a particular mode on or near roadways. Nearly all respondents reported using automobiles and walking on/near roads. Approximately 75 percent and 60 percent stated using bikes on/near roads in Alaska and Idaho, respectively. Surprisingly, a higher percentage (about 30 percent) of respondents from Idaho used ATV/OHVs on or near roads than in Alaska (roughly 25 percent). Conversely, almost double the number of respondents from Alaska (20 percent) reported using snowmachines on/near roads.

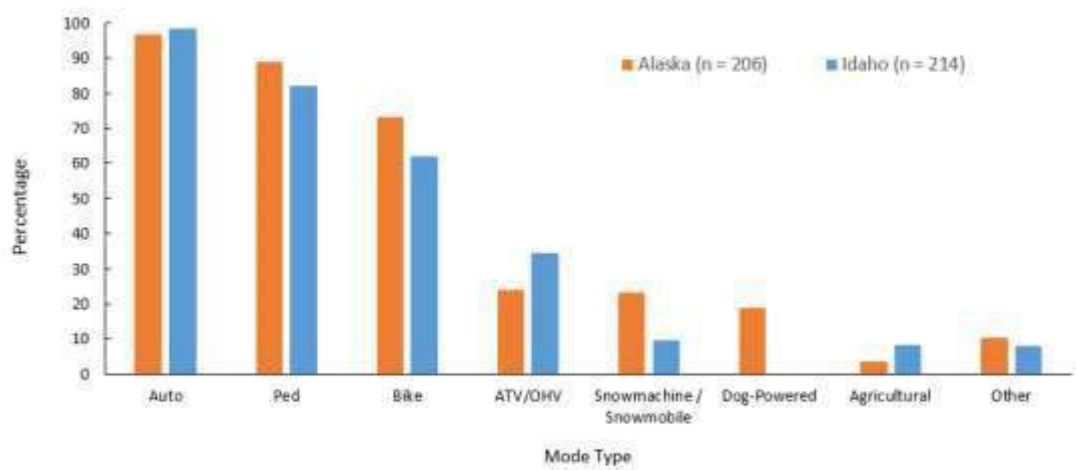


Figure 5.12. Operation on/near roads by mode

Respondents were asked to state their level of agreement on a Likert scale ranging from strongly agree to strongly disagree with the following statement: *My neighborhood has an adequate number of good sidewalks or walking paths* (see figure 5.13). In general, respondents from Idaho perceived having better access to sidewalks and walking paths (56 percent) than those from Alaska (30 percent). This is likely due to the fact that Idaho had more respondents from self-reported urban areas (figure 5.6).

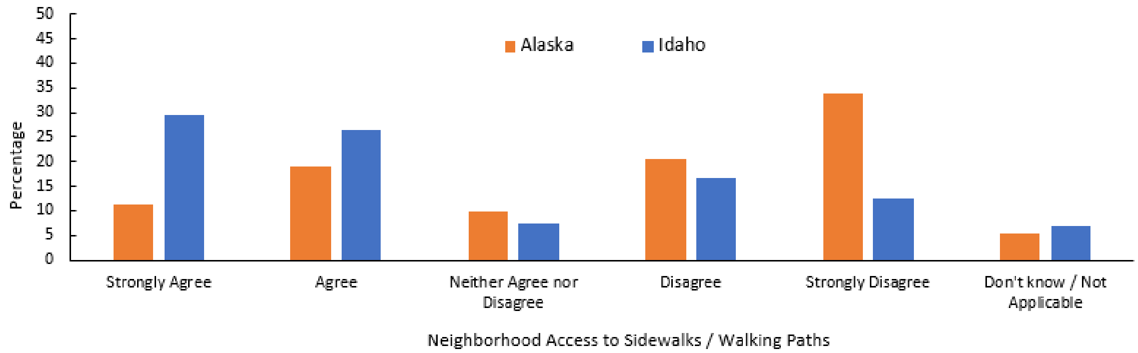


Figure 5.13. Perceived sidewalk/walking path access by state

The mode type used was stated by each respondent for the following activity categories: to go to work, to go shopping, for work, to go out for fun/entertainment, to go to school, and to go grocery shopping. Respondents were asked to select which activities they used each mode for. In Alaska (see figure 5.14), 67 percent of responses were for walking (13 percent), bicycle (32 percent), ATV (12 percent), and other (10 percent). The only modes used for grocery shopping were bicycle, ATV, and other. In Idaho (figure 5.15), the most varied responses, and the only ones that included the grocery shopping, were for walking (7 percent), and bicycle (29 percent). In Alaska motorcycles, ATVs, snowmachines, and dog-powered modes were most used for fun/entertainment. In Idaho bicycle, ATVs, and snowmachines were most used for fun/entertainment.

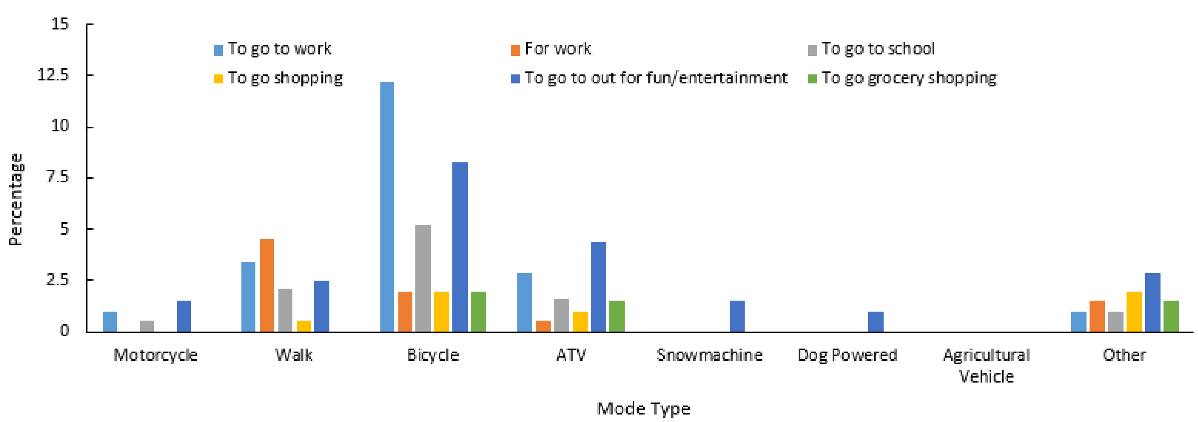


Figure 5.14. Trip types by mode in Alaska

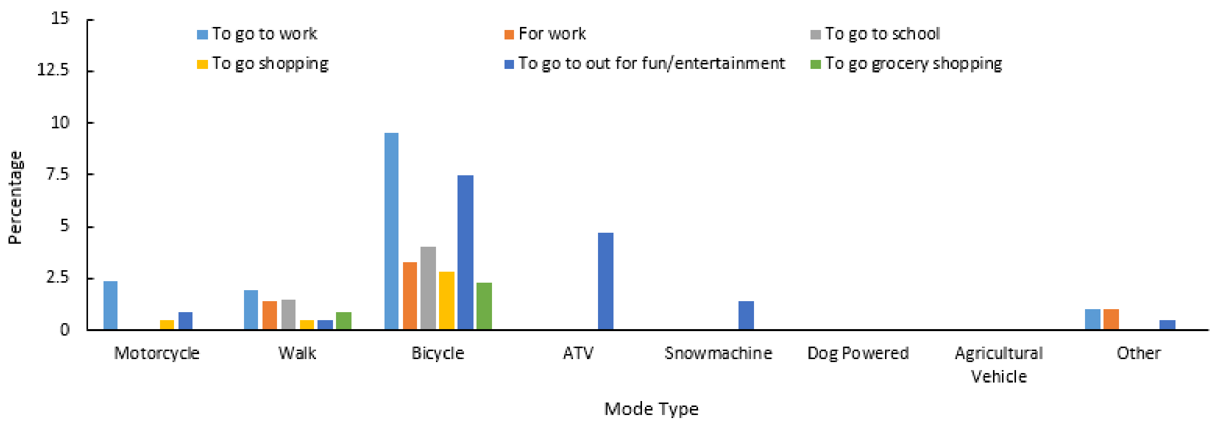


Figure 5.15. Trip types by mode in Idaho

This is reflected again in figure 5.16 and figure 5.17, with these modes being primarily used for fun/entertainment. Walking was most used for work in both Alaska and Idaho. This is different from the data shown in figures 18 and 19, which show that in Alaska, walking was used primarily for a mixture of recreation and utilitarian purposes, whereas in Idaho walking was primarily used for recreational purposes. The mode most used for going to work in Alaska was the bicycle, and in Idaho the motorcycle. Only 5 percent of respondents in Alaska (figure 5.14) used either a motorcycle (2 percent), snowmachine (2 percent), dog- powered mode (1 percent), or agricultural vehicle (0 percent). Similarly, only 7 percent of total respondents in Idaho (figure 5.15) reported using a motorcycle (4 percent), snowmachine (1 percent), dog-powered mode (0 percent), agricultural vehicle (0 percent), or other (2 percent).

Respondents were asked to identify on a recreational-utilitarian continuum how they used each mode type. The results for Alaska and Idaho are shown in figure 5.16 and figure 5.17, respectively. In Alaska, approximately 75 percent of respondents use dog-powered modes only for recreational purposes, while the remaining modes (ATV, snowmachine, bicycle and walking) were mostly distributed across recreational and utilitarian use. Snow machines (47 percent) and dog-powered modes (75 percent) were primarily used only for recreation. AVTs (33 percent), bicycles (34 percent), and walking (34 percent) were mostly used for a mixture of recreational and utilitarian purposes.

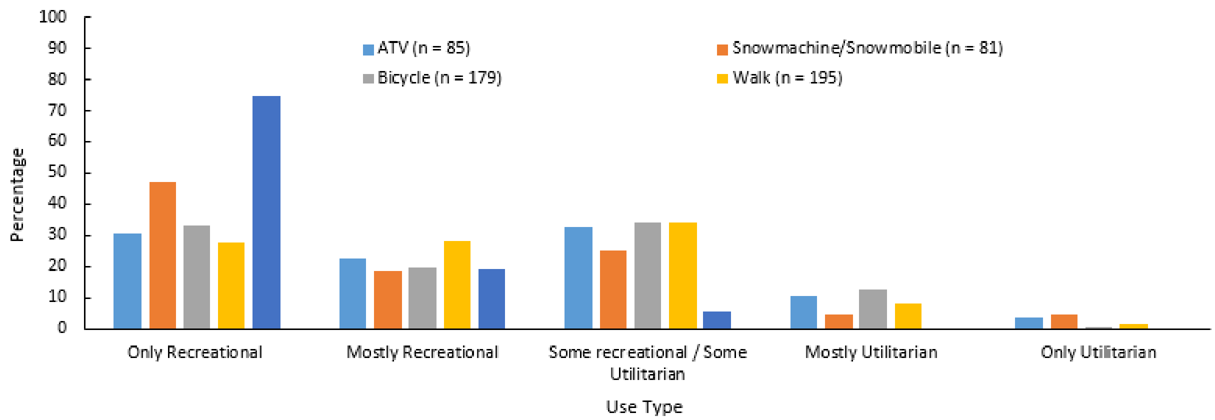


Figure 5.16. Use type by mode in Alaska

In Idaho, the non-automobile modes were used primarily for recreational purposes only (44 percent of ATVs, 78 percent of snowmachines, 56 percent of bicycles, 41 percent of walkers, and 100 percent of dog-powered modes). However, the number of dog-powered mode respondents was only one, and although this may be generally representative of the proportion of dog-powered mode users in comparison to the other modes, it is likely to be insufficient for statistical analysis purposes. All of the non-automobile modes were used less for more utilitarian purposes.

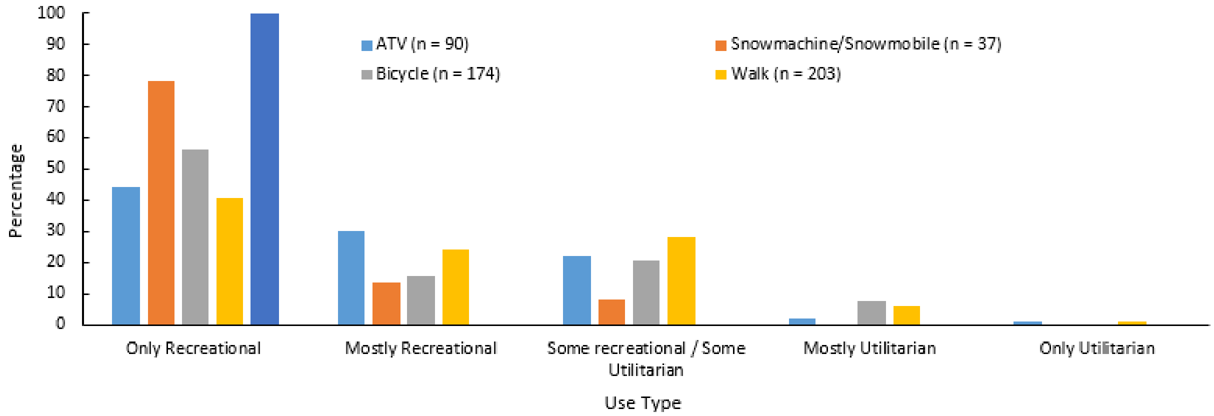


Figure 5.17. Use type by mode in Idaho

In Alaska, survey respondents predominantly traveled less than 100 miles per year when riding either an all-terrain vehicles, snowmachines or snowmobiles, or a dog-powered modes (Figure 5.18). Of the total number of all-terrain vehicle users (N=81), 32.1 percent indicated that they traveled fewer than 100 miles, while 34.5 percent stated that they rode between 100 and 250 miles in a calendar year. Another 19.0 percent logged between 251 and 500 miles, and 9.6 percent reported traveling in excess of 1000 miles. By comparison, 36.3 percent of all snowmachine or snowmobile riders (N=85) and 40.4 percent of all dog-powered users (N=38) indicated that they traveled fewer than 100 miles, and approximately one-quarter of each mode's users traveled between 100 and 250 miles. In terms of logging over 1000 miles, 16.5 percent of all snowmachine or snowmobile riders and 13.5 percent of all dog-powered mode users answered in the affirmative.

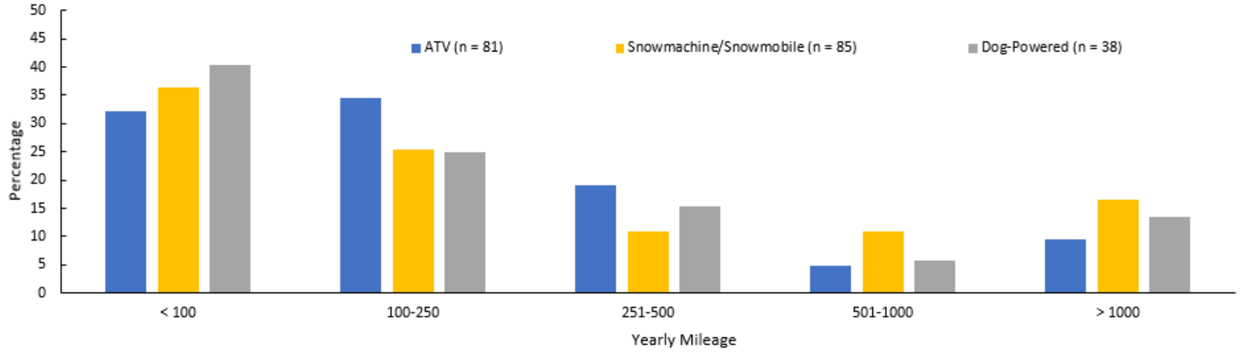


Figure 5.18. Yearly miles traveled by ATV, snowmachine, and dog-powered modes in Alaska

Alaskan travel usage by all-terrain vehicle, snowmachine or snowmobile, and dog-powered modes differed from those living in Idaho (figure 5.19). Only 14.4 percent of all all-terrain vehicle riders (N=83) and 10.8 percent of all snowmachine or snowmobile riders (N=35) estimated their annual ridership to be below 100 miles, as 35.1 percent of snowmachine or snowmobile riders indicated annual mileage in the 251- to 500-mile range, while 20 percent each of snowmachine or snowmobile riders indicated riding between 100 to 250 miles or between 501 and 1000 miles each year. For this survey, only one Idaho resident indicated that he or she used dog-powered transportation, and annual travel did not exceed 100 miles.

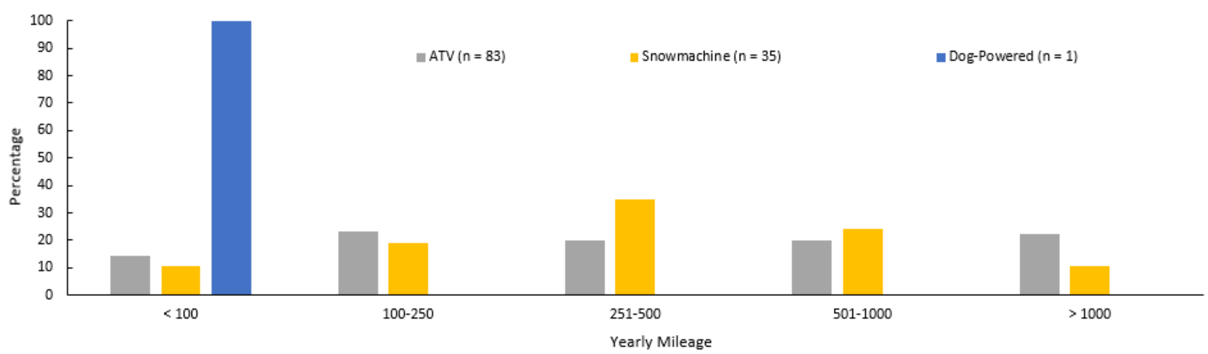


Figure 5.19. Yearly miles traveled by ATV, snowmachine, dog-powered modes in Idaho

To gauge pedestrian or bicycle travel, survey respondents were asked to estimate their monthly miles traveled (figure 5.20). In Alaska, 33.5 percent of all bicyclists (N=175) and 35.2 percent of all pedestrians (N=193) indicated monthly travel of less than 10 miles. A majority of the pedestrians surveyed, or 52.8 percent, indicated travel between 10 and 50 miles, while another 8.3 percent judged their aggregate total to be between 51 and 100 miles. Travel by bicyclists, on the other hand, was comparably greater in the higher mileage categories, with 17 percent falling in the 51 to 100 mile range and 22.7 percent indicating monthly bicycle travel in excess of 100 miles.

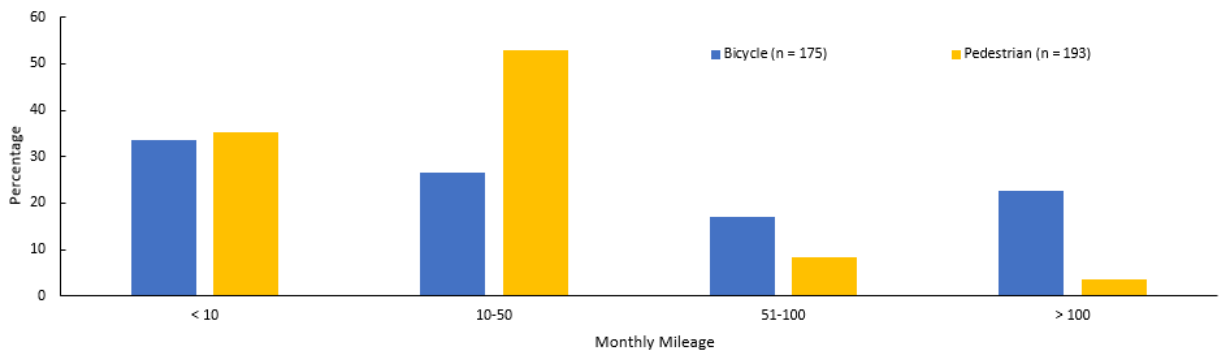


Figure 5.20. Monthly miles traveled by bike and pedestrian modes in Alaska

By comparison to the residents of Alaska, respondents hailing from the state of Idaho were far less active (figure 5.21). Of the total number of bicyclists (N=173) and pedestrians (N=198) surveyed, 53.8 percent and 45.5 percent, respectively, indicated monthly travel totals of less than 10 miles. Another 22.5 percent of the respondents logged bicycle travel between 10 and 50 miles each month, and 14.5 percent had monthly totals between 51 and 100 miles. Exactly half (50 percent) of the pedestrians surveyed from Idaho indicated travel between 10 and 50 miles each month, and only small fractions traveled between 51 and 100 miles (2.5 percent) or more than 100 miles (2.0 percent).

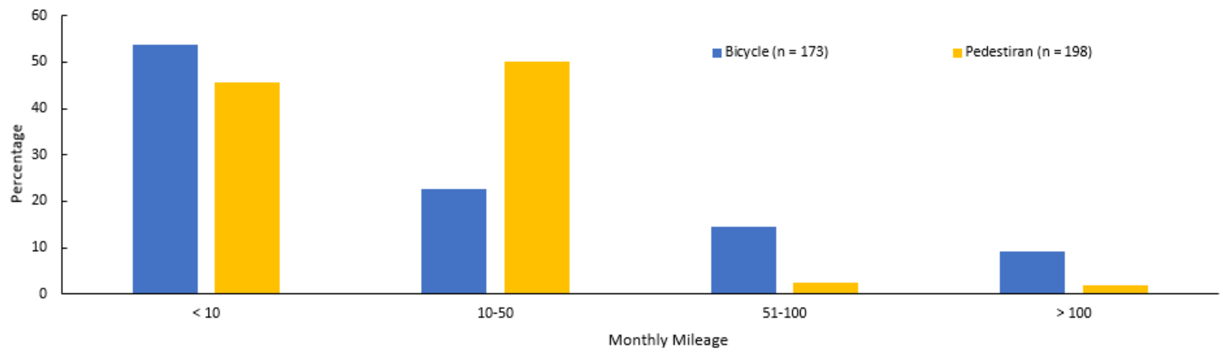
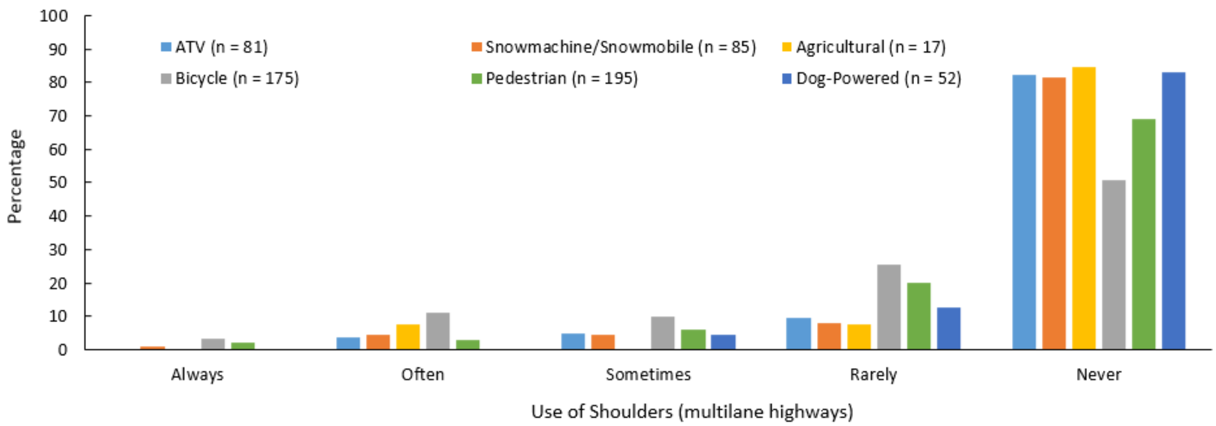


Figure 5.21. Monthly miles traveled by bike and pedestrian modes in Idaho

Respondents were asked to identify which modes they used and how often on the following facilities:

- shoulders on multilane highways
- shoulders on two-lane highways
- shoulders on two-lane roads
- bike lanes
- sidewalks
- shared paths/trails.

For respondents from both Alaska and Idaho, there appeared to be an increase in usage of NTV and non-motorized transportation modes as the road type shifted from multilane highway to two-lane road (see figure 5.22 and figure 5.23, respectively). A similar trend is seen in figure 5.24 (Alaska) and figure 5.25 (Idaho) as the infrastructure type moves farther from the traveled way (i.e., on the road to an adjacent or non-road path/trail).



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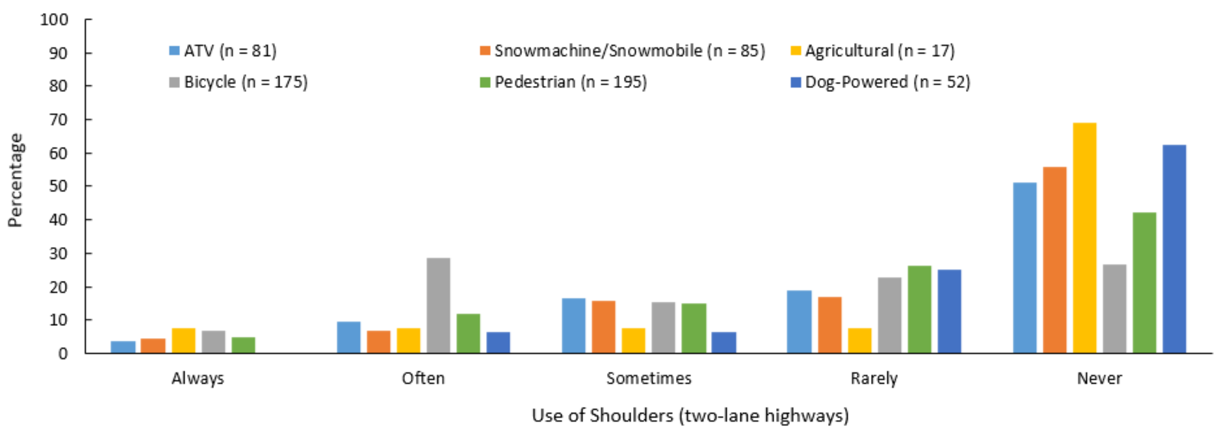

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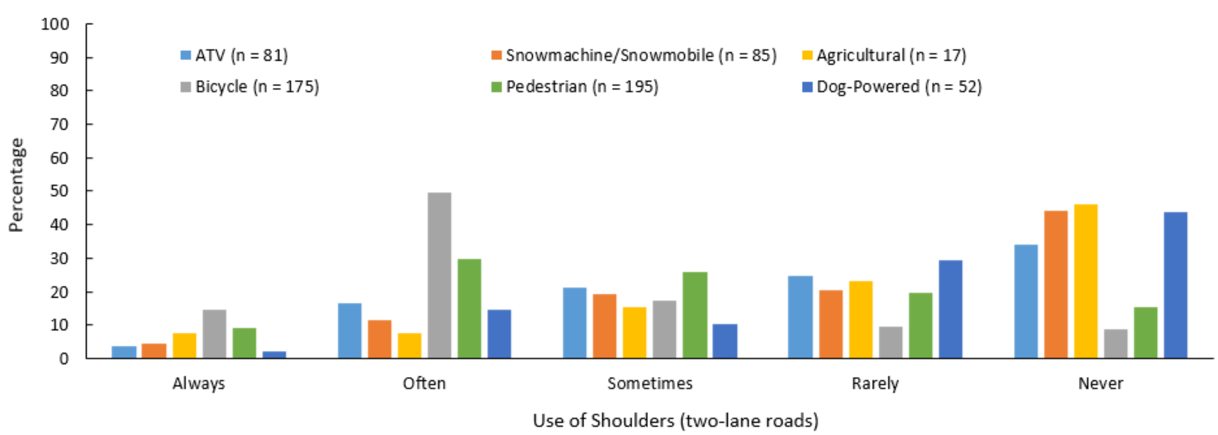
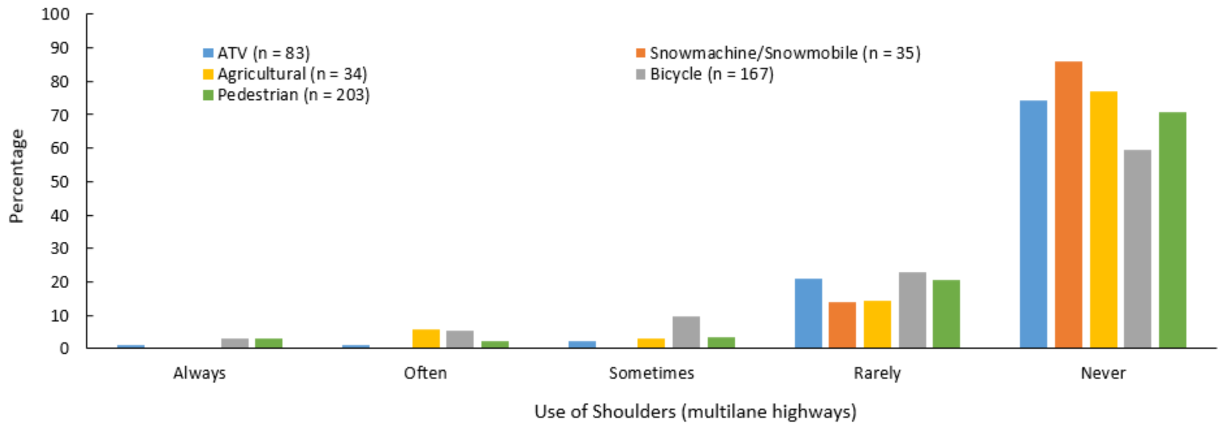


(c)

Figure 5.22. Shoulder use on (a) multilane highways, (b) two-lane highways and (c) two-lane roads by mode in Alaska



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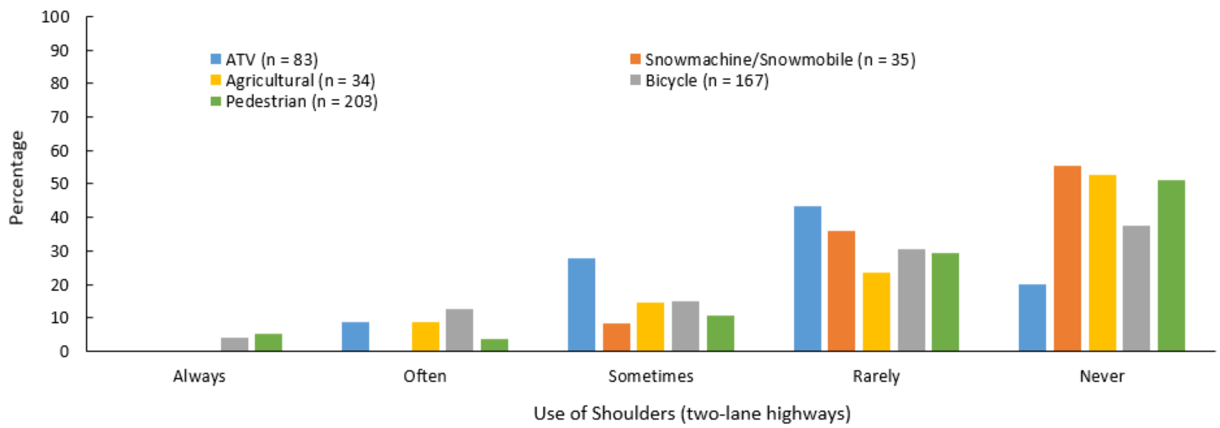

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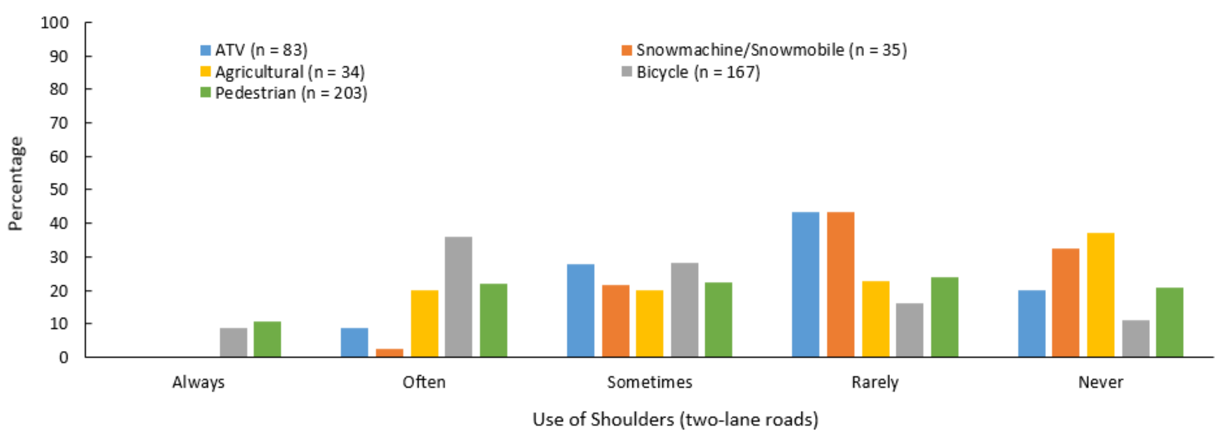

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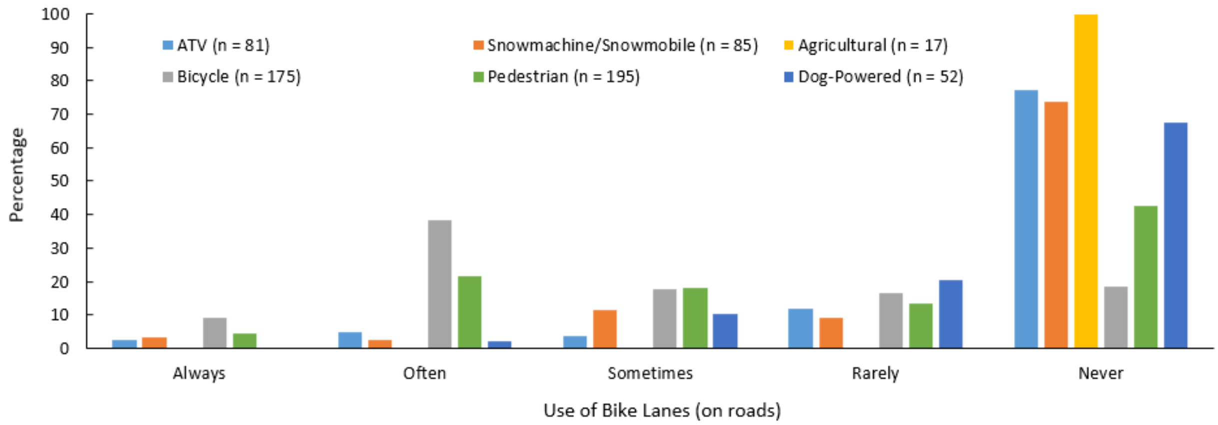
Figure 5.23. Shoulder use on (a) multilane highways, (b) two-lane highways and (c) two-lane roads by mode in Idaho



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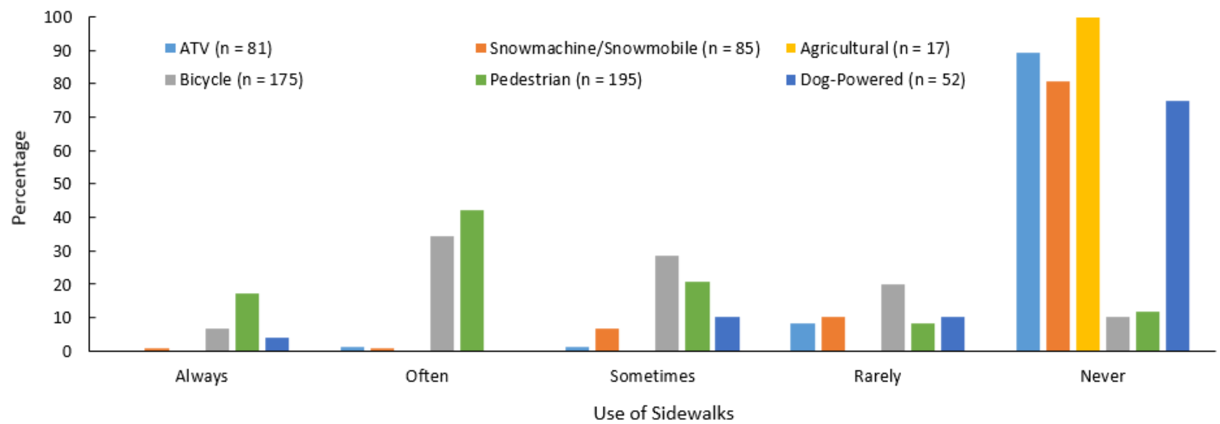

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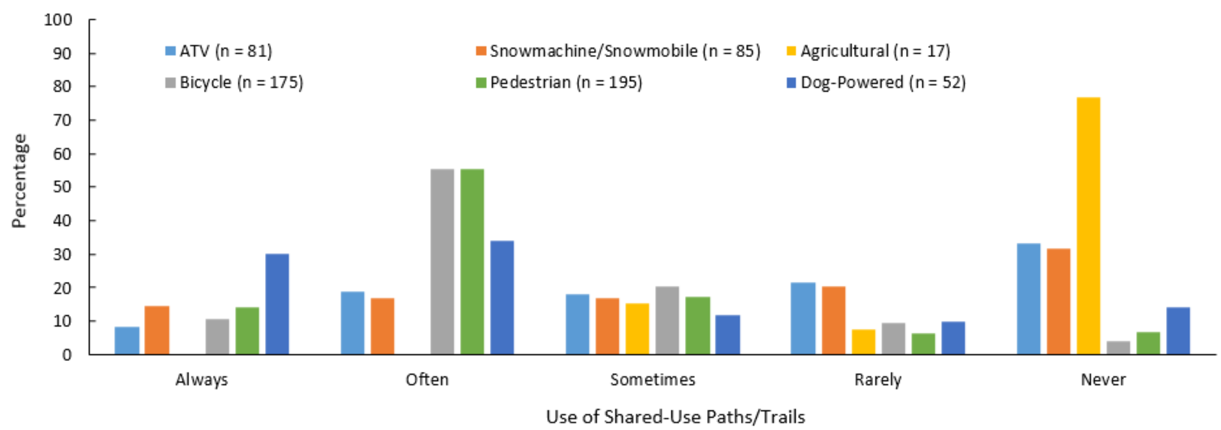

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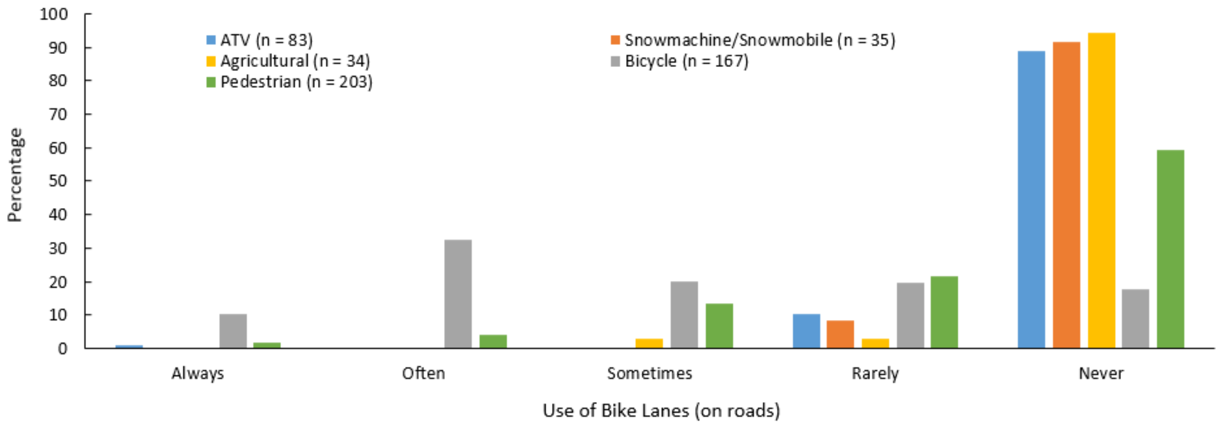
Figure 5.24. Facility use on (a) bike lanes, (b) sidewalks, and (c) shared-use paths/trails by mode in Alaska



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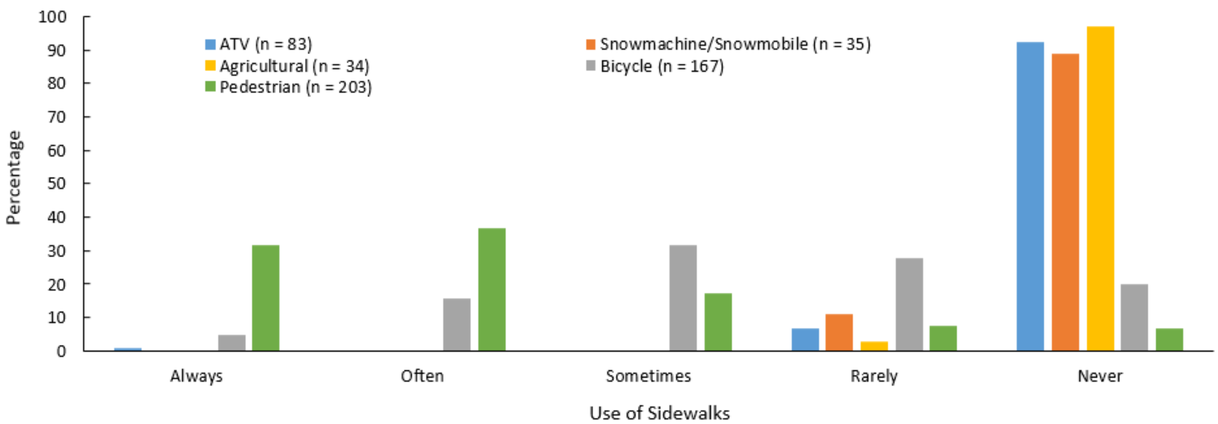

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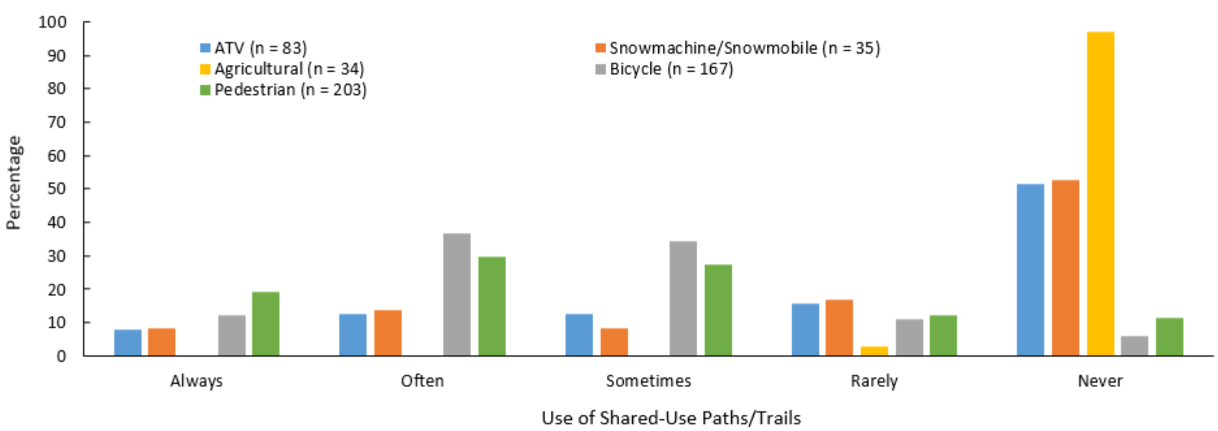

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Figure 5.25. Facility use on (a) bike lanes, (b) sidewalks, and (c) shared-use paths/trails by mode in Idaho

5.4. Trail Access

Respondents were asked to state their level of agreement on a Likert scale ranging from strongly agree to strongly disagree with the following statement: My neighborhood has an adequate number of good sidewalks or walking paths. In general, respondents from Idaho perceived having better access to sidewalks and walking paths (56 percent) than those from Alaska (30 percent). This is likely due to the fact that Idaho had more respondents from self-reported urban areas (figure 5.26).

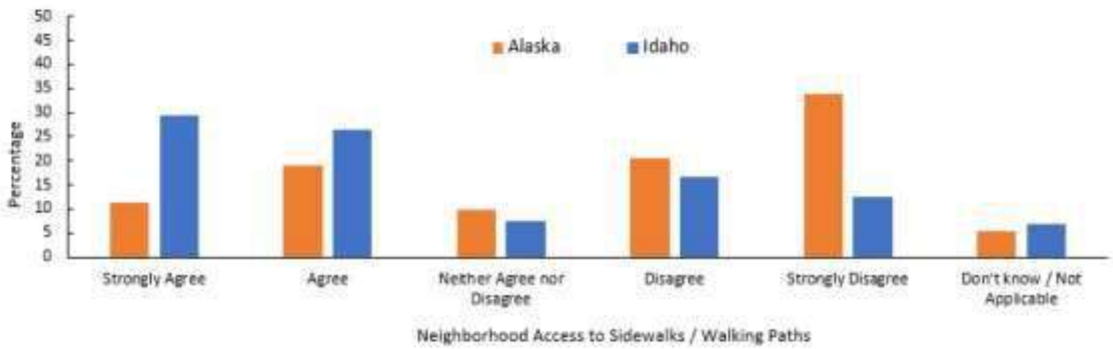

Figure 5.26. Perceived sidewalk/walking path access by state

Respondents who reported using ATVs and snowmachines were asked to state their level of agreement on a Likert scale ranging from strongly agree to strongly disagree with the following statement: *I feel there are adequate trail opportunities near my home.* Results indicated that roughly 53 percent and 41 percent of ATV users in Alaska and Idaho, respectively, agreed that there were adequate trail opportunities near their homes (see figure 5.27 and figure 5.28). This is comparable with responses from snowmachine users, at approximately 53 percent in Alaska and 44 percent in Idaho. In general, more ATV and snowmachine users in Idaho reported not having adequate access to trails near their homes than those from Alaska. This is consistent with the general area types (rural versus urban) where the majority of respondents from Alaska and Idaho reported residing (see figure 5.6), presuming that a person who lives in a more rural area would have better or more proximal access to a trail system.

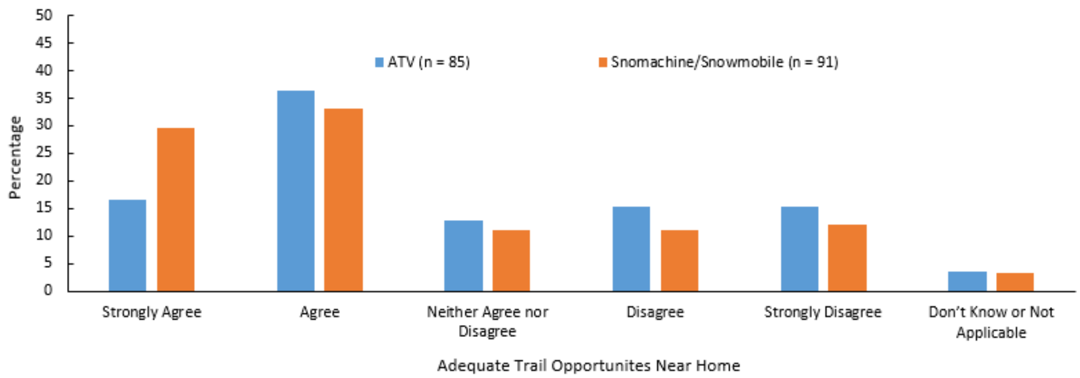

Figure 5.27. Perceived access to trail opportunities for ATV and snowmachine users in Alaska

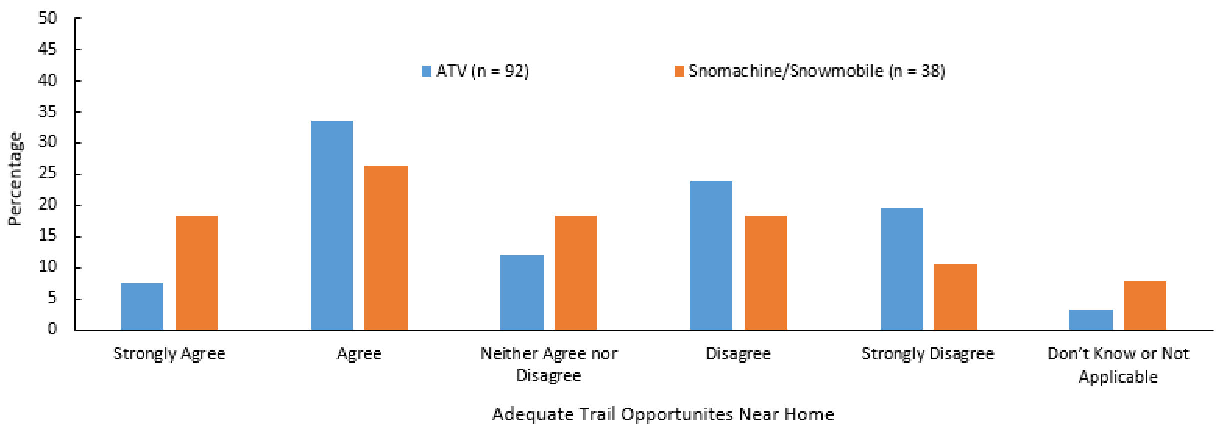

Figure 5.28. Perceived access to trail opportunities for ATV and snowmachine users in Idaho

Similarly, respondents who reported using bicycle, pedestrian, or dog-powered modes were asked to state whether they agreed with having adequate trail access near their place of residence. As seen in figure 5.29, bicyclists and pedestrians were approximately evenly split between those who agreed to having adequate access to trails or paths and those who did not, and this was consistent between Alaska and Idaho. Additionally, 77 percent of dog-powered mode users reported having adequate trail access in Alaska. The one respondent from Idaho was not of a substantial sample size to make a general statement on the perceived access of dog-powered users in that state.

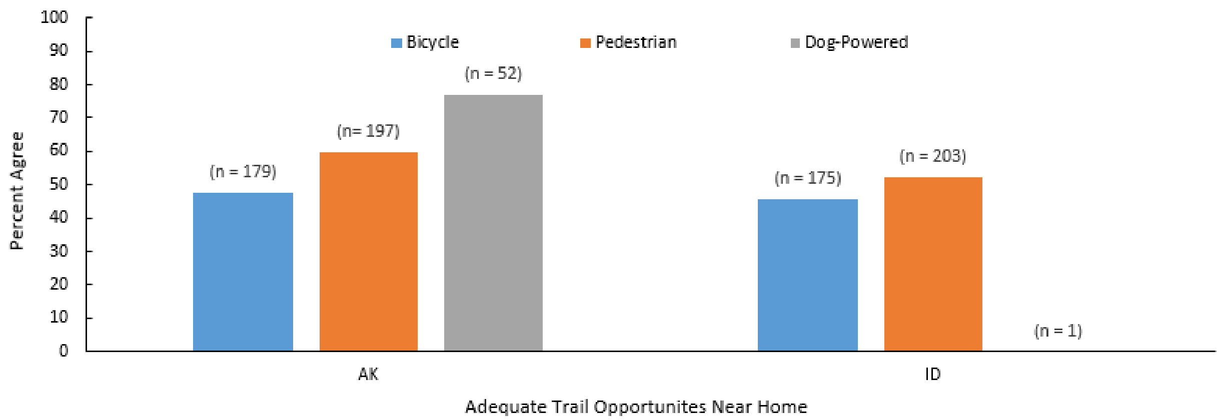

Figure 5.29. Perceived access to trail/path opportunities of bicyclists, pedestrians and dog-powered users

5.5. Learning Method and Use by Children

Respondents were asked to identify how they learned to operate each transportation mode. Respondents were allowed to select all options that applied. With the exceptions of dogsled and agricultural modes, Alaskans and Idahoans responded similarly (see figure 5.30 and figure 5.31). For all modes except automobile, users primarily received training from a friend or relative or were self-taught.

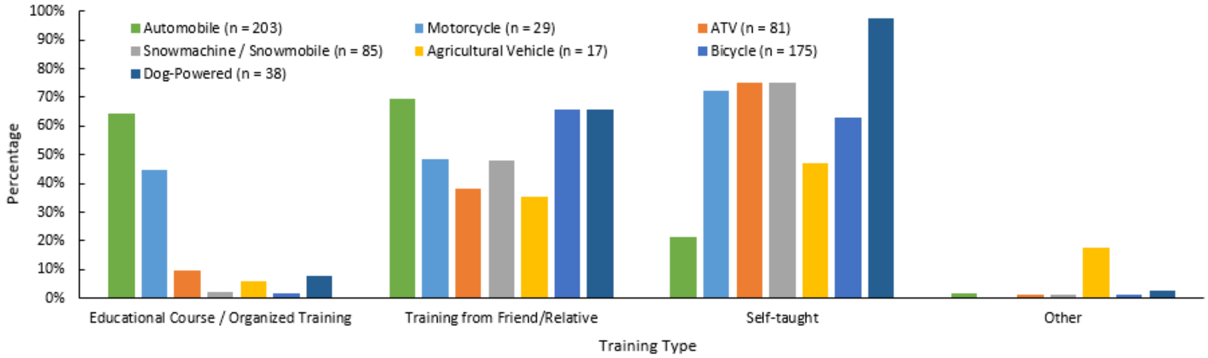

Figure 5.30. Learning method by mode in Alaska

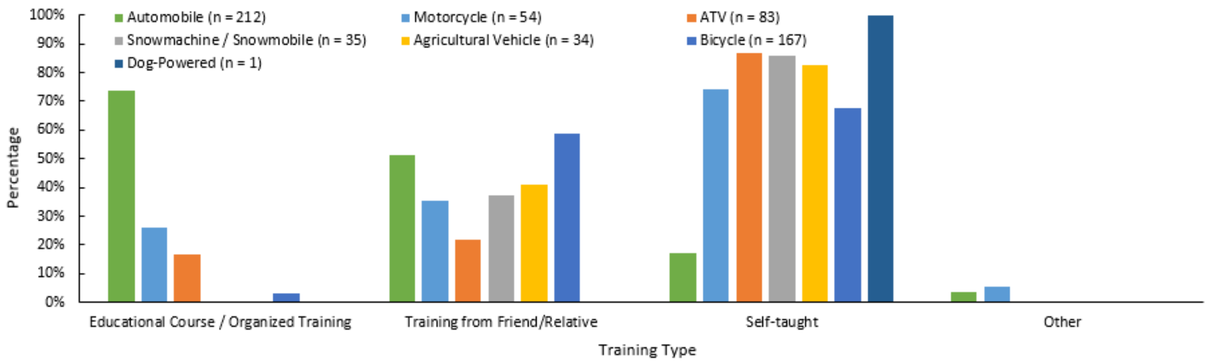

Figure 5.31. Learning method by mode in Idaho

There was higher representation of ATV and snowmachine use by children under the age of 16 in Alaska than in Idaho (figure 5.32 and figure 5.33). Bicycle and pedestrian modes were used by children under the age of 16 almost equally across the two states, while Alaska showed marginal use of dog-powered modes.

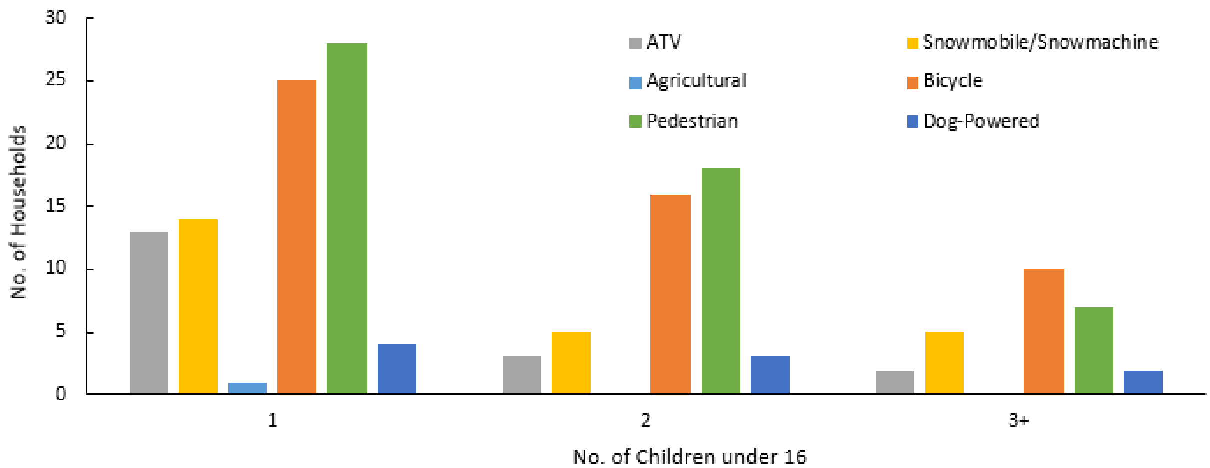

Figure 5.32. Mode use by children under age 16 in Alaska

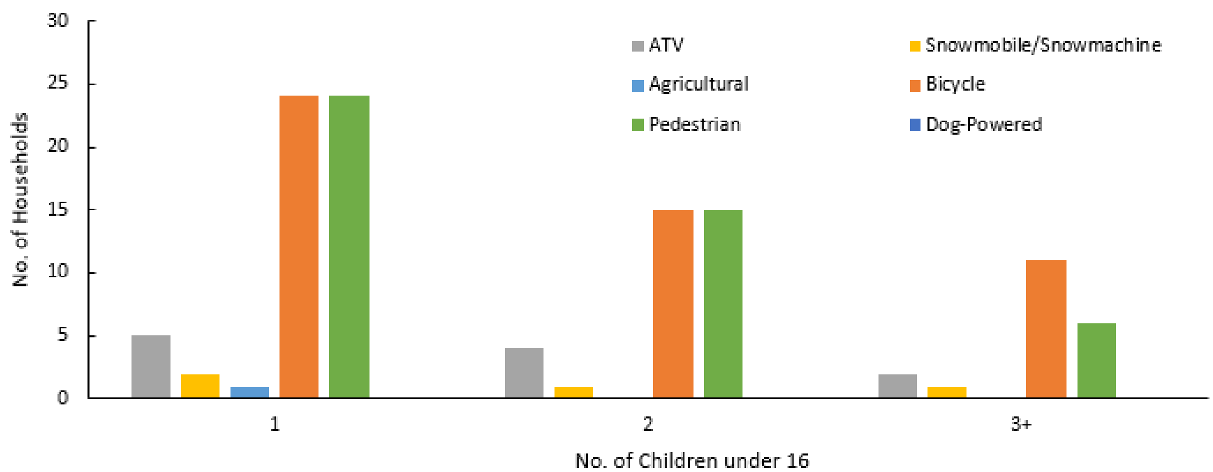

Figure 5.33. Mode use by children under age 16 in Idaho

5.6. Crash Involvement and Safety

NTV mode user respondents were asked to identify whether they had been in a crash with an automobile or with a different NTV mode. In figure 5.34 and figure 5.35, each response is broken into two sections, auto and other. For Alaska and Idaho, less than 6 percent of ATV, snowmachine/snowmobile, agricultural, and pedestrian users were involved in a crash. Fourteen percent of bicycle users in Idaho had been involved in an automobile crash and 6 percent had been involved in a crash with another NTV mode, while in Alaska the percentages were 20 percent and 7 percent, respectively. The one dogsled mode user in Idaho had been involved in both an automobile and NTV mode crash, while the cumulative results for all Alaskans were 2 percent and 13 percent, respectively. Because the Idaho dogsled crash results only had one respondent, it is given its own vertical scale in figure 5.35. Agricultural vehicle respondents were not involved in any reported crashes.

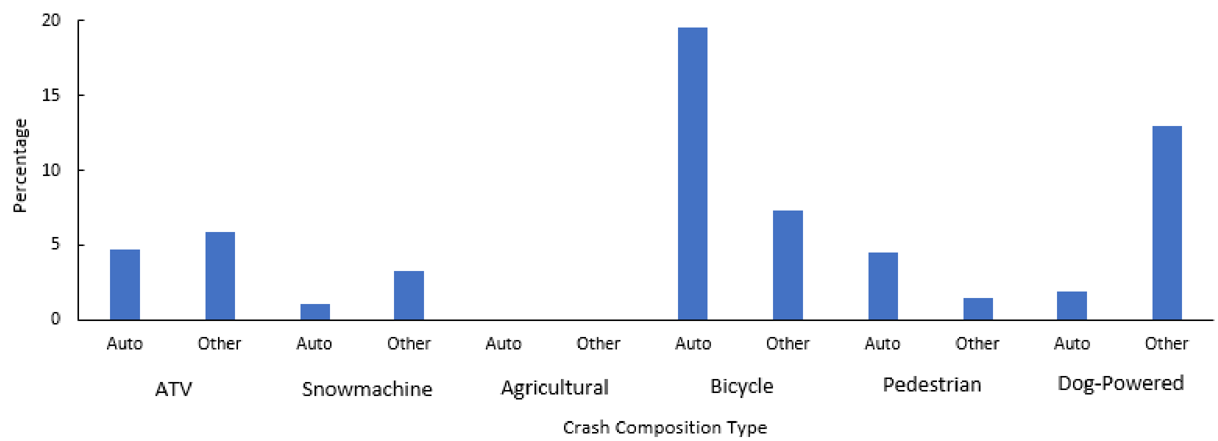

Figure 5.34. Crash involvement by mode composition in Alaska

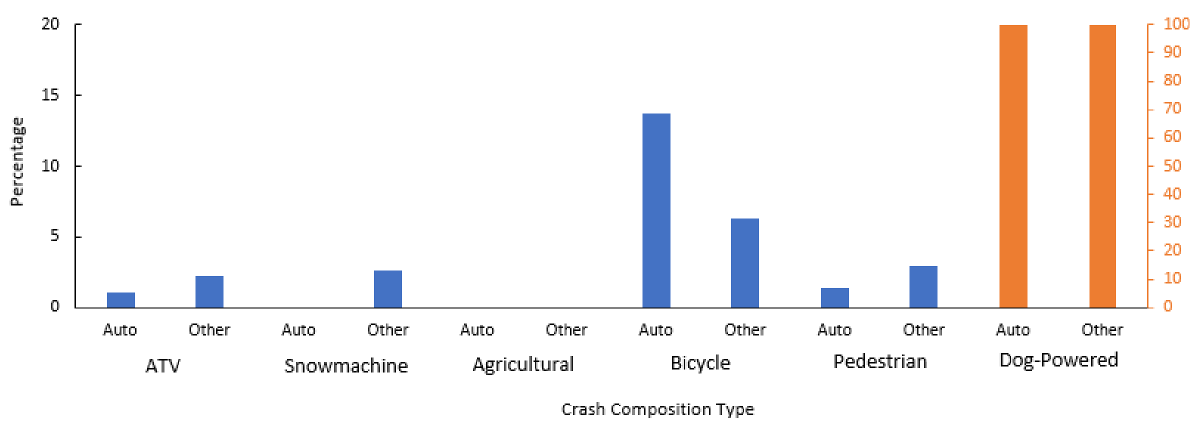

Figure 5.35. Crash involvement by mode composition in Idaho

Respondents were asked to identify their use of visibility equipment. Headlights and taillights represented the options for bicycle users. For both Alaska and Idaho, about 50 percent of bicycle users used headlights and taillights, as shown in figure 5.36 and figure 5.37. For Alaska, more users reported wearing visibility equipment than using additional reflectors and safety accessories.

Dogsled mode users reported proportionally higher usage of each safety equipment category than all other modes. For Idaho, no single piece of equipment exceeded 50 percent by any of the mode group users.

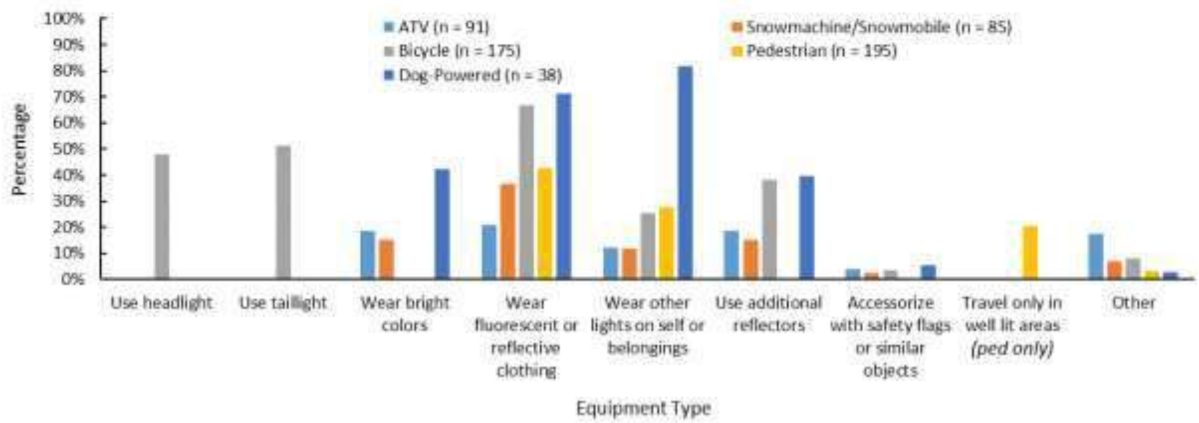

Figure 5.36. Visibility equipment use by mode in Alaska

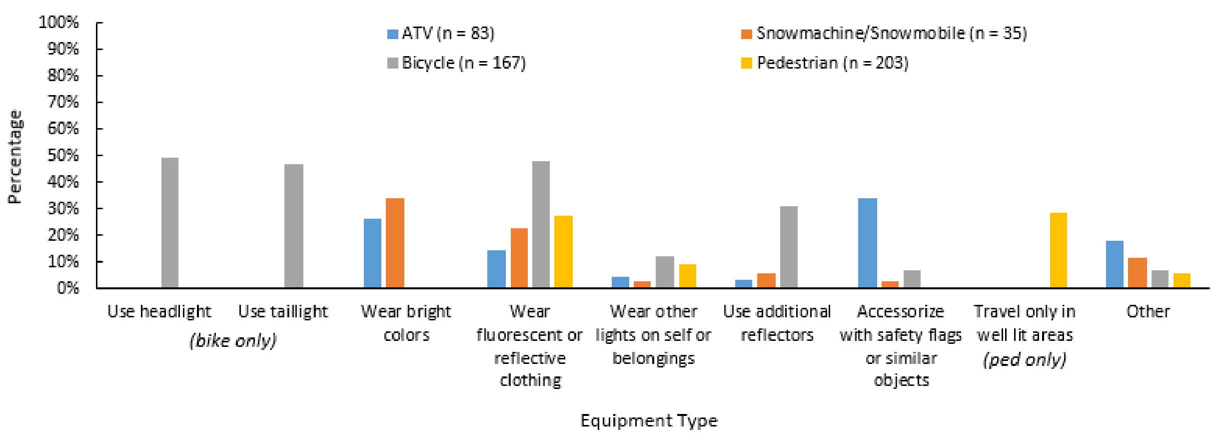

Figure 5.37. Visibility equipment use by mode in Idaho

Respondents were asked to identify how frequently they used a helmet while operating an ATV, a snowmachine/snowmobile, a bicycle, or dogsled mode. Dogsled mode users in Alaska never wore a helmet 78 percent of the time, as shown in figure 5.38. Excluding dogsled modes, 50 percent of the users from Alaska reported always, often, or sometimes wearing a helmet in comparison to 70 percent for Idahoans(figure 5.39).

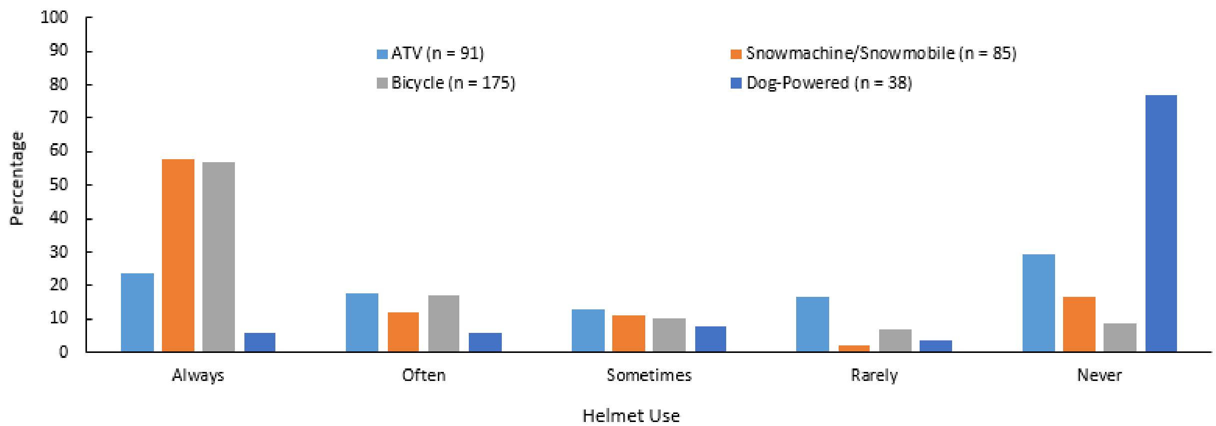

Figure 5.38. Helmet use by mode in Alaska

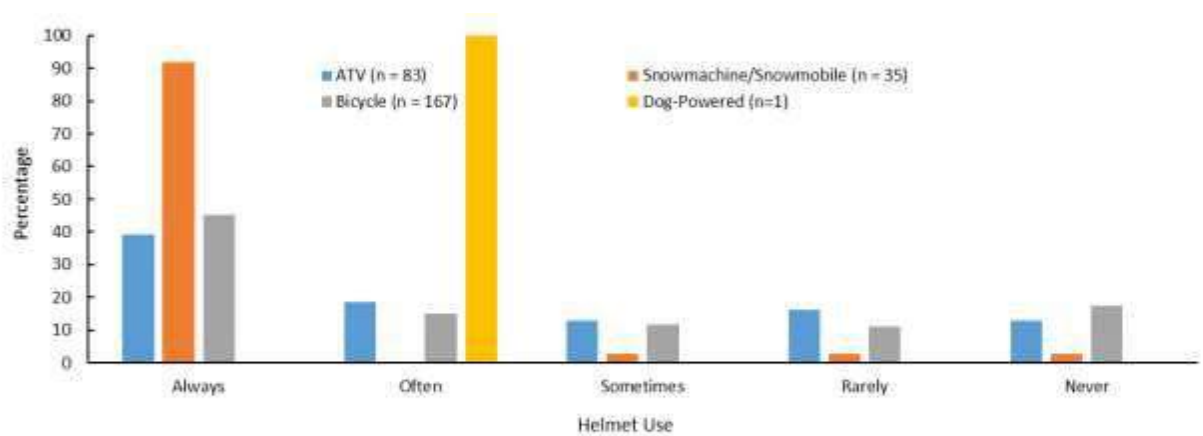

Figure 5.39. Helmet use by mode in Idaho

Respondents were asked to identify whether operating an NTV vehicle in mixed traffic seemed to reduce their safety. In Alaska, 40 percent of ATV, 46 percent of snowmachine, 14 percent of agricultural, and 62 percent of dogsled users reported feeling less safe in mixed traffic. In Idaho, 52 percent of ATV, 44 percent of snowmachine/snowmobile, 40 percent of agricultural, and 100 percent of dogsled mode users reported feeling less safe in mixed traffic (figure 5.40).

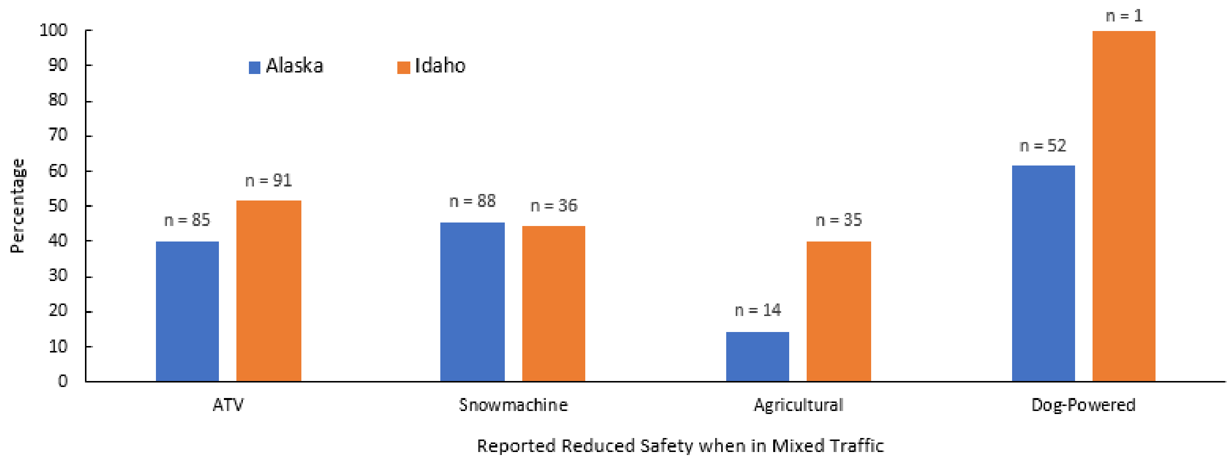

Figure 5.40. Perceived safety in mixed-use Traffic

Respondents were asked to identify whether they had been in an unreported crash as either an ATV, snowmachine, agricultural vehicle, or dogsled user with an automobile, a bicyclist or pedestrian with an automobile, or between two non-automobile modes. Respondents from Alaska and Idaho identified an aggregate total of 16 and 15 unreported crashes, respectively. Unreported crashes with an automobile totaled five and four for Alaska and Idaho, respectively, while unreported crashes involving a bicyclist or pedestrian and an automobile (seven and five) and two non-automobile modes (four and six) were also noted (see table 5.1).

Table 5.1. Unreported crashes (in the last five years)

Crash Type	**Frequency**	
	Alaska	*Idaho*
Unreported Crash as ATV/OHV/Dog with an Automobile	5	4
Unreported Crash as a Bike or Ped with an Automobile	7	5
Unreported Crash with two Non-Automobile Modes	4	6
Total	16	15

CHAPTER 6. ANALYSIS

6.1. Perceived Safety Statistical Model

Several statistical tests were considered for the analysis of the mixed-use survey. When the results of the survey were analyzed, several issues were encountered, including small sample sizes for specific modes, questions, and answers; lack of normality among parts of the results; dichotomous and categorically dependent and independent variables; lack of homogeneity of variances; numerous outliers throughout the results; and the presence of multicollinearity between multiple sets of questions. For these reasons, statistical tests such as chi-square, *t*-Test, analysis of variance (ANOVA), multivariate analysis of variance (MANOVA), and Poisson regression could not be performed because at least one of these conditions was violated. However, the binomial logistic regression model has four assumptions that were all met with the survey results.

A binomial logistic regression model predicts the probability that an observation will be one of the two categorical options of the dependent variable using one or more categorical or continuous independent variables. The four assumptions of a binomial logistic regression are as follows:

1) the dependent variable has to be dichotomous,
2) at least one categorical or continuous independent variable has to be included,
3) the observations have to be independent and the dependent variable has to have mutually exclusive and exhaustive categories, and
4) there has to be linearity of independent variables and log odds.

For a binomial logistic regression model, the desired sample size contains at least ten times the number of independent variables included in the model. An alpha level of 0.05 was used as a significance criterion for all statistical testing. This alpha level, which represents the standard industry value, means that the analysis results had a 95 percent probability of being correct.

The results of the binomial logistic regression contained three factors used to determine whether the model was statistically significant. These factors were the p value of the omnibus test, p value for the Hosmer and Lemeshow test, and classification accuracy. The classification accuracy had to be above 65 percent for the binomial logistic regression model to be statistically significant and accurate. The results of the binomial logistic regression contained a table of the independent variables included in the model, along with each standard error, equation slope, and odds ratio. The standard error depicts the dispersion of the survey data, with values less than 1.0, meaning that there was low a amount of dispersion and values much greater than 1.0 meaning that either the input data were largely dispersed or the variable's category had a small sample size. The equation slope, signified by the letter B, is used to compute the odds ratio by raising the base of the natural log to the B^{th} power. The odds ratio depicts the effect of the independent variable in comparison to its base case on the outcome of the dependent variable.

6.1.1. Model Development

To build statistical models showing the effects of learning methods and mode use on the perception of safety of NTV transportation mode users in mixed traffic, the binomial logistic regression analysis was applied. The focus of the analysis was on the NTV transportation modes of ATVs, snowmachines, bicycles, agricultural vehicles, and dogsleds.

The factors considered to affect a user's perception of safety in mixed traffic included, but were not limited to learning method, mileage, hours of operation, use of reflective/visibility safety equipment, use of a helmet, involvement in reported and unreported crashes, traveling with or facing traffic, purpose of using the mode (recreation versus utilitarian), frequency of riding on the shoulders of paved roads, the presence of certain road characteristics that made users feel safer, days out of the month the users operated the mode, average trip length, number of years engaged in use of the mode, possession of a state issued driver's license, age range, sex, employment status, marital status, and household income.

Binomial logistic regression (BLR) models were developed for the perception of safety in mixed traffic for ATVs, snowmachines, and bicycles. For the dogsled and snowmachine modes, statistically significant relationships were not found between the perception of safety and the learning method. For the agricultural mode, only one statistically significant model was developed. However, since most of the odds ratio values within each variable were on the extreme ends of the possible range, meaningful comparisons between a variable's base case and category could not be made. Therefore, a relationship between agricultural vehicle users' perception of safety in mixed traffic and any of the considered factors was not pursued.

6.1.2. Model Findings

The bicycle model was validated on the basis of the following results: $N>80$ for the sample size, a $p<0.05$ for the omnibus test, a $p>0.05$ for the Hosmer and Lemeshow test, and a >65 percent classification accuracy, which signified that the model was statistically significant. Table 6.1 summarizes these results. The bicycle model showed a significant association between the perception of safety in mixed traffic, age, sex, monthly bicycle usage, learning method, direction of travel relative to traffic, crashes with automobiles, crashes with nontradition transportation modes, and frequency of wearing a helmet (see table 6.2). Note that the standard errors in the bicycle (and snowmachine) models was large for some of the variables because of the small sample size. However, the large standard errors do not discredit the overall model.

Table 6.1. Bicycle model validation

Selected Cases	N=324
Omnibus test	p=0.003
Hosmer and Lemeshow test	p=0.305
Classification accuracy	87.0%

Table 6.2. Bicycle BLR model variables

Variable		**B**	**S.E.**	**O.R.**
Age Range (base=18-25)				
	26-30	-0.27	0.89	0.76
	31-40	-19.68	7619.94	0
	41-50	-1.29	0.63	0.28
	51-60	-0.87	0.56	0.42
	> 60	-1.09	0.56	0.34
Days used out of the month (base=1-3)				
	4-6	1.07	0.90	2.92
	7-10	0.28	1.03	1.32
	11-15	1.42	0.98	4.14
	16-20	-18.28	7728.29	0
	21-31	-18.14	7245.03	0
Learning Method (base=organized training)				
	Received training from friend or relative	2.16	1.39	8.71
	Self-taught	0.39	0.44	1.48
Direction when traveling in roadway (base=facing traffic)				
	With Traffic	-0.42	0.52	0.66
Crash with automobile (base=yes)				
	No	-0.09	40908.78	0.92
	I prefer not to answer	0.17	40908.78	1.19
Crash with NTV mode (base=yes)				
	No	-0.28	0.82	0.75
Wearing a helmet (base=always)				
	Often	-1.50	0.56	0.22
	Sometimes	-0.42	0.55	0.66
	Rarely	-0.63	0.65	0.53
	Never	0.04	0.68	1.04
Sex (base=male)				
	Female	-0.13	0.41	0.88

In the bicycle model, bicyclists over the age of 25 were more likely to feel unsafe in mixed traffic than riders ages 18 to 25. These results may be due to younger people tending to be more reckless and less concerned for their safety. Bicyclists who rode every other day or more were much less likely to feel unsafe in mixed traffic than those who rode a couple days out of the month, while those who rode between four and 15 days a month were more likely to feel unsafe than those who rode a couple days a month. This may be due to the higher comfort levels of riders who bike so frequently that they accustomed to mixed traffic, and those who ride four to 15 days a month may better understand the risks than those who infrequently ride in mixed traffic.

Bicyclists who received training from a friend or relative or were self-taught were less likely to feel unsafe in mixed traffic than those who learned to ride through organized training. This may be due to the different information bicyclists were told as they learned to ride, which then affected how and what they perceived as dangerous.

Bicyclists who traveled with traffic were less likely to feel unsafe in mixed traffic than those who traveled against traffic. Bicyclists who had not been involved in a crash with automobiles or other NTV modes were less likely to feel unsafe in mixed traffic than those who had been in a crash. Bicyclists who wear a helmet often, sometimes, or rarely were less likely to feel unsafe in mixed traffic than those who always or never wore a helmet. Female bicyclists were less likely than males to feel unsafe in mixed traffic. The cause of this is unknown currently.

The ATV model was validated on the basis of the following results: N>60 for the sample size, a $p<0.05$ for the omnibus test, a $p>0.05$ for the Hosmer and Lemeshow test, and a >65 percent classification accuracy, which signified that the model was statistically significant (see table 6.3).

The ATV model showed a significant association between the perceptions of safety in mixed traffic, age, sex, yearly mileage, learning method, using visibility equipment, and frequency of wearing a helmet (see table 6.4).

Table 6.3. ATV model validation

Selected Cases	N=118
Omnibus test	p=0.014
Hosmer and Lemeshow test	p=0.695
Classification accuracy	72.0%

Table 6.4. ATV BLR model variables

Variable		**B**	**S.E.**	**O.R.**
Age Range (base=18-25)				
	26-30	3.58	1.96	35.95
	31-40	1.89	1.29	6.60
	41-50	3.32	0.92	27.74
	51-60	2.49	0.82	12.10
	> 60	1.63	0.72	5.11
Sex (base=male)				
	Female	0.10	0.55	1.10
Learning Method (base=organized training)				
	Received training from friend or relative	0.22	0.79	1.25
	Self-taught	-0.37	0.64	0.69
Yearly Mileage (base=less than 100)				
	100-250	-1.56	1.84	0.21
	251-500	-1.04	1.76	0.35
	501-1000	0.65	1.78	1.92
	1001-2000	1.53	1.84	4.64
	2001-4000	1.10	1.76	3.01
	More than 4000	1.69	2.03	5.39
Wearing a helmet (base=always)				
	Often	0.46	0.68	1.59
	Sometimes	0.18	0.80	1.19
	Rarely	-0.88	0.85	0.41
	Never	0.80	0.85	2.23
Use Visibility Equipment (base=yes)				
	No	-0.43	0.53	0.65

In the ATV model, ATV riders over the age of 25 were more likely to feel unsafe in mixed traffic than riders ages 18 to 25. Female ATV riders were more likely to feel unsafe in mixed traffic than male riders. These results may be due to younger males tending to be more reckless and less concerned for their safety. ATV riders who received training from a friend or relative were less likely to feel unsafe in mixed traffic than those who learned to ride through organized training, while those who were self-taught were more likely to feel unsafe than riders who had received organized training. This may be due to the different information riders were being told as they learned to ride, which then affected how and what they perceived as dangerous. ATV riders who rode more than 500 miles annually were more likely to feel unsafe in mixed traffic than riders who rode fewer than 100 miles annually. This is probably due to the increase in comfort level with ATVs the more that users operate them.

ATV riders who wore a helmet often, sometimes, or never were less likely to feel unsafe in mixed traffic than riders who always wore a helmet. ATV riders who rarely wore their helmet are more likely to feel unsafe than riders who always wore their helmet. ATV riders who did not use visibility equipment were less likely to feel unsafe in mixed traffic than those who did.

The snowmachine model was validated on the basis of the following results: an $N>70$ for the sample size, a $p<0.05$ for the omnibus test, a $p>0.05$ for the Hosmer and Lemeshow test, and a >65 percent classification accuracy, which signified that the model was statistically significant (see table 6.5).

The snowmachine model showed the significant association between the perceptions of safety in mixed traffic, age, sex, yearly hours of operation, using visibility equipment, crashes with automobiles, frequency of paved shoulder use, and frequency of wearing a helmet (see table 6.6).

Table 6.5. Snowmachine model validation

Selected Cases	N=78
Omnibus test	p=0.028
Hosmer and Lemeshow test	p=0.552
Classification accuracy	83.3%

Table 6.6. Snowmachine BLR model variables

Variable		**B**	**S.E.**	**O.R.**
Sex (base=male)				
	Female	-2.00	0.84	0.14
Frequency of paved shoulder use (base=always)				
	Often	-1.07	1.42	0.34
	Sometimes	-2.67	1.41	0.07
	Rarely	-3.86	1.45	0.02
	Never	-0.61	0.80	0.54
Crash with automobile (base=yes)				
	No	1.67	2.34	5.33
Use Visibility Equipment (base=yes)				
	No	-1.07	0.76	0.34
Wearing a helmet (base=always)				
	Often	0.99	1.02	2.70
	Sometimes	-20.67	15515.06	0.00
	Rarely	0.05	1.40	1.05
	Never	-22.77	40192.97	0.00
Hours of operation (base=less than 50)				
	50-100	-3.11	1.54	0.05
	101-200	-2.02	1.42	0.13
	201-400	-1.45	1.51	0.23
	401-600	-3.40	2.12	0.03
	More than 600	2.84	1.94	17.13
Age Range (base=18-25)				
	26-30	42.81	29599.02	3.92E+18
	31-40	2.08	1.46	8.03
	41-50	0.96	1.43	2.61
	51-60	0.74	1.09	2.11
	> 60	0.37	1.17	1.45

Female snowmachine riders were substantially less likely to feel unsafe in mixed traffic than male snowmachine riders. The reason for this large difference is unknown currently. Snowmachine riders who did not always use paved shoulders were more likely to feel unsafe in mixed traffic than those who always used paved shoulders. This may be due to the lack of familiarity and comfort level of riders who did not always use paved shoulders. Snowmachine riders who had not been involved in a crash with automobiles were more likely to feel unsafe in mixed traffic than those who had not been in a crash. This is possibly due to the induced fear of the possibility of having a crash while riding in mixed traffic. Snowmachine riders who did not use visibility equipment were less likely to feel unsafe in mixed traffic than those who did. This may be due to riders who used visibility gear already feeling unsafe to begin and the gear not alleviating that perception of reduced safety while in mixed traffic.

Snowmachine riders who wore a helmet often or rarely were more likely to feel unsafe in mixed traffic than riders who always wore a helmet, while those who sometimes or never wore a helmet were not likely to feel unsafe more than those who always wear a helmet. The cause of this is unknown currently. Snowmachine riders who rode more than 50 hours annually were more likely to feel unsafe in mixed traffic than those who rode fewere than 50 hours annually. This is possibly due to an increased understanding of the risks of riding in mixed traffic, at least until they are very experienced, at which point they become more accustomed to mixed traffic. Snowmachine riders over the age of 25 were more likely to feel unsafe in mixed traffic than riders ages 18 to 25. These results may be due to younger people tending to be more reckless and less concerned for their safety.

A statistically significant relationship between the learning methods of snowmachine riders and their perception of safety was not found. This is probably almost completely due to the lack of riders who learned to ride a snowmachine through any organized training.

6.2. Trail Access Model

Linear forward pass model selection was used to reduce the number of variables for modeling. This is because the cumulative logit model requires that the model have many fewer predictors than data points. By using the linear forward pass method to eliminate variables that were unlikely to be significant, a lot of time was saved in running the various cumulative logit models. The forward pass is a statistical tool often used to pare down variables for modeling and the SPSS software only does a forward stepwise model selection for linear models, not generalized linear models.

The final model selected by the linear forward pass for ATVs included two variables based on the following survey questions (see table 6.7):

- “How do you typically access those trails?” and
- “On average, how many miles do you ride your ATV in a year?”

Table 6.7. ANOVA table for the linear forward pass model on the ATV variables

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
How do you typically access those trails?	Regression	11.290	1	11.290	8.509	0.006
	Residual	46.440	35	1.327		
	Total	57.730	36			
On average, how many miles do you ride an ATV in a year?	Regression	17.172	2	8.586	7.198	0.002
	Residual	40.557	34	1.193		
	Total	57.730	36			

a. Dependent Variable: I feel that there are adequate trail opportunities to ride my ATV near my home.

Once the forward pass had been completed, a cumulative logit model test could be performed using the selected variables. In addition to testing the "base model" selected by the forward pass, six other variables were tested with the cumulative logit model. These variables were selected in part as a result of preliminary variable and cross-tabulation testing but also by looking at the model from an engineering perspective and selecting variables that could logically have an impact on respondents' access to trails near their home.

Q7 - In which one of the following areas do you consider your current home to be?

Q9 - How many of each transportation mode listed below does your household own? *(Recoded to a ratio of ATV ownership to automobile ownership)*

Q17 - How frequently do you ride an ATV on, adjacent to, or near a roadway?

Q29 - How many individuals, including yourself, ride an ATV in your household?

Q31 - On average, how many miles do you put on your ATV in a year?

Q39 - Why do you most commonly ride an ATV? Select all that apply.

A cumulative logit model was fit on the base model and then the base model plus one of the additional variables. The resulting Akaike's Information Criteria (AIC) and corrected AIC values were compared to determine the best fitting model (table 6.8). The base model had the lowest AIC value; therefore, it was the best fitted model. In the case processing summary (table 6.9) one of the 85 cases is excluded. This is likely due to there being a null/missing value in the data, or it was an outlier value.

Table 6.8. AIC and corrected AIC values from the ATV cumulative logit model

Model Number	Model Name	AIC	Corrected AIC
1	Base model	119.784	121.704
2	Base + Q7	147.608	150.041
3	Base + Q9	194.915	197.487
4	Base + Q17	167.255	170.921
5	Base + Q29	188.494	190.926
6	Base + Q32	163.781	166.246
7	Base + Q39	197.560	208.083

Table 6.9. Case processing summary from the ATV cumulative logit model output

Case Processing Summary

	N	Percent
Included	84	98.8%
Excluded	1	1.2%
Total	85	100.0%

In table 6.10 are the tests of model effects for the ATV cumulative logit model. Looking at the tests of model effects, both Q37 and Q31 are significant predictors in the model.

Table 6.10. Model effects for the ATV cumulative logit model

Tests of Model Effects								
Q#	Source	Type III						
		Likelihood Ratio Chi-Square	df	Sig.	F	df1	df2	Sig.
Q37	How do you typically access those trails?	17.013	2	0.000	8.506	2	67	0.001
Q31	On average, how many miles do you ride an ATV in a year?	9.351	1	0.002	9.351	1	67	0.003
Dependent Variable: I feel that there are adequate trail opportunities to ride my ATV near my home.								

Table 6.11 shows the parameter estimates for the ATV cumulative logit model. The odds of a person who did not have access to trails agreeing that they had adequate access to trails was 2.25 times that of a person who hauled their ATV to a trail head with a trailer. The odds of a person who rode from home agreeing that they had adequate access to trails was 0.233 times that of a person who hauled their ATV to the trail head with a trailer. This means that a person who hauled their ATV with a trailer would be much more likely to agree that they had adequate access to trails than a person who rode from home. Lastly, the odds of a person agreeing that they had adequate access were smaller for people who rode more miles per year.

Table 6.11. Parameter estimates for the ATV cumulative logit model

Parameter Estimates				
Parameter		B (log odds ratio)	Odds Ratio	Std. Error
Threshold	[I feel that there are adequate trail opportunities to ride my ATV near my home.= Strongly Agree]	-3.770	0.023	0.5559
	[I feel that there are adequate trail opportunities to ride my ATV near my home.= Agree]	-1.658	0.191	0.4330
	[I feel that there are adequate trail opportunities to ride my ATV near my home.= Neither Agree nor Disagree]	-1.020	0.361	0.4188
	[I feel that there are adequate trail opportunities to ride my ATV near my home.= Disagree]	-0.069	0.933	0.4245
	[I feel that there are adequate trail opportunities to ride my ATV near my home.= Strongly Disagree]	1.852	6.370	0.6140
[How do you typically access those trails?= No access to trails]		0.809	2.246	1.0789
[How do you typically access those trails?= Ride from Home]		-1.455	0.233	0.3950
[How do you typically access those trails?= Haul with Trailer]		0^{a}	1.000	
On average, how many miles do you ride an ATV in a year?		-0.443	0.642	0.1482
(Scale)		$.792^{b}$	2.208	

Dependent Variable: I feel that there are adequate trail opportunities to ride my ATV near my home.
Model: (Threshold), How do you typically access those trails?, On average, how many miles do you ride an ATV in a year?
a. Set to zero because this parameter is redundant.
b. Computed based on the deviance.

The cross-tabulated values for predicted category value and the response variable that asked respondents whether they had adequate access to trails can be used to assess the prediction accuracy of the model (table 6.12). Of the respondents who selected “strongly agree,” five out of 14 were predicted correctly. Of the respondents who selected “agree,” 27 out of 31 were predicted correctly. Lastly, of the respondents who selected “strongly disagree,” four out of 12 were predicted correctly.

Table 6.12. Cross-tabulation of the predicted category value and the response variable showing prediction accuracy of the ATV model

Cross Tabulation								
		I feel that there are adequate trail opportunities to ride my ATV near my home.						Total
		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Don't Know or Not Applicable	
Predicted Category Value	Strongly Agree	5	1	0	0	1	0	7
	Agree	8	27	8	11	7	1	62
	Strongly Disagree	1	3	3	2	4	2	15
Total		14	31	11	13	12	3	84

For snowmachines, there was an indication of quasi-complete separation in the response variable. To rectify this issue the categories "strongly agree" and "agree" were collapsed into one category, "agree." Likewise, the categories "disagree" and "strongly disagree" were collapsed into the single category, "disagree." This helped to lower the large standard of error to a more reasonable level. The final model selected by the linear forward pass for snowmachines included four variables. The survey questions, "How far do you travel to reach opportunities to ride snowmachines?" "What age range describes you?" "What is your marital status?" and "On the shoulders of two lane roads (paved)" can be seen in table 6.13.

Table 6.13. ANOVA table for the linear forward pass on the snowmachine variables

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
How far do you travel to reach opportunities to ride snowmachines?	Regression	6.676	1	6.676	11.842	.001[b]
	Residual	24.803	44	0.564		
	Total	31.478	45			
What age range describes you?	Regression	10.096	2	5.048	10.152	.000[c]
	Residual	21.382	43	0.497		
	Total	31.478	45			
What is your marital status?	Regression	12.158	3	4.053	8.810	.000[d]
	Residual	19.320	42	0.460		
	Total	31.478	45			
On the shoulders of two lane roads (paved)	Regression	14.327	4	3.582	8.562	.000[e]
	Residual	17.151	41	0.418		
	Total	31.478	45			

a. Dependent Variable: I feel there are adequate trail opportunities to ride my Snowmachine near my home (3 variable version)

b. Predictors: (Constant), How far do you travel to reach opportunities to ride snowmachines?

c. Predictors: (Constant), How far do you travel to reach opportunities to ride snowmachines?, What age range describes you?

d. Predictors: (Constant), How far do you travel to reach opportunities to ride snowmachines?, What age range describes you?, What is your marital status?

e. Predictors: (Constant), How far do you travel to reach opportunities to ride snowmachines?, What age range describes you?, What is your marital status?, On the shoulders of two lane roads (paved)

Once the forward pass had been completed, a cumulative logit model could be fit using the selected variables. In addition to testing the "base model" selected by the forward pass, six other variables were tested using the cumulative logit model. Again, these variables were selected in part as a result of preliminary variable and cross-tabulation testing but also by looking at the model from an engineering perspective and selecting variables that could logically have an impact on a respondents' access to trails near their home.

Q7 - In which one of the following areas do you consider your current home to be?

Q9 - How many of each transportation mode listed below does your household own?

(Recoded to a ratio of snowmachine ownership to automobile ownership)

Q18 - How frequently do you ride a snowmachine on, adjacent to, or near a roadway?

Q55 - How many individuals, including yourself, ride a snowmachine in your household?

Q57 - On average, how many miles do you put on your snowmachine in a year?

Q65 - Why do you most commonly ride a snowmachine? Select all that apply.

A cumulative logit model was fit on the base model, and then the base model plus one of the additional variables. The resulting AIC and corrected AIC values were compared to determine the best fitting model (see table 6.14). The base model had the lowest AIC value; therefore, it was the best fitted model. In the case processing summary (table 6.15) two of the seven cases were excluded. This is likely due to there being a null/missing value in the data.

Table 6.14. AIC and corrected AIC values from the snowmachine cumulative logit model

Model Number	Model Name	AIC	Corrected AIC
1	Base model	108.676	111.690
2	Base + Q7	115.089	118.755
3	Base + Q9	116.420	120.192
4	Base + Q18	108.493	113.693
5	Base + Q55	117.094	120.761
6	Base + Q58	117.803	121.469
7	Base + Q65	110.320	122.195

Table 6.15. Case processing summary from the snowmachine cumulative logit model output

Case Processing Summary		
	N	Percent
Included	84	92.3%
Excluded	7	7.7%
Total	91	100.0%

Table 6.16 reports the tests of model effects for the ATV cumulative logit model. Looking at the tests of model effects, all four variables (Q64, Q60, Q199, and Q201) were significant predictors in the model.

Table 6.16. Test of model effects for the snowmachine cumulative logit model

Tests of Model Effects							
Source	Type III						
	Likelihood Ratio Chi-Square	df	Sig.	F	df1	df2	Sig.
On the shoulders of two lane roads (paved)	16.080	4	0.003	4.020	4	112	0.004
What is your marital status?	6.877	2	0.032	3.439	2	112	0.036
How far do you travel to reach opportunities to ride snowmachines?	37.934	1	0.000	37.934	1	112	0.000
What age range describes you?	12.532	1	0.000	12.532	1	112	0.001

Dependent Variable: I feel there are adequate trail opportunities to ride my Snowmachine near my home
Model: (Threshold), On the shoulders of two lane roads (paved), What is your marital status?, How far do you travel to reach opportunities to ride snowmachines?, What age range describes you?

Table 6.17 reports the parameter estimates for the snowmachine cumulative logit model. The odds of a person who always rode on the shoulder of paved, two-lane roads agreeing that they had adequate access to trails was 7.22 times the odds of a person who never rode on the shoulder of paved, two-lane roads. The odds of a person who often rode on the shoulder of paved, two-lane roads agreeing that they had adequate access to trails was 23.853 times the odds of a person who never rode on the shoulder of paved, two-lane roads. The odds of a person who sometimes rode on the shoulder of paved, two-lane roads agreeing that they had adequate access to trails was 0.598 times the odds of a person who never rode on the shoulder of paved, two-lane roads. The odds of a person who rarely rode on the shoulder of paved, two-lane roads agreeing that they had adequate access to trails was 1.205 times the odds of a person who never rode on the shoulder of paved, two-lane roads. The odds of a person who was single agreeing that they had adequate access to trails was 0.051 times the odds of a person who was separated/divorced/ widowed. The odds of a person who was married/had a partner agreeing that they had adequate access to trails was 0.13 times the odds of a person who was separated/ divorced/ widowed. The odds of a person agreeing that they had adequate access to trails were larger for people who traveled farther to reach trail opportunities. The same was true for people who were older.

Table 6.17. Parameter estimates for the snowmachine cumulative logit model

Parameter Estimates				
Parameter		B (log odds ratio)	Odds Ratio	Std. Error
Threshold	[I feel there are adequate trail opportunities to ride my Snowmachine near my home (3 variable version)= Agree]	4.917	136.542	1.4247
	[I feel there are adequate trail opportunities to ride my Snowmachine near my home (3 variable version)= Neither]	5.675	291.590	1.4630
[On the shoulders of two lane roads (paved)= Always]		1.977	7.220	1.1853
[On the shoulders of two lane roads (paved)= Often]		3.172	23.853	0.8824
[On the shoulders of two lane roads (paved)= Sometimes]		-0.515	0.598	0.6383
[On the shoulders of two lane roads (paved)= Rarely]		0.186	1.205	0.6906
[On the shoulders of two lane roads (paved)= Never]		0[a]	1	
[What is your marital status?= Single]		-2.969	0.051	1.2161
[What is your marital status?= Married or with partner]		-2.044	0.130	0.9045
[What is your marital status?= Separated, divorced, or widowed]		0[a]	1	
How far do you travel to reach opportunities to ride snowmachines?		0.984	2.676	0.2026
What age range describes you?		0.660	1.935	0.2000
(Scale)		.706[b]	2.026	

Dependent Variable: I feel there are adequate trail opportunities to ride my Snowmachine near my home
Model: (Threshold), On the shoulders of two lane roads (paved), What is your marital status?, How far do you travel to reach opportunities to ride snowmachines?, What age range describes you?
a. Set to zero because this parameter is redundant.
b. Computed based on the deviance.

The cross-tabulated values for predicted category values and the response variables that asked respondents whether they had adequate access to trails were used to assess the prediction accuracy of the model (table 6.18). Of the respondents who selected “agree,” 54 out of 57 were predicted correctly. Of the respondents who selected “disagree,” 14 out of 20 were predicted correctly. The total predictive accuracy of the model was the ratio of correct predictions (68) to total values (86), giving a 79 percent model predictive accuracy.

Table 6.18. Cross-tabulation of the predicted category values and the response variables showing the prediction accuracy of the snowmachine model

Crosstabulation					
		I feel there are adequate trail opportunities to ride my Snowmachine near my home			
		Agree	**Neither Agree nor Disagree**	**Disagree**	**Total**
Predicted Category Value	**Agree**	54	6	6	66
	Disagree	3	3	14	20
Total		57	9	20	86

CHAPTER 7. DISCUSSION AND CONCLUSIONS

The primary research goal was to collect and analyze non-motorized and NTV transportation mode data in the Pacific Northwest (Alaska and Idaho, specifically) to better inform policy and design to meet the needs of rural and small urban communities. Further goals were to determine the safety implications of NTV transportation modes in mixed traffic and whether users' learning methods and regular usage of these modes shaped their behavior. Gaps were found in the literature regarding NTV transportation mode and mixed-use environment safety so this study developed, conducted, and analyzed the results of a regional survey focused on user safety in mixed-use environments.

First, the Pacific Northwest Transportation Survey was administered to better understand NTV transportation modes. Second, mapping of census-defined populated places and transportation networks was completed to assess the connectivity of incorporated places. Third, the trauma registry was organized by mode and event location category and mapped by location and location connectivity. Lastly, a binomial logistic regression model was developed to asses differences in safety perceptions and behaviors of ATV and snowmachine users.

The Pacific Northwest Transportation Survey data indicated that ATVs were used on or near roads 24 percent of the time and snowmachines were used on or near roads 23 percent of the time. The survey data also suggested that bicycles, pedestrians, and ATVs all served an important role as transportation modes in Alaska. While snowmachines were used primarily for recreational purposes, the data suggested that ATVs were not used merely for recreation but as primary modes of transportation, performing tasks such as going to work, going to school, for work, going shopping, going grocery shopping, and going out for fun/entertainment.

Through preliminary modeling some key elements related to accessibility of trails for ATVs and snowmachines were illuminated. For ATV's, people who hauled their ATV with a trailer were much more likely to agree that they had adequate access to trails than a person who rode from home. Additionally, the odds of a person agreeing that they had adequate access were smaller for people who rode more miles per year. The overall predictive accuracy of the ATV model was found to be 43 percent.

For snowmachines, a person who often or always rode on the shoulder of paved, two-lane roads had greater odds of stating that they had adequate access to trails. People who were separated/divorced/ widowed felt they have better access to trails than people who were married or single. Lastly, the odds of a person agreeing that they had adequate access to trails were larger for people who were older. The overall predictive accuracy of the snowmachine model was 68 percent. Based on this preliminary modeling, the key factors affecting whether ATV and snowmachine users felt that they had adequate access to trails seemed to be how people accessed trails, how frequently they used their ATV or snowmachine, and their age. Both models had satisfactory prediction accuracy, with the snowmachine model being more skilled at prediction than the ATV model. For surveys, there is a lot of variability in how people respond; therefore, it is difficult to predict how people will respond.

Road and highways connected 184 of the census-defined populated places in Alaska, approximately 52 percent of all populated places. Trails alone connected 72 places (21 percent of all populated places), and 97 places (27 percent of all populated places) were not connected to any other places/ isolated places. On average 67 percent of the population was native Alaskan in isolated places, and the percentage of native Alaskans was about 88 percent in places for which road and highway network data were not available. As stated above, survey respondents reported using their ATVs on and near roadways 24 percent of the time, yet there were significantly more, 2 times as many, traumas in connected places as in isolated places, and 3 times more traumas in highway-connected places than in secondary road-connected places. In comparison, bicycles were used on or near roadways 75 percent of the time and had 449 on-road traumas from 2004 to 2011, whereas ATVs had 352 on-road traumas even though they reportedly were only used on or near roadways 24 percent of the time. Snowmachines were used on and near roadways 23 percent of the time and had 3 times as many traumas in highway-connected places than in secondary road-connected places.

Highway-connected places had a significantly higher risk of having ATV and snowmachine traumas than road-connected places. This indicates that part of the issue could be the amount of traffic in connected areas, or perhaps the frequency of use of ATVs, rather than automobiles in non-connected areas leading to fewer mixed-use scenarios. In looking at all of these data together, they seem to indicate that connected and urban locations had significantly more safety issues related to ATVs and other NTV transportation modes. This provides further evidence that policies related to NTV vehicle types (e.g., motorized and off-road classified vehicles) need to be enforced or modified.

The binomial logistic regression model analyses produced reasonable and statistically significant models for ATV and snowmachine users. The models for these modes showed the relationship between an individual's perception of safety in mixed traffic and many of the variables considered, such as the user's age and helmet use. A relationship between learning methods and the perception of safety in mixed traffic was found for the ATV mode model but not in the model for snowmachines.

These binomial logistic regression models can be used to ascertain which groups of people need the most assistance to increase their safety when using certain NTV transportation modes on public roadways.

These findings illustrate the unique transportation environment in Alaska. It is important that engineers and city planners take into account the needs and preferences of the people living in the villages, towns, and cities that they design and maintain. Future research will seek to define the network structure of trail-connected places as well as the extent to which rivers, particularly during winter months, contribute to these informal networks. Additionally, projects geared toward obtaining real-time counts of ATV and snowmachine use, as well as broader statewide efforts for bicycles and pedestrians, should be considered to better understand why so many traumas related to their use occur on and near roadways.

Future areas of study should include a larger survey, meaning a more substantial number of respondents. A larger survey population would help to balance out the survey between variables and responses. In an ideal data set there would be substantially more survey responses than variables. Additionally, a larger number of respondents could give an even better view into what safety features and accessibility infrastructure the people of Alaska need. Counting stations could also be set up to get live usage data for alternative and non-motorized transportation modes.

During the survey development, one additional goal of this study was to build statistical models showing the effects of learning methods and mode use on the crash involvement of NTV transportation mode users, both reported and unreported. However, the limited number of responses that claimed involvement in a reported or unreported crash using an NTV transportation mode prevented robust statistical tests from being performed. Additional data collection is recommended on this topic.

The development of and results from this mixed-use survey lay the groundwork for future efforts. Further efforts to collect additional responses for the mixed-use survey to reveal more significant relationships among these variables are recommended. Further research into unreported crashes involving NTV transportation modes may reveal previously unknown causes and patterns of crashes and injuries, and research into the causes for the increasing rates of ATV-related injuries and fatalities, for example, may help to establish relationships based on the variables used in this study. Additionally, other NTV modes such as dogsleds and agricultural vehicles, which are essential modes of transport in select rural or remote regions of the country, deserve to be more closely examined to determine how the perspectives of users who rely on those modes will shape or influence overall safety moving forward.

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APPENDIX A: TRAUMA REGISTRY DATA REQUEST

THE STATE
of ALASKA
GOVERNOR BILL WALKER

Department of
Health and Social Services

DIVISION OF PUBLIC HEALTH
Emergency Programs

[illegible]

ALASKA TRAUMA REGISTRY
RELEASE OF INFORMATION POLICY

INTRODUCTION

The purpose of the Release of Information Policy is to establish guidelines for the release of data from the Alaska Trauma Registry to individuals or organizations requesting information pursuant to the provisions of 7 AAC 26.745 TRAUMA REGISTRY which provides in part: (b) The Trauma System Review Committee shall keep Trauma Registry Data confidential in accordance with AS 18.23.030 except that (3) reports on trauma registry data, not including patient identifiers, physician identifiers, or hospital identifiers, may be provided to epidemiologists, health planners, medical researchers, or other interested persons to study causes, severity, demographics and outcomes of injuries, or for other purposes of studying the epidemiology of injuries or emergency medical services and trauma system issues.

In sharing trauma registry information it is the intent of the Trauma System Review Committee that

1. patient, facility, health care provider, and service confidentiality be protected
2. legitimate and responsible use of trauma registry data for the purposes of promoting public health research, public health education, injury prevention, and peer review be insured, and
3. trauma registry data is represented accurately and without prejudice to an individual or institution.

PROCEDURE

Information requests will be put into one of two categories and considered as outlined below.

1. As established by the Trauma System Review Committee, participating trauma registry hospitals and ambulance services may request reports or information under 7 AAC 26.745. Customized reports or information will be provided to individuals or institutions requesting information pertaining to themselves to include privileged and nonprivileged data and information; privileged data or information is defined as any data or information identifying an individual patient, physician, hospital, or prehospital care provider, and acquired in the performance of activities of the Alaska Trauma Registry program.
2. A recognized and known legitimate individual or organization requesting nonprivileged data or information from the trauma registry for the purpose of promoting public health research or public health education will be provided the requested information by the Trauma Registry Database Manager. The Trauma Registry Database Manager may require that the requestor submit his/her request in writing and provide proof of requester legitimacy. Nonprivileged data or information is defined as any data or information that does not identify an individual patient, physician, hospital, or prehospital care provider, and data or information that constitutes a limited data set under 45 C.F.R. 164.514(e).

Release of information may be contingent upon signature of the following agreement:

ALASKA TRAUMA REGISTRY DATA UTILIZATION AGREEMENT

The Trauma Program of the Alaska Department of Health and Social Services, Division of Public Health, places the following conditions on the acceptance and utilization of data from the Alaska Trauma Registry:

1. Ownership of the data will remain with the Alaska Department of Health and Social Services, Division of Public Health, Section of Emergency Programs/Trauma Program (ADHSS/DPH/EP/TP).

2. Applicant will have access to the "raw" data that has been sent for research and analysis. No other person will have access to the data unless for technical support and with ADHSS/DPH/EP/TP approval. Upon completion of the proposed research project in the application, the "raw" data will be deleted, and transmittal copies destroyed.

3. Access to the data file will be protected by a security system that requires the user to provide at least one password.

4. Release of nonaggregate data to any other individual or agency without the express permission of the ADHSS/DPH/EP/TP is prohibited. If given permission, recipient will ensure that the individual or agency agrees to the same restrictions and conditions that apply to the recipient with respect to the data.

5. The recipient will commit to protecting the identity of trauma registry patients, ambulance services, and hospitals. (Although we do not give names, in some communities, the dates, age, sex, race and place of injury occurrence are sufficient to identify an individual or service.) No use will be made of the identity of a person, service or hospital discovered inadvertently.

6. The recipient will comply with all statutes and regulations related to the protection of patient-identifiable information, including HIPAA privacy and security regulations. An agency using the data will ensure minimum use and provide for personal sanctions against an individual who violates the regulations regarding disclosure.

7. The recipient shall immediately report to ADHSS/DPH/EP/TP any use or disclosure of the data not provided for by its data utilization agreement of which it becomes aware.

8. Data will not be linked to any data set with individually identifiable records.

9. The recipient will submit to the ADHSS/DPH/EP/TP a signed Alaska Trauma Registry confidentiality statement.

10. The data may only be used for studies of a public health nature.

11. The recipient will allow the ADHSS/DPH/EP/TP and the Trauma System Review Committee prepublication review of conclusions based upon data from the trauma registry. (This is to insure correct interpretation of the contents of the database.) If disagreement exists, the recipient will allow the Trauma System Review Committee the opportunity to include their comment within the published document. Acknowledgement is to be given to the ADHSS/DPH/EP/TP as the source of data in any publications, articles or studies that are prepared or published.

12. The recipient will not identify the data or contact the individuals represented in the data.

STUDY PROPOSAL

The study proposal will include objectives, methods, study population of interest, and specific elements needed from the trauma registry. The requestor must inform the Trauma Registry Database Manager of any changes to the study design or changes in the estimation of time for project completion.

DUTIES OF THE TRAUMA SYSTEM REVIEW COMMITTEE

The Trauma System Review Committee will be available to make final determinations on requests for information from the trauma registry. An information request review by the Trauma Registry Database Manager may be accomplished by circulation of the proposal to committee members.

DUTIES OF THE TRAUMA REGISTY DATABASE MANAGER

The Trauma Registry Database Manger will:

1. Prepare requested reports to participating hospitals or ambulance service

2. Answer legitimate requests for non-privileged data by recognized individuals

3. Reject inappropriate requests

4. Work with requestors and Trauma System Review Committee members on requests

5. Report all information requests, as requested by the Trauma System Review Committee, during regularly scheduled meetings by presenting short summaries of information provided.

CONFIDENTIALITY

Any and all release of information pursuant to this policy shall be expressly subject to the provisions of AS 18.23.030 (a), which provides that such information shall be held in confidence and is not subject to subpoena or discovery. Such released information shall be used solely for research/investigation purposes, and shall have any patient, provider and facility identifying information redacted. Those persons or institutions who receive any information pursuant to this policy shall be required to sign and return a confidentiality agreement that forbids re-disclosure of released information, except for the described purposes of study or research pursuant to the provisions of 7 AAC 26.745.

RESEARCH APPLICATION
(To be filled out by applicant)

Upon approval by the Trauma Registry Database Manager, and/or the Trauma Program Manager, and/or Trauma System Review Committee; the Trauma Registry has up to 30 business-days (excluding weekends and holidays), to complete a data request. Depending upon the complexity of the data request, more complex requests could lengthen this time period. This time period has the potential to be expedited for less complex data requests.

Please complete the following for data release.

Name NATHAN BELZ, Ph.D.

Agency UNIVERSITY OF ALASKA FAIRBANKS

Address 245 DUCKERING, 306 TANANA DRIVE

FAIRBANKS, AK 99775-5900

City FAIRBANKS State AK ZIP 99775-5900

Phone Number 907-474-5765

Fax Number 907-474-7067

Email npbelz@alaska.edu

Project Title: MIXED USE SAFETY ON RURAL FACILITIES IN THE PACIFIC NORTHWEST

Expected time of completion 12/31/2016

Person receiving data transfer NATHAN BELZ

I have read and agree to the above conditions for the use of data from the Alaska Trauma Registry of the ADHSS/DPH/EP/TP.

Signature Date 07.26.2016

(Print Name) NATHAN BELZ

PLEASE ATTACH A COPY OF THE STUDY PROPOSAL

1. Objective
2. Methods
3. Population of interest
4. Years of interest
5. Data elements of interest

(1) **OBJECTIVE**: This research will address the issues associated with providing safe accommodation, limiting the improper use of public rights-of-way, and maintaining mobility, and provide future guidelines for design, education, and enforcement for mixed-use rural facilities. Four specific objectives have been identified as integral pieces of this research effort. First, this research seeks to determine the characteristics of NTV and NMT crashes in five rural area types: edge, traditional/main street, gateway, resource dependent (agriculture and mining), and tribal/village/isolated. Second, this research will document the state-of-practice related to the motivation for use, extent and magnitude of safety-related issues, and deficiencies in fatality/injury reporting methods for NTVs and NMT on mixed-use facilities. Third, and directly tied to the first objective, this research will critique and identify deficiencies in injury/fatality reporting for crashes involving NTVs and NMT on rural mixed-use facilities. Lastly, and more generally, this research will improve the definition of "mixed-use facility" in a rural context by more robustly identifying the types of non-traditional and non-motorized forms of travel and considering the spaces and areas where specific conflicts occur both between and within these forms of travel.

(2) **METHODS:** Use SPSS software to determine frequencies of specific injuries or vulnerable populations. Calculate injury rates and trends using population data from the Alaska Department of Labor and Workforce Development. Serious and fatal crash data analysis to be accompanied by a comprehensive literature review and a regional travel survey.

(3) **POPULATION OF INTEREST:** Injuries due to crashes (motor vehicle, snow machine, ATV, boating, airplane). No single population of particular interest, though rural areas are most concern. All areas in the state needed for comparison.

(4) **YEARS OF INTEREST:** requesting data from the new ATR data system to include 2005 through the most recent available

(5) **Data ELEMENTS OF INTEREST:** All demography, injury event, emergency/admission, and injury data elements. Discharge information not needed.

THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Health and Social Services

DIVISION OF PUBLIC HEALTH
Emergency Programs

ALASKA TRAUMA REGISTRY CONFIDENTIALITY STATEMENT

I understand and agree that in the performance of my role on a steering or review committee or board or group; or as an employee of Southern Region Emergency Medical Services Council, Inc.; or as an employee of ADHSS/DPH/EP/TP; or as an employee of a participating hospital or prehospital service; or as a trauma registry manager, trauma registrar, or data entry clerk; or as a professional services contractor for the Department of Health and Social Services; or as a recipient of trauma registry data, I must maintain and safeguard the confidentiality of privileged Alaska Trauma Registry data and information. I understand that privileged data and information is defined as:

> "Data and information generated and/or acquired by the Alaska Trauma Registry Program which identifies an individual patient, practitioner, or facility; written or recorded records of any trauma registry steering or review committee sessions, data collection staff meeting, or any regularly constituted committee of the Alaska Trauma Registry Program; data and information generated and/or acquired in the administration of the Alaska Trauma Registry Program; any personal knowledge of any representative or employee of the Alaska Trauma Registry Program who can identify an individual patient, practitioner, or facility."

Further, I understand that violation of the Alaska Trauma System Confidentiality Policy may result in legal action.

In order that we may exchange data from time to time which otherwise may be considered of a confidential nature, the undersigned agrees to abide by the following statement:

> "Any data or information identifying an individual patient, physician, hospital, or prehospital care provider, and acquired by either party in the performance of activities of the Alaska Trauma Registry project shall be held in strict confidence and shall not be disclosed to any person or legal entity without the prior written consent of the other party."

(SIGNATURE)

07.26.2016

(DATE)

NATHAN BELZ

(PRINT NAME)

ASST. PROFESSOR

(TITLE)

ALASKA TRAUMA REGISTRY: INJURY SURVEILLANCE DATA ELEMENTS 1991 – 2012 (UPDATED 12/15/2010)			
DEMOGRAPHY	**VARIABLE LABE**	**DECSRIPTION**	ELEMENTS OF INTEREST PLEASE MARK WITH AN X
AGE	AGE		X
SEX	SEX	MALE OR FEMALE	X
RACE	ETHNICITY	WHITE,BLACK,HISPANIC,AMERICAN INDIAN,ASIAN,PACIFIC ISLAND, ALASKA NATIVE, UNK	X
CITY OF RESIDENCE	HOMECITY		X
REGION OF RESIDENCE	RESREGION		X
INJURY EVENT	**VARIABLE LABE**	**DECSRIPTION**	
MONTH OF INJURY	INJMO		X
YEAR OF INJURY	YEAR		X
PLEACE OF INJURY OCCURRENCE	PLACESPEC	ECODE CATEGORY	X
PLACE OF INJURY OCCURRENCE	INJPLACE	FREE TEXT	X
CITY OF INJURY OCCURRENCE	SCENECITY		X
REGION OF INJURY OCCURRENCE	INJREGION		X
ETIOLOGY CODE	ECODE	ICD9 ECODE	X
CAUSE OF INJURY	INJCAUSE		X
INJURY DESCRIPTION	INJDESC		X
INJURY DESCRIPTION CONTINUED	INJDESC2		X
WORK-RELATEDNESS OF INJURY	WORKRELATE		X
INDUSTRY	INDNARR		X
OCCUPATION	OCCNARR		X
SAFETY EQUIPMENT USE (1ST)	PROTECTION		X
SUSPECTED ALCOHOL USE	ALCOHOLDOC	TESTED POSITIVE OR NOTED IN MEDICAL RECORDS	X
SUSPECTED DRUG USE	DRUGDOC	TESTED POSITIVE OR NOTED IN MEDICAL RECORDS	X
EMERGENCY/ADMISSION	**VARIABLE LABE**	**DECSRIPTION**	
BLOOD ALCOHOL CONCENTRATION	EDALCOHOL	TEST RESULT IF PERFORMED	X
DRUG SCREEN	EDDRUGS	TEST RESULT IF PERFORMED	X
TOTAL NUMBER OF INTENSIVE CARE D	ICUDAYS		
INJURIES	**VARIABLE LABE**	**DECSRIPTION**	
PRIMARY DIAGNOSIS	DIAGNOSIS		
DIAGNOSIS CODE 1-10	NCODE1 - NCODE1	ICD9 NCODE	
TRAUMATIC BRAIN INJURY	TBI	TBI = B	
SPINAL CORD INJURY	SPINE	SPNIE = S	
ABBREVIATED INJURY SCORE	AIS_MAX	AIS OF THE MOST SERIOUSLY INJURED BODY REGION SCORES = 1-6, NA, INSUFFICENT DATA	X
ABBREVIATED INJURY SCORE	AIS_TEXT	AIS DESCRIPTION	X
INJURY SEVERITY SCORE	ISS	SCORES = 1-75, NA, INSUFFICENT DATA	X
DISCHARGE	**VARIABLE LABE**	**DECSRIPTION**	
HOSPITAL DISCHARGE DISPOSITION	FINALDISCH		
GENERAL CONDITION ON DISCHARGE	GENCONDDC		
DISABILITY	DISABILITY	THE JUDGEMENT MADE UPON DISCHARGE	
FATALITY	FATAL		
NUMBER OF HOSPITAL DAYS	HOSPDAYS		
NUMBER OF HOSPITAL DAYS	HOSPDAYS2	2ND FACILITY IF TRANSFERRED	
NUMBER OF HOSPITAL DAYS	HOSPDAYS3	3RD FACILITY IF TRANSFERRED	
HOSPITAL CHARGES	HOSPCHARGE	ZERO OR BLANK = NOT COLLECTED AT THE PARTICULAR FACILITY	
HOSPITAL CHARGES	HOSPCHARG2	2ND FACILITY IF TRANSFERRED	
HOSPITAL CHARGES	HOSPCHARG3	3RD FACILITY IF TRANSFERRED	
HOSPITAL PAYMENT SOURCE 1- 4	PAYER1 - PAYER4	ALL AT THE FIRST FACILITY	
HOSPITAL PAYMENT SOURCE	PAYER2ADM	2ND FACILITY IF TRANSFERRED	

APPENDIX B: SURVEY TARGET GROUPS

Alaska

User Group	Sate	Company/Entity	Contact Info
General Transportation	AK	Fairbanks Metropolitan Area Transportation System	donna.gardino@fmats.us
General Transportation	AK	Fairbanks North Star Borough - Trails Advisory Commission	parks@fnsb.us
General Transportation	AK	Fairbanks North Star Borough - Planning	kspillman@fnsb.us
General Transportation	AK	Alaska DOT - Tech Transfer	david.waldo@alaska.gov
General Transportation	AK	Municpality of Anchorage - Parks and Rec	parks@muni.org
General Transportation	AK	Denali Borough Assembly	dbgovt@mtaonline.net
General Transportation	AK	TTAP	bdbluehorse@alaska.edu
Bike/Ped	AK	Fairbanks Cycle Club	veep@fairbankscycleclub.org
Bike/Ped	AK	Goldstream Sports	tyson@goldstreamsports.com
Bike/Ped	AK	UAF Department of Recreation and Wellness	mtoldmixon@alaska.edu
Bike/Ped	AK	Bike Anchorage	info@bikeanchorage.org
Bike/Ped	AK	Arctic Bike Club	media@arcticbikeclub.org
Bike/Ped	AK	Juneau Freewheelers	http://cycleak.com/
Mushing/Dog-Powered	AK	Alaska Dog Mushers Association	adma@sleddog.org
Mushing/Dog-Powered	AK	Alaskan Sled Dog and Racing Association	(907) 562-2235
Mushing/Dog-Powered	AK	Willow Dog Mushers Association	info@willowdogmushers.org
Mushing/Dog-Powered	AK	Tok Dog Mushers Association	info@tokdogmushers.org
Mushing/Dog-Powered	AK	Alaska Skijoring and Pulk Association	info@alaskaskijoring.org
Mushing/Dog-Powered	AK	Two Rivers Dog Mushing Association	info@trdma.org
Mushing/Dog-Powered	AK	Tanana Dog Mushers Association	TananaDogMushers.com
Mushing/Dog-Powered	AK	Nome Kennel Club	nkc@nomekennelclub.com
Mushing/Dog-Powered	AK	Montana Creek Dog Mushers Association	mraychel@mtaonline.net
Mushing/Dog-Powered	AK	Chugiak Dog Mushers Association	amy@jaengeberg.com
			dkpartow@gci.net
ATV/Snowmachine	AK	Alaska Mat-Su Valley ATV Club	alaskamatsuvalleyatvclub@yahoo.com
ATV/Snowmachine	AK	Alaska State Parks - Chugach/Wood-Tikchik Area Office	csp@alaska.gov
ATV/Snowmachine	AK	Alaska State Parks - Kenai/Prince William Sound	dnr.pkskenai@alaska.gov
ATV/Snowmachine	AK	Alaska State Parks - Kodiak Area	dnr.pkskodiak@alaska.gov
ATV/Snowmachine	AK	Alaska State Parks - Mat-Su/Copper Basin Area	dnr.matsuparks@alaska.gov
ATV/Snowmachine	AK	Alaska State Parks - Northern Area	dnr.pksnorth@alaska.gov
ATV/Snowmachine	AK	Alaska State Parks - Southeast Area	(907) 465-4563
ATV/Snowmachine	AK	Alaska Bureau of Land Management - Glenallen	blm_ak_gfo_general_delivery@blm.gov
ATV/Snowmachine	AK	Alaska Bureau of Land Management - Arctic	Arctic@blm.gov
ATV/Snowmachine	AK	Alaska Bureau of Land Management - Central Yukon	CentralYukon@blm.gov
ATV/Snowmachine	AK	Alaska Bureau of Land Management - Eastern Interior	Easterninterior@blm.gov
ATV/Snowmachine	AK	Northern Power Sports	craig@northernpowersports.com
ATV/Snowmachine	AK	Alaska Fun Center	afc@mosquitonet.com
ATV/Snowmachine	AK	Outpost Alaska	(907) 456-3265
ATV/Snowmachine	AK	Compeaus	craig@compeaus.com
ATV/Snowmachine	AK	Delta Power Sports	josh@deltapowersports.com
ATV/Snowmachine	AK	Rough Riders AK	big_tipps@hotmail.com
ATV/Snowmachine	AK	Alaska Motor Mushers Club	ammcracing@ammcracing.org
ATV/Snowmachine	AK	Anchorage Snowmobile Club	info@anchoragesnowmobileclub.com
ATV/Snowmachine	AK	Caribou Hills Cabin Hoppers	lopemank@yahoo.com
			jnhoskins@gmail.com
ATV/Snowmachine	AK	Curry Ridge Riders	akcurryridgeriders@gmail.com
ATV/Snowmachine	AK	Fairbanks Snow Travelers	www.snowtravelers.org
ATV/Snowmachine	AK	Homer Snomads	ejsuoja@yahoo.com
ATV/Snowmachine	AK	Ice Racing Alaska	www.iceracingak.com
ATV/Snowmachine	AK	Lake Louise Snowmachine Club	pvtworld2@gmail.com
ATV/Snowmachine	AK	Valdez Snowmachine Club	sbenda@gci.net
ATV/Snowmachine	AK	Alaska State Snowmobile Association	http://ridealaska.com/archive/assa

http://www.ncai.org/tribal-directory/alaska-native-corporations		
Alaska Federation of Natives	afninfo@NativeFederation.org	
Ahtna, Incorporated	dmiller@ahtna.net	news@ahtna.net
Aleut Corporation	receptionist@aleutcorp.com	info@aleutcorp.com
ANCSA Regional Association	Broken Link...	
Arctic Slope Regional Corporation	thardt@asrc.com	
Bering Straits Native Corporation	media@beringstraits.com	
Bristol Bay Native Corporation	907.278.3602	
Calista Corporation	(907)275-2800	
Chugach Alaska Corporation	communications@chugach.com	subcontracting@chugach.com
Cook Inlet Region, Incorporated	info@ciri.com	
Doyon, Limited	communications@doyon.com	
Koniag, Incorporated	No Contact Info Available	
NANA Regional Corporation	news@nana.com	
Sealaska Corporation	webmaster@sealaska.com	
Toksook Bay:	cityofookclerk@yahoo.com	admin@cityofook.com
Point Lay: Noe Texeira, Harry Olemaun	noe.texeira@north-slope.org	harry.olemaun@north-slope.
Valdez: Rob Comstock, Public Works Director, Cindy Rymer, Administrative A	rcomstock@ci.valdez.ak.us	crymer@ci.valdez.ak.us
Cordova: Sam Greenwood	planning@cityofcordova.net	
Gulkana:	soaringeagletransit@gulkanacouncil.org	secretary@gulkanavillage.org
Kawerak Transportation Program: Ken Waterman	ktp@kawerak.org	
Galena City Manager, Shanda Huntington	shuntington@ci.galena.ak.us	
Nome Eskimo Community	info@necalaska.org	
City of Fort Yukon	cityclerk@gci.net	
Kodiak City Engineer, Glenn Melvin	gmelvin@city.kodiak.ak.us	
Dillingham City Planner, Courtenay Carty	planner@dillinghamak.us	
Bethel City Manager, Ann Capela	acapela@cityofbethel.net	
Kotzebue	margaret.hansen@alaska.gov	
Native Village of Kotzebue IRA	jennifer.snider@qira.org	nicole.stoops@qira.org

Idaho

Name	Email
Misa Milojevic	misam73@gmail.com
Dave Spencer	chm40@aol.com
Allen Myers	a10autobody@gmail.com
Eric Frei	ericfrei@cableone.net
Theodore Peterson	tcpeterson@vandels.uidaho.edu
Brad Lockart	sno-drifters@hotmail.com
Pat West	hcsc25b@yahoo.com
Dave Bunker	branch@safelink.net
Mark Wood	m_awood@frontier.net
Robert Workman	framing4uqwestoffice.net
Rick Woytko	gvsnogoers00@gmail.com
Steve Hull	dodge4you@hotmail.com
Kenny Richey Jr	kenny.richey@intgas.com
John Miller	dogmntpine@aol.com
Justin Abramoski	jabramoski@live.com
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Reed Hansen	rmk800@icsofidaho.net
Bob Stantus	rsstantus@msn.com
Jeanine Hansen	jeanineharrophansen@gmail.com
Travis Perez	tperez334@yahoo.com
Norman Stoner	njstoner@silverstar.com
Suzell Burch	Suzelle.Burch@fallriverelectric.com

Agricultural Associations/Organizations [Idaho Area Code (208)]

Food Producers of Idaho (FPI)
55 SW 5th Avenue, Suite 100
Meridian, Idaho 83642
888-0988
Email: rick@amgidaho.com
Website: www.foodproducersofidaho.org
Rick Waitley, Executive Director

Idaho Agri Women
3769 Pioneer Rd.
Homedale, ID 83625
Phone/FAX: 495-2544
Email: kealder@outlook.com
Kathy Alder, Secretary

Idaho Alfalfa and Clover Seed Growers Association
55 SW 5th Avenue, Suite 100
Meridian, Idaho 83642
888-0988
Email: benjamin@amgidaho.com
Website: www.alfalfaseed.org
Benjamin Kelly, Executive Director

Idaho Cattle Association (ICA)
2120 Airport Way Boise, Idaho 83705
343-1615
Email: info@idahocattle.org
Website: www.idahocattle.org
Laurie Lickley, President
www.facebook.com/idahocattleassociation

Idaho Dairymen's Association (IDA)
195 River Vista Pl, #308
Twin Falls, Idaho 83301
208-736-1953
Email: bob@wdbs.us
Website: idahodairymen.org
Bob Naerebout, Executive Director

Idaho-Eastern Oregon Onion Committee
PO Box 909
Parma, Idaho 83660
722-5111
Email: cbfitch@cableone.net
Website: www.usaonions@cableone.net
Candi Fitch, Executive Director

Idaho Farmers Union (IFU)
3417 Hiland Ave. Burley, Idaho 83318
878-9794
Email: renrutgg@hotmail.com
Gary L. Turner, President
Kristine Hondo, Vice President

Idaho Grain Producers Association (IGPA)
821 W. State Street
Boise, Idaho 83702
345-0706
Email: ssatterlee@idahograin.org
Website: www.idahograin.org
Stacey Katseanes Satterlee, Executive Director

Idaho Growers Shippers Association (IGSA)
PO Box 51100 Idaho Falls, ID 83405
3670 S 25 th East
Idaho Falls, Idaho 83404-4956
529-4400
Email: tblacker@idahoshippers.org
Website: www.idahoshippers.org

Idaho Hay & Forage Association, Inc. (IHFA)
55 SW 5th Avenue, Suite 100
Meridian, Idaho 83642
888-0988
Email: rick@amgidaho.com
Website: www.idahohay.com
Rick Waitley, Executive Director

Idaho Honey Industry Association (IHIA)
55 SW 5th Ave, Suite 100
Meridian, ID 83642
888-0988 FAX: 888-4586
Email: rick@amgidaho.com
Rick Waitley, Executive Director

Idaho Hop Growers Association
PO Box 67
Wilder, Idaho 83676
722-5482
Email: tracey-s2@gmx.com
Tracey Tengs, Administration

Idaho Mint Growers Association (IMGA)
55 SW 5th Avenue, Suite 100
Meridian, Idaho 83642
888-0988
Email: roger@amgidaho.com
Web: idahomint.org
Roger Batt, Executive Director

Idaho-Oregon Fruit & Vegetable Association, Inc. (IOFVA)
PO Box 909
Parma, Idaho 83660-0909
722-5111
Email: cbfitch@cableone.net
Website: www.id-orfv.org
Candi Fitch, Executive Director

Idaho Pork Producers Association (IPPA)
PO Box 387

Kuna, ID 83634
880-2316 idahopigs@gmail.com
Brad Thornton, President
Tom Goodwin, Vice President
Bonnie Hanson-Secretary

Idaho Rural Council
PO Box 236
Boise, Idaho 83701
FAX: 352-4645
Email: irc@idahoruralcouncil.org
K.C. Duerig, President
Stacey S Butler, Ex. Director

Idaho Sugarbeet Growers Association (ISGA)
1951 S. Saturn Way, Suite 100
Boise, ID 83709
343-0167
Email: mduffin@amalsugar.com
Web: www.americansugarbeet.org
Mark Duffin, Executive Director

Nezperce Prairie Grass Growers Association (NPGGA)
55 SW 5th Avenue, Suite 100
Meridian, Idaho 83642
888-0988
Email: benjamin@amgidaho.com
Website: www.npgga.org
Benjamin Kelly, Executive Director

North Idaho Farmers' Association
302 E. Linden Ave, Suite102
Coeur d'Alene, Idaho 83814
Email: linda@northidahofarmers.org
Website: www.northidahofarmers.org
Linda Clovis, Public Relations

Nyssa-Nampa Beet Growers Association
PO Box 2723
208-863-5353
Email: norma@fortboise.com
Norma Burbank, Executive Secretary

Pacific Northwest Grain & Feed Association, Inc.
200 SW Market St., Suite 190
Portland, Oregon 97201-5731
503-227-0234
Email: margerie@pnwgfa.org
Website: www.pnwgfa.org
Margerie Sedam, Association Director

Pacific Northwest Vegetable Association
100 N. Fruitland Ave, Suite B Kennewick, Washington 99336
509-585-5460
Email: snolan@agmgt.com
Website: www.pnva.org

Sheri Nolan, Executive Secretary

Snake River Farmers Association (SRFA)
PO Box 807
Heyburn, Idaho 83336
(208) 436-9737 Fax: (208)436-0573
Email: info@snakeriverfarmers.org
Michaelene Rowe, President

United Dairymen of Idaho (UDI)
743 N. Touchmark Ave. Meridian, Idaho 83642
327-7050 or 332-1640 FAX: 327-7054
info@uidaho.org
Website: www.idahodairy.com
Karianne Fallow, Contact person

United Onions USA, Inc.
55 SW 5th Ave. Suite 100
Meridian, ID. 83642
Email: rick@amgidaho.com
Website: www.unitedonions-usa.com
Rick Waitley, Executive Director

USA Dry Pea & Lentil Council
2780 W. Pullman Road
Moscow, Idaho 83843-4024
882-3023
Email: pulse@pea-lentil.com
Website: www.pea-lentil.com
Tim D. McGreevy, Executive Director

Western Bean Dealers Association
PO Box 641
Buhl, ID 83316-0641
537-6678
Email: westbean@gmail.com
Lisa Knutz, Secretary/Treasurer

Idaho Alfalfa and Clover Seed Commission (IACSC)
55 SW 5th Avenue, Suite 100
Meridian, Idaho 83642
888-0988
Email: rick@amgidaho.com
Website: www.alfalfaseed.org
Rick Waitley, Administrator

Idaho Apple Commission
PO Box 909
Parma, Idaho 83660
722-5111
Email: cbfitch@cableone.net
Website: www.idahoapples.com
Candi Fitch, Executive Director

Idaho Barley Commission
821 W. State Street
Boise, Idaho 83702
334-2090
Email: kolson@barley.idaho.gov
Website: www.barley.idaho.gov
Kelly Olson, Administrator

Idaho Bean Commission
821 W. State Street
Boise, Idaho 83702
334-3520
Email: andi.woolf@bean.idaho.gov
Website: www.bean.idaho.gov
Andi Woolf-Weibye, Executive Director

Idaho Beef Council
1951 W. Frederic Lane
Boise, Idaho 83705
376-6004 FAX: 376-6002
Email: beefcouncil@idbeef.org
Website: www.idbeef.org
Traci Bracco, Executive Director

Idaho Cherry Commission
PO Box 909
722-5111
Email: cbfitch@cableone.net
Candi Fitch, Executive Director

Idaho Grape Growers and Wine Producers Commission
821 West State Street
Boise, Idaho 83702
332-1538
FAX: 334-2505
Website: www.idahowines.org
Email: info@idahowines.org
Moya Shatz Dolsby, Executive Director

Idaho Hop Commission
PO Box 67
Wilder, Idaho 83676
722-5482 FAX: 482-6951
Email: tracey-s2@gmx.com

Idaho Mint Commission
55 SW 5th Avenue, Suite 100
Meridian, Idaho 83642
888-0988 FAX: 888-4586
Website: www.idahomint.org
Email: roger@amgidaho.com
Roger Batt, Administrator

Idaho Pea & Lentil Commission
2780 W. Pullman Road
Moscow, Idaho 83843-4024

882-3023
Email: pulse@pea-lentil.com
Website: www.pea-lentil.com
Tim D. McGreevy, CEO Commissioners:

Idaho Potato Commission (IPC)
[661 S. Rivershore, Suite 230] Eagle, Idaho 83616
FAX: 514-4209
Email: patrick.kole@potato.idaho.gov
Website: www.idahopotato.com

Idaho Wheat Commission (IWC)
821 W. State Street
Boise, Idaho 83702
334-2353
Email: blaine@idahowheat.org
Website: www.idahowheat.org
Blaine Jacobson, Executive Director

APPENDIX C: APPROVED IRB SURVEY DOCUMENTS

(907) 474-7800
(907) 474-5444 fax
uaf-irb@alaska.edu
www.uaf.edu/irb

UNIVERSITY OF ALASKA FAIRBANKS

Institutional Review Board

909 N Koyukuk Dr. Suite 212, P.O. Box 757270, Fairbanks, Alaska 99775-7270

June 21, 2016

To:	Nathan Belz, PhD Principal Investigator
From:	University of Alaska Fairbanks IRB
Re:	[918111-1] Pacific Northwest Transportation Survey

Thank you for submitting the New Project referenced below. The submission was handled by Exempt Review. The Office of Research Integrity has determined that the proposed research qualifies for exemption from the requirements of 45 CFR 46. This exemption does not waive the researchers' responsibility to adhere to basic ethical principles for the responsible conduct of research and discipline specific professional standards.

Title:	Pacific Northwest Transportation Survey
Received:	June 2, 2016
Exemption Category:	2
Effective Date:	June 21, 2016

This action is included on the July 13, 2016 IRB Agenda.

Prior to making substantive changes to the scope of research, research tools, or personnel involved on the project, please contact the Office of Research Integrity to determine whether or not additional review is required. Additional review is not required for small editorial changes to improve the clarity or readability of the research tools or other documents.

IRB Exemption Request
Application

Complete this form only if you think your research may qualify as "exempt" from the requirements of 45 CFR 46. As the name implies, submission of this form is a request; the final determination of exemption status will be made by the Office of Research Integrity on behalf of the Institutional Review Board. If your project is not determined to be "exempt" you will have to complete a Research Protocol.

Additional information and instructions for completing this form are available as hidden text. **To view or hide the instructions click the show/hide formatting icon (¶) on your Word toolbar.** It is strongly recommended that you display the instructions while initially completing this form. The hidden text will not be visible if you print the document. If you have a MAC go to the Word menu, click Preferences, and then click View, under Non-printing characters, select the check box next to the "Hidden Test". Tip: You can also turn the All option on or off by clicking Show/Hide symbol on the menu bar paragraph symbol.

This form is an unlocked word document, so all MS Word tools and features are available. Do not change the text in any of the shaded areas of the form. Your responses to each question/section should be written where it says <<Overwrite Here>>; please keep the text of your response in the same blue 10 pt Arial font.

APPLICATION INFORMATION:

Proposed Start Date	June 21st, 2016
Anticipated Completion Date	December 31st, 2016

PRINCIPAL INVESTIGATOR ASSURANCE STATEMENT: *IRB protocols may only be submitted by individuals who are eligible to serve as a Principal Investigator (PI) under UAF policy #05-003 (http://www.uaf.edu/research/faculty/policies-and-regulations/Principal-Investigator-Eligibility.pdf).*

By submitting this protocol application, I certify that the information provided is accurate and complete. I agree to and will comply with the following statements:

1. Abide by all regulations, policies and procedures applicable to research involving human subjects.
2. Accept responsibility for the scientific and ethical conduct of this research.
3. Accept responsibility for providing personnel (collaborators, staff, graduate students, undergraduate students, and volunteers) with the appropriate training and mentoring to conduct their duties as part of this research.
4. If this IRB Protocol Application is for Graduate Student Research, the student's graduate advisory committee has reviewed and approved this Exemption Request.
5. Submit any modified research procedures, research tools, consent/assent forms, etc. to the Office of Research Integrity.
6. Immediately report to the Office of Research Integrity any complaints from participants or others.

I realize that failure to comply with the above provisions may result in suspension or termination of this project by the IRB and, if appropriate, referral to the appropriate administrative official(s) for disciplinary action.

CLASSIFICATION OF PROJECT:

	Type of Project	Student Name (if needed)
x	Faculty Research	Dr. Nathan Belz
x	Doctoral or Master Degree Research	Carrie Sorensen, Interdisciplinary Studies (Transportation Statistics)

	Undergraduate Research Project	
	Other – Please describe.	

General Objectives and Methodology:

The goal of this project is to: improve safety and minimize the dangers for all transportation mode types while traveling in mixed-use environments on rural facilities through the development and use of engineering and education safety measures. Mixed-use refers to the interaction of different modes of transportation such as non-traditional (ATV and snowmachine) and non-motorized (bicycle, pedestrian, mushing) types of transportation. Safety issues and perceptions will be obtained using an online survey.

Purpose(s) of the Research:

	Purpose
x	Contribute to generalizable knowledge.
	Assess the effectiveness of a specific program, method, practice, etc.:

Exemption Categories:

	Exemption Category
	Exemption 1: Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
x	**Exemption 2:** Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, **unless**: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; **and** (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.
	Exemption 3: Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior that is not exempt under Category 2, **if** (i) the human subjects are elected or appointed public officials or candidates for public office; **or** (ii) Federal statute(s) require(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.
	Exemption 4: Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, **if** these sources are (i) publicly available **or** (ii) if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.
	Exemption 5: Research and demonstration projects which are **conducted by or subject to** the approval of Department or Agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for the benefits or services under those programs.
	Exemption 6: Taste and food quality evaluation and consumer acceptance studies, **if** (i) wholesome foods without additives are consumed **or** (ii) a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or an agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency of the Food Safety and Inspection Service of the U.S. Department of Agriculture.

IRB Research Protocol
Application

Instructions for completing this form are available as hidden text. **To view or hide the instructions click the show/hide formatting icon (¶) on your Word toolbar.** It is strongly recommended that you display the instructions while initially completing this form. The instructions can be hidden once the Protocol is ready to submit to the IRB. The instructions will not be visible if you print the document. If you have a MAC go to the Word menu, click Preferences, and then click View, under Non-printing characters, select the check box next to the "Hidden Test". Tip: You can also turn the All option on or off by clicking Show/Hide symbol on the menu bar paragraph symbol.

Do not change the text in any of the shaded areas of the form. Your responses to each question/section should be written where it says <<Overwrite Here>>; please keep the text of your response in the same blue 10 pt Arial font.

A. APPLICATION INFORMATION:

Title:	Pacific Northwest Transportation Survey
Proposed Start Date	June 21st, 2016
Anticipated Completion Date	December 31st, 2016

B. PRINCIPAL INVESTIGATOR ASSURANCE STATEMENT: *IRB protocols may only be submitted by individuals who are eligible to serve as a Principal Investigator (PI) under UAF policy #05-003 (http://www.uaf.edu/research/faculty/policies-and-regulations/Principal-Investigator-Eligibility.pdf).*

By submitting this protocol application, I certify that the information provided is accurate and complete. I agree to and will comply with the following statements:

1. Abide by all regulations, policies and procedures applicable to research involving human subjects.
2. Accept responsibility for the scientific and ethical conduct of this research.
3. Accept responsibility for providing personnel (collaborators, staff, graduate students, undergraduate students, and volunteers) with the appropriate training and mentoring to conduct their duties as part of this research.
4. If this IRB Protocol Application is for Graduate Student Research, the student's graduate advisory committee has reviewed and approved this research protocol.
5. Obtain approval from the IRB prior to amending or altering the research protocol, consent/assent forms or initiating further correspondence with the research subjects,
6. Immediately report to the Office of Research Integrity any complaints from participants or others, all serious adverse reactions, and/or any unanticipated problems or issues related to this study.
7. Comply with requests of the IRB regarding Continuing/Final Review and assessment in a timely manner.

I realize that failure to comply with the above provisions may result in suspension or termination of this project by the IRB and, if appropriate, restricted access to funding and notification of sponsor, and referral to the appropriate UAF administrative official(s) for disciplinary action.

C. Funding Information:

	Type of Funding	Sponsor or Source	UAF proposal (S#), Grant (G#), or Account (fund-org)
	Internal Competitive	n/a	n/a
	Internal Non-Competitive	n/a	n/a
	External	PacTrans	103010-67048-339320
	Other	n/a	n/a

Justification of Multiple Awards:

n/a

D. Classification of Project:

	Type of Project	Description (if needed)
x	Faculty Research	Dr. Nathan Belz
x	Doctoral or Master Degree Research	Carrie Sorensen, Interdisciplinary Studies (Transportation Statistics)
	Undergraduate Research Project	
	Other – Please describe.	

E. Additional IRB Requirements:

Required Information	Response
Name of Committee	Institutional Review Board
Institution	University of Alaska - Fairbanks
Contact Person	Gretchen Hundertmark
Email Address	ghundertmark@alaska.edu
Phone Number	907-474-7800

	Review Status	Explanation (if needed)
	Application has not been submitted.	<<Overwrite Here>>
	Application is currently under review.	<<Overwrite Here>>
	Application has been approved.	<<Overwrite Here>>
	Other – Please explain.	<<Overwrite Here>>

F. General Objectives and Methodology:

The goal of this project is to: improve safety and minimize the dangers for all transportation mode types while traveling in mixed-use environments on rural facilities through the development and use of engineering and education safety measures. Mixed-use refers to the interaction of different modes of transportation such as non-traditional (ATV and snowmachine) and non-motorized (bicycle, pedestrian, mushing) types of transportation. Safety issues and perceptions will be obtained using an online survey.

G. Literature Search (References):

Federal Highway Administration. (2010). Factors Contrubuting to Pedestrian and Bicycle Crashes on Rural Highways. McLean, VA: U.S. Department of Transportation.

Garland, S. (2014). National Estimates of Victim, Driver, and Incident CHaracteristics for ATV-Related, Emergency Department-Treated Injuries in the United States from January 2010-August 2010. Bethesda, MD: Consumer Product Safety Commission.

International Snowmobile Manufacturers Association. (2014). Facts and Statistics. Retrieved October 12, 2014, from http://www.snowmobile.org/pr_snowfacts.asp

Jennisan, C., Harland, K., Ellis, D., & G., D. (2012). All-terrain vehicles: deadly on and off the road. Injury Prevention, 18, 192-193.

Jennisen, C., Denning, G., Peck, J., Wetjen, K., Hoogerwerf, P., & Harland, K. (2012, October). Got Wheels? Adolescent Exposure to All-Terrain Vehicles and their Driving Practices. Annals of Emergency Medicine, 60(4), pp. 99-100.

Landen, M. e. (1999). Injuries Associated with Snowmobiles. Public Health Reports No. 114, p48.

Mishkovsky, N., Dalbey, M., Bertaina, S., Read, A., & McGaillard, T. (2010). Putting Smart Growth to Work in Rural Communities. Washington, D.C.: International City/County Management Association.

Peek-Asa, C., Sprince, N., Whittem, P., Falb, S., Madsen, M., & Zwerling, C. (2007). Characteristics of crashes with farm equipment that increase potential for injury. Journal of Rural Health 23(4), 339-347.

Pierz, J. (2003). Snowmobile Injuries in North America. Clinical Orthopaedics and Related Research, 29-36.

Snyder, C., Muensterer, O., Sacco, F., & Safford, S. (2014). Helmet Use Among Alaskan Children Involved in Off-Road Motorized Vehicle Crashes. International Journal of Circumpolar Health.

Topping, J., & Garland, S. (2012). 2012 Annual Report of ATV-Related Deaths and Injuries. Bethesda, MD: U.S. Consumer Product Safety Commission, Division of Hazard Analysis.

USDOT. (2014). Safer People, Safer Streets: Summary of US Department of Transporation Action Plan in Increase Walking and Biking and Reduce Pedestrian and Bicyclist Fatalities. Washington, D.C.: US Department of Transporation.

Williams, A., Oesch, S., McCartt, A., Teoh, E., & Sims, L. (2014). On-road all-terrain vehicle ATV fatalities in the United States. Journal of Safety Research, 50, 117-123.

H. Research Population:

Required Information	Response
1. Maximum number of research participants to be enrolled.	Unlimited
2. What are the selection criteria for research participants?	Random (people that elect to take an online questionnaire)
3. Discuss which populations are specifically excluded from the research?	No populations are anticipated to be specifically excluded

I. Protected Groups:

	Protected Group
	Children *(individuals under 18 years of age)*
	Pregnant Women *(in projects where there is the potential for fetal harm/impact)*
	Prisoners

J. Recruitment:

Required Information	Response
1. Discuss the recruitment process. *Note: You must include copies of any proposed recruitment materials with your IRBNet submission package.*	No recruitment; participants will self-elect to participate in the survey. Local user groups (e.g., Fairbanks Cycle Club, Alaska Dog Mushers Association, etc.) will be contacted about the survey and asked to help distribute the survey link.
2. Discuss how you plan to encourage the participation of women and minorities.	Since the survey is administered at random, women and minorities will be included only if they are selected and are willing to participate. We anticipate and will encourage participation of individuals from rural villages and tribes.

K. Benefits, Costs, Risks, Compensation:

Question	Response
1. What are the potential benefits to an individual research participant?	Contribution to ongoing research related to mixed-use and non-traditional travel mode safety in Alaska and the Pacific Northwest. Participants can be entered into a random drawing for a $25 Amazon gift card.
2.<u>If applicable</u>, what are the potential benefits to the culture or society that is the subject of the research?	The direct and specific benefits of this project are a number of guidelines with the intention to improve safety for non-traditional and non-motorized users of the transportation network. Through identifying high risk areas, both targeted engineering and non-engineering strategies will address safety on rural mix-use facilities by focusing on the following four primary areas: Education | Increase knowledge and compliance with safe operating practices | Increase user awareness appropriate sharing behavior on mixed-use facilities | Increase public and private partnerships to encourage training for young operators/users Enforcement | Encourage strict enforcement of NTV operation Engineering | Consider mixed-use needs in transportation planning and design | Provide safer crossing and shared-use environments Policy | Improve NTV and NMT crash data (public safety and medical partnerships, etc.) | Identify high risk locations and support more focused enforcement efforts | Encourage collaboration between local communities and decision makers to address unique mobility needs
3. Will compensation (cash, gift cards, non-monetary gifts, etc.) be provided to research participants? If yes, describe the compensation to be offered, how it will be distributed, and what records will be kept.	Yes. $25 Amazon gift cards will be distributed to 20 participants at random. Participants must provide a valid email address to be eligible for the drawing. This email address will be used to contact them and distribute the gift cards. Email address will not be linked to the survey responses.
4. What are the costs (monetary or time) to an individual research participant?	No monetary cost; approximately 15 minutes of their time.
5. Describe the risk of potential harm or discomfort (physical, psychological, or sociological) to a individual research participant?	No risk of harm or discomfort.
6. What will be done to minimize or mitigate potential harms or discomfort that may be experienced by an individual research participant?	As stated above, there is no risk of harm or discomfort. Participation is completely voluntary and the subject may elect to discontinue the survey at any time.

7. If applicable, what are the potential risks to the culture or society that is the subject of the research?	No foreseen risks.
8. If applicable, what will be done to minimize or mitigate potential harms to the culture or society that is the subject of the research?	As stated above, there are no foreseen risks.

L. Participant Consent / Assent:

Research Requests:

	Request	Justification
	1. Waiver of informed consent.	n/a
x	2. Waiver of the requirement for documentation (written, audio or video) of informed consent:	This project is exempt and the survey is short; consent will be obtained when the person elects to begin the survey. As such, we request to waive the requirement to provide documentation of informed consent.
	3. Greater than 8th grade reading level for consent or assent materials.	n/a
	4. Inclusion of participants whose primary language is not English.	n/a
	5. Inclusion of adults with diminished mental capabilities.	n/a

Consent/Assent Process:

Participant will select the "Begin Survey" button on the survey website.

M. Research Methodology:

Research Plan:

Required Information	Response
1. What is (are) the specific questions that the research seeks to answer?	1) How can we most effectively and safely accommodate personal transportation in spaces where mixed-use travel occurs? 2) How do we limit the improper or inappropriate use of public right-of-way on facilities where mixed-use travel occurs? 3) How do we ensure that we maintain mobility for those with limited travel options?
2. If identifying data will be collected, how will participant confidentiality be maintained?	Email addresses will be obtained for participants that elect to enter the drawing for gift cards. This will be stored locally on the PIs computer and used only for the drawing and distribution of gift cards. The list of emails will be destroyed (deleted) after the gift cards have been issued.

3. How will the data be used? Include all planned uses (i.e. presentation at scholarly meetings, journal articles, dissertation or thesis, agency reports, presented at public meetings, etc.)	Results and findings from the survey will be included in the PacTrans final report, presentation at scholarly meetings, included in journal articles, and in a masters thesis.
4. Where will the project be conducted? Provide the specific physical location.	UAF, online.

Research Tools:

	Data Collection Methods or Instruments
x	Questionnaires.
	Interviews.
	Observations.
	Focus Groups.
	Review of Archived Data / Records / Samples.

N. Potential Conflicts of Interest or Commitment:

Y	N		Explanation (required for all yes answers)
		1. Does any member of the research team have a proprietary interest in the project that may result in patents, trademarks, or licensing agreements? If so, the researcher will need to work with the Office of Technology Transfer to protect these rights.	No.
		2. Does any member of the research team have any equity / financial interest in the research? This would include incentive payments, but not regular salary or stipends.	No.
		3. Does any member of the research team have a power relationship with any or all of the research participants? A power relationship is one that may influence the perception of voluntariness of participation (e.g. employer/employee, counselor/client, or teacher/student)?	No.
		4. Does any member of the research team have any other potential or actual conflict of interest or commitment relative to this research?	No.

O. Data Storage and Retention:

Required Information	Response
1. What is the form in which the data will be collected or recorded? *(Examples: paper instruments, electronic records, field notes, audio recordings, etc.)*	Survey Monkey, Excel.

2. Where will the data be stored during the life of the project?	Data will remain with the PI (Nathan Belz) and Co-PI (Kevin Chang) from the University of Idaho during the project and stored on the Survey Monkey account and a backup copy kept on a USB thumb drive.
3. What will be done with the data at the end of the project?	Data will be stored by the PI at the end of data collection. Security of the data will be maintained by physical transfer of the data.
4. If the data will be maintained after the end of the project, where will it be stored and who will be responsible for maintaining and securing it?	Data will be stored on a local USB drive; PI will be responsible for maintaining and securing the data under lock or supervision in 245 Duckering. Data will not be used but kept on record for PacTrans (funding agency)
5. If the data will be maintained after the end of the project, how long will it be stored or archived?	Data will be stored indefinitely.
6. Who will be responsible for maintaining or ultimately disposing of the data?	PI will be responsible for maintaining the data.
7. How will data be transferred or shared among research team members? *(Examples: data will be maintained on a secure server that is only accessible to research team members, data will be transferred to non-UAF collaborators on encrypted CD/DVDs sent via Federal Express, etc.)*	Data will be stored and transferred using external hard drives to remain locked in the PI's office.
8. Do you have or plan to apply for a Certificate of Confidentiality from the National Institutes of Health?	No.

APPENDIX D: PACIFIC NORTHWEST TRANSPORTATION SURVEY

Welcome to the Pacific Northwest Transportation Survey!

Your input is important and will help transportation professionals develop a better understanding of travel and infrastructure needs in the Pacific Northwest (AK, ID, OR, and WA). The survey will take about **20 minutes of your time** and you must be **18 years or older to participate**.

By clicking the "Next" button at the bottom of this page you consent to participating in the survey. The survey is anonymous, but if you would like to be entered into the drawing for one of **twenty $25 Amazon.com gift cards** you will be required to provide a name and a valid e-mail address so we can contact you if you are selected.

If you have questions about the survey, contact:
Dr. Nathan Belz, University of Alaska Fairbanks (npbelz@alaska.edu or 907-474-5765) or
Dr. Kevin Chang, University of Idaho (kchang@uidaho.edu or 208-885-4028).

If you have questions or concerns about your rights as a research participant, contact the UAF Office of Research Integrity at uaf-irb@alaska.edu or 1-866-876-7800.

NOTE: After starting the survey, if you need to revert back to a previous page in the survey, use the **"Prev"** button located at the bottom of the page. **DO NOT USE THE BACK BUTTON ON YOUR BROWSER** as this action will take you out of the survey and you will lose your responses.

Let’s begin!

(click "Next" below)

Household/Residence Characteristics

1. How would you best describe your primary residence?

- ◯ House (not on farmland or open space)
- ◯ House (on working farmland, in major open space, or secluded wooded area)
- ◯ Apartment, townhouse, condominium, multi-family house (duplex)
- ◯ Dormitory or other institutional housing

Other (please specify)

2. In general, what types of housing can be found within a half a mile of your current home?

- [ ] House (not on farmland or open space)
- [ ] House (on working farmland, in major open space, or secluded wooded area)
- [ ] Apartment, townhouse, condominium, multi-family house (duplex)
- [ ] Dormitory or other institutional housing

Other (please specify)

3. How many adults 18 years old or older, including yourself, are currently living in your home?

- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5+

4. How many children under the age of 18 are currently living in your home?

- ○ 0
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5+

5. My neighborhood has an adequate number of good sidewalks or walking paths.

- ○ Strongly Agree
- ○ Agree
- ○ Neither Agree nor Disagree
- ○ Disagree
- ○ Strongly Disagree
- ○ Don't know or Not Applicable

6. My residence has adequate parking for my car(s).

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree
- Don't Know or Not Applicable

* 7. In which one of the following areas do you consider your current home to be?

- Rural area (open land with few homes and buildings)
- Urban area (region in or surrounding a city)

Household/Residence Characteristics

8. Select a rural subcategory that best describes where your home is.

- Edge (at the fringe of metropolitan areas and typically connected to them by state and interstate highways)
- Traditional Main Street (have compact street design that is often accessible to a transportation hub; historically significant architecture and public spaces)
- Gateway (adjacent to high-amenity recreational areas such as National Parks, National Forests, and coastlines)
- Resource Dependent (surrounded by or in proximity to single industries i.e., agriculture and mining)
- Remote (tribal, village, and/or isolated)

Vehicle Ownership

9. How many of each transportation mode listed below does your household own?

	0	1	2	3	4	5+
Car or Truck	◯	◯	◯	◯	◯	◯
Motorcycle	◯	◯	◯	◯	◯	◯
Bicycle	◯	◯	◯	◯	◯	◯
ATV (All-terrain vehicle)	◯	◯	◯	◯	◯	◯
Snowmachine/Snowmobiles	◯	◯	◯	◯	◯	◯
Dogsled or Dog-powered	◯	◯	◯	◯	◯	◯
Agricultural Vehicle	◯	◯	◯	◯	◯	◯

Commute Characteristics

10. What is your ONE-WAY commute distance to work?

◯ Less than one mile

◯ 1-5 miles

◯ 6-15 miles

◯ 16-30 miles

◯ 30+ miles

◯ Not applicable

11. What is your ONE-WAY commute distance to the nearest town center?

◯ Less than one mile

◯ 1-5 miles

◯ 6-15 miles

◯ 16-30 miles

◯ 30+ miles

◯ Not applicable

12. For each trip purpose below, select the transportation type that you use most often.

	Car or Truck	Motorcycle	Walk or Jog	Bicycle	ATV	Snowmachine or Snowmobiles	Dog Sled or Dog-Powered	Agricultural Vehicle	Other	N/A
To go to work	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
For work	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
To go to school	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
To go shopping	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
To go to out for fun/entertainment	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
To go grocery shopping	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

Frequency of Vehicle/Mode Use

* 13. How frequently do you drive an automobile on, adjacent to, or near a roadway?

◯ Always

◯ Often

◯ Sometimes

◯ Rarely

◯ Never

* 14. How frequently do you ride a motorcycle on, adjacent to, or near a roadway?

◯ Always

◯ Often

◯ Sometimes

◯ Rarely

◯ Never

* 15. How frequently do you walk on, adjacent to, or near a roadway?

- Always
- Often
- Sometimes
- Rarely
- Never

* 16. How frequently do you ride a bicycle on, adjacent to, or near a roadway?

- Always
- Often
- Sometimes
- Rarely
- Never

* 17. How frequently do you ride an ATV on, adjacent to, or near a roadway?

- Always
- Often
- Sometimes
- Rarely
- Never

* 18. How frequently do you ride a snowmachine/snowmobile on, adjacent to, or near a roadway?

- Always
- Often
- Sometimes
- Rarely
- Never

* 19. How frequently do you use dog-powered assistance (e.g. dogsled, skijoring, bikejor) on, adjacent to, or near a roadway?

- Always
- Often
- Sometimes
- Rarely
- Never

* 20. How frequently do you drive an agricultural vehicle on, adjacent to, or near a roadway?

- Always
- Often
- Sometimes
- Rarely
- Never

* 21. Do you travel on, adjacent to, or near a roadway using a different mode (or type) of transportation that was not previously mentioned?

- Yes
- No

Estimate of Miles/Hours of Use

22. For the mode of transportation previously not mentioned, what type is it and how many hours and miles do you travel by this mode in a year?

Type:

Hours:

Miles:

Automobiles

The following questions are about your personal automobile ownership and use.

23. How many individuals, including yourself, drive an automobile in your household?

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6+

24. On average, how many miles do you drive your personal automobile in a year?

- ◯ Less than 10,000
- ◯ 10,000-20,000
- ◯ 20,001-40,000
- ◯ 40,001-60,000
- ◯ More than 60,000

25. How did you learn to drive an automobile? Select all that apply.

- ☐ Driver Education Course
- ☐ Received training from friend or relative
- ☐ Self-taught
- ☐ Other (please specify)

Motorcycles

The following questions are about your motorcycle ownership and use.

26. How many individuals, including yourself, ride a motorcycle in your household?

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6+

27. On average, how many miles do you ride a motorcycle in a year?

- ◯ Less than 10,000
- ◯ 10,000-20,000
- ◯ 20,001-40,000
- ◯ 40,001-60,000
- ◯ More than 60,000

28. How did you learn to ride a motorcycle? Select all that apply.

- ☐ Driver Education Course
- ☐ Received training from friend or relative
- ☐ Self-taught
- ☐ Other (please specify)

ATVs

The following questions are about your ATV ownership and use.

29. How many individuals, including yourself, ride an ATV in your household?

- 1
- 2
- 3
- 4
- 5
- 6+

30. How many of these individuals are under the age of 16?

- 0
- 1
- 2
- 3
- 4
- 5
- 6+

31. On average, how many miles do you ride an ATV in a year?

- Less than 100
- 100-250
- 251-500
- 501-1,000
- 1,001-2,000
- 2,001-4,000
- More than 4,000

32. On average, how many hours do you put on your ATV in a year?

- Less than 50
- 50-100
- 101-200
- 201-400
- 401-600
- More than 600

33. I ride my ATV for:

- Only recreational uses (e.g., hunting, trail riding, etc.)
- Mostly recreational uses
- Some recreational and some utilitarian uses
- Mostly utilitarian uses (e.g., errands, daily travel, etc.)
- Only utilitarian uses

34. How frequently do you ride your ATV on the following types of road components?

	Always	Often	Sometimes	Rarely	Never
On the shoulders of two lane roads (paved)					
On the shoulders of two lane highways (paved)					
On the shoulders of multilane highways (paved)					
Bike lanes on roads					
Sidewalks					
Bike/walking path/trail					

35. How did you learn to ride an ATV? Select all that apply.

- [ ] Organized training
- [ ] Received training from friend or relative
- [ ] Self-taught
- [ ] Other (please specify)

* 36. I feel that there are adequate trail opportunities to ride my ATV near my home.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree
- Don’t Know or Not Applicable

ATVs

37. How do you typically access those trails?

- Ride directly from my home
- Haul them by trailer to a trailhead
- Other (please specify)

38. How far do you travel to reach opportunities to ride ATVs?

- Less than one mile
- 1-5 miles
- 6-15 miles
- 16-30 miles
- 30+ miles
- Not applicable

39. Why do you most commonly ride an ATV? Select all that apply.

- Commuting or for work
- Commuting or for school
- Recreation/Exercise
- Personal trips (i.e., errands, picking up someone, visiting others)
- Other (please specify)

* 40. Have you ever been in a crash with an automobile while riding an ATV?

- Yes
- No
- I prefer not to answer

ATVs

41. Did your last crash with an automobile occur on public or private property?

- On public property
- On private property

42. While riding an ATV, where did your last crash with an automobile occur?

- Off-road/Trail
- At or in an intersection
- Non-intersection road crossing
- Along the roadway
- Other (please specify)

43. Which of the following occurred as a result of the crash with an automobile? Select all that apply.

- No damage or injury
- Property damage only
- Personal injury/Injury to others
- Fatality
- Other (please specify)

44. In your opinion, what might have been done to prevent the crash with an automobile?

45. Does riding an ATV in mixed traffic seem to reduce your safety?

- ◯ Yes
- ◯ No
- ◯ N/A

46. What are some road characteristics you have observed that made you feel safer while riding in mixed traffic? Select all that apply.

- ☐ Signage that cautions automobile drivers that non-traditional and non-motorized vehicles (i.e. ATVs) may be present
- ☐ Pavement markings that section off an area for non-traditional and non-motorized vehicle (i.e. ATVs) use
- ☐ Wider lanes
- ☐ Wider shoulders
- ☐ Lighting
- ☐ Not applicable
- ☐ Other (please specify)

* 47. Have you ever been in a crash riding an ATV that involved a different non-traditional and/or non-motorized mode (such as pedestrians, snowmachines, or bicycles)?

- ◯ Yes
- ◯ No
- ◯ I prefer not to answer

ATVs

48. Did this crash occur on public or private property?

- ◯ On public property
- ◯ On private property

49. Where did this crash occur?

- Off-road/Trail
- At or in an intersection
- Non-intersection road crossing
- Along the roadway
- Other (please specify)

50. Which of the following occurred as a result of the crash? Select all that apply.

- No damage or injury
- Property damage only
- Personal injury/Injury to others
- Fatality
- Other (please specify)

51. In your opinion, what might have been done to prevent this crash?

52. Do you make yourself more visible when riding an ATV? Select all that apply.

- Wear bright colors
- Wear fluorescent or reflective clothing
- Wear other lights on self or belongings
- Use additional reflectors
- Accessorize with safety flags or similar objects
- N/A
- Other (please specify)

53. If you use these features to make yourself more visible, when do you use them?

- Day time only
- Night time only
- Both
- N/A

54. How often do you wear a helmet when riding?

- Always
- Often
- Sometimes
- Rarely
- Never

Snowmachines/Snowmobiles

The following questions are about your snowmachine/snowmobile ownership and use.

55. How many individuals, including yourself, ride a snowmachine in your household?

- 1
- 2
- 3
- 4
- 5
- 6+

56. How many of these individuals are under the age of 16?

- 0
- 1
- 2
- 3
- 4
- 5
- 6+

57. On average, how many miles do you ride a snowmachine in a year?

- Less than 100
- 100-250
- 251-500
- 501-1,000
- 1,001-2,000
- 2,001-4,000
- More than 4,000

58. On average, how many hours do you put on your snowmachine in a year?

- Less than 50
- 50-100
- 101-200
- 201-400
- 401-600
- More than 600

59. I ride my snowmachine/snowmobile for:

- Only recreational uses (e.g., hunting, trail riding, etc.)
- Mostly recreational uses
- Some recreational and some utilitarian uses
- Mostly utilitarian uses (e.g., errands, daily travel, etc.)
- Only utilitarian uses

60. How frequently do you ride on the following types of road components?

	Always	Often	Sometimes	Rarely	Never
On the shoulders of two lane roads (paved)	○	○	○	○	○
On the shoulders of two lane highways (paved)	○	○	○	○	○
On the shoulders of multilane highways (paved)	○	○	○	○	○
Bike lanes on roads	○	○	○	○	○
Sidewalks	○	○	○	○	○
Bike/walking path/trail	○	○	○	○	○

61. How did you learn to ride a snowmachine? Select all that apply.

- [ ] Organized training
- [ ] Received training from friend or relative
- [ ] Self-taught
- [ ] Other (please specify)

* 62. I feel that there are adequate trail opportunities to ride my snowmachine near my home.

- ○ Strongly Agree
- ○ Agree
- ○ Neither Agree nor Disagree
- ○ Disagree
- ○ Strongly Disagree
- ○ Don’t Know or Not Applicable

Snowmachines/Snowmobiles

63. How do you typically access those trails?

- ◯ Ride directly from my home
- ◯ Haul them by trailer to a trailhead
- ◯ Other (please specify)

64. How far do you travel to reach opportunities to ride snowmachines?

- ◯ Less than one mile
- ◯ 1-5 miles
- ◯ 6-15 miles
- ◯ 16-30 miles
- ◯ 30+ miles
- ◯ Not applicable

65. Why do you most commonly ride a snowmachine? Select all that apply.

- ☐ Commuting or for work
- ☐ Commuting or for school
- ☐ Recreation/Exercise
- ☐ Personal trips (i.e., errands, picking up someone, visiting others)
- ☐ Other (please specify)

* 66. Have you ever been in a crash with an automobile while riding a snowmachine?

- ◯ Yes
- ◯ No
- ◯ I prefer not to answer

Snowmachines/Snowmobiles

67. Did your last crash with an automobile occur on public or private property?

- On public property
- On private property

68. While riding a snowmobile, where did your last crash with an automobile occur?

- Off-road/Trail
- At or in an intersection
- Non-intersection road crossing
- Along the roadway
- Other (please specify)

69. Which of the following occurred as a result of the crash with an automobile? Select all that apply.

- No damage or injury
- Property damage only
- Personal injury/Injury to others
- Fatality
- Other (please specify)

70. In your opinion, what might have been done to prevent the crash with an automobile?

71. Does riding a snowmachine in mixed traffic seem to reduce your safety?

- Yes
- No
- N/A

72. What are some road characteristics you have observed that made you feel safer while riding in mixed traffic? Select all that apply.

- [ ] Signage that cautions automobile drivers that non-traditional and non-motorized vehicles (i.e. ATVs) may be present
- [ ] Pavement markings that section off an area for non-traditional and non-motorized vehicle (i.e. ATVs) use
- [ ] Wider lanes
- [ ] Wider shoulders
- [ ] Lighting
- [ ] Not applicable
- [ ] Other (please specify)

* 73. Have you ever been in a crash riding a snowmachine that involved a different non-traditional and/or non-motorized mode (such as agricultural vehicles, ATVs, or bicycles)?

- ○ Yes
- ○ No
- ○ I prefer not to answer

Snowmachines/Snowmobiles

74. Did this crash occur on public or private property?

- ○ On public property
- ○ On private property

75. Where did this crash occur?

- ○ Off-road/Trail
- ○ At or in an intersection
- ○ Non-intersection road crossing
- ○ Along the roadway
- ○ Other (please specify)

76. Which of the following occurred as a result of the crash? Select all that apply.

- ☐ No damage or injury
- ☐ Property damage only
- ☐ Personal injury/Injury to others
- ☐ Fatality
- ☐ Other (please specify)

77. In your opinion, what might have been done to prevent this crash?

78. Do you do anything to make yourself more visible when riding a snowmachine? Select all that apply.

- ☐ Wear bright colors
- ☐ Wear fluorescent or reflective clothing
- ☐ Wear other lights on self or belongings
- ☐ Use additional reflectors
- ☐ Accessorize with safety flags or similar objects
- ☐ N/A
- ☐ Other (please specify)

79. If you use these features to make yourself more visible, when do you use them?

- ○ Day time only
- ○ Night time only
- ○ Both
- ○ N/A

80. How often do you wear a helmet when riding?

- Always
- Often
- Sometimes
- Rarely
- Never

Agricultural Vehicles

The following questions are about your agricultural vehicle ownership and use.

81. How many individuals, including yourself, drive an agricultural vehicle in your household?

- 1
- 2
- 3
- 4
- 5
- 6+

82. How many of these individuals are under the age of 16?

- 0
- 1
- 2
- 3
- 4
- 5
- 6+

83. On average, how many hours do you put on your agricultural vehicle on or near roads in year?

- ○ Less than 50
- ○ 50-100
- ○ 101-200
- ○ 201-400
- ○ 401-600
- ○ More than 600

84. How frequently do you drive on the following types of road components?

	Always	Often	Sometimes	Rarely	Never
On the shoulders of two lane roads (paved)	○	○	○	○	○
On the shoulders of two lane highways (paved)	○	○	○	○	○
On the shoulders of multilane highways (paved)	○	○	○	○	○
Bike lanes on roads	○	○	○	○	○
Sidewalks	○	○	○	○	○
Bike/walking path/trail	○	○	○	○	○

85. How did you learn to drive an agricultural vehicle? Select all that apply.

- ☐ Organized training
- ☐ Received training from friend or relative
- ☐ Self-taught
- ☐ Other (please specify)

* 86. Have you ever been in a crash with an automobile while driving an agricultural vehicle?

- ○ Yes
- ○ No
- ○ I prefer not to answer

Agricultural Vehicles

87. Did your last crash with an automobile occur on public or private property?

- On public property
- On private property

88. While driving an agricultural vehicle, where did your last crash with an automobile occur?

- Off-road/Trail
- At or in an intersection
- Non-intersection road crossing
- Along the roadway
- Other (please specify)

89. Which of the following occurred as a result of the crash with an automobile? Select all that apply.

- No damage or injury
- Property damage only
- Personal injury/Injury to others
- Fatality
- Other (please specify)

90. In your opinion, what might have been done to prevent this crash with an automobile?

91. Does driving an agricultural vehicle in mixed traffic seem to reduce your safety?

- Yes
- No
- N/A

92. What are some road characteristics you have observed that made you feel safer while driving in mixed traffic? Select all that apply.

- [ ] Signage that cautions automobile drivers that non-traditional and non-motorized vehicles (i.e. ATVs) may be present
- [ ] Pavement markings that section off an area for non-traditional and non-motorized vehicle (i.e. ATVs) use
- [ ] Wider lanes
- [ ] Wider shoulders
- [ ] Lighting
- [ ] Not applicable
- [ ] Other (please specify)

93. Have you ever been in a crash riding an agricultural vehicle that involved a different non-traditional and/or non-motorized mode (such as ATVs, bicycles, or pedestrians)?

- Yes
- No
- I prefer not to answer

Agricultural Vehicles

94. Did this crash occur on public or private property?

- On public property
- On private property

95. While driving an agricultural vehicle, where did this crash occur?

- Off-road/Trail
- At or in an intersection
- Non-intersection road crossing
- Along the roadway
- Other (please specify)

96. Which of the following occurred as a result of the crash? Select all that apply.

- ☐ No damage or injury
- ☐ Property damage only
- ☐ Personal injury/Injury to others
- ☐ Fatality
- ☐ Other (please specify)

97. In your opinion, what might have been done to prevent this crash?

Bicycles

The following questions are about your bicycle ownership and use.

98. How many individuals, including yourself, ride a bicycle in your household?

- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6+

99. How many of these individuals are under the age of 16?

- 0
- 1
- 2
- 3
- 4
- 5
- 6+

100. On average, how many miles do you travel by bike in a month?

- Less than 10
- 10-50
- 51-100
- 101-250
- More than 250

101. On average, how many days out of the month do you ride a bicycle?

- 1-3
- 4-6
- 7-10
- 11-15
- 16-20
- 21-31

102. I ride my bicycle for:

- Only recreational uses (e.g., exercise, trail riding, etc.)
- Mostly recreational uses
- Some recreational and some utilitarian uses
- Mostly utilitarian uses (e.g., errands, daily travel, etc.)
- Only utilitarian uses

103. What is the average length of your trip using a bicycle?

- ○ Less than 1 mile
- ○ 1-3 miles
- ○ 4-6 miles
- ○ 7-10 miles
- ○ 11-15 miles
- ○ 16-20 miles
- ○ 21-30 miles
- ○ 30+ miles

104. How did you learn to ride a bicycle? Select all that apply.

- ☐ Organized training
- ☐ Received training from friend or relative
- ☐ Self-taught
- ☐ Other (please specify)

105. Why do you most commonly ride a bicycle? Select all that apply.

- ☐ Commuting or for work
- ☐ Commuting or for school
- ☐ Recreation/Exercise
- ☐ Personal trips (i.e., errands, picking up someone, visiting others)
- ☐ Other (please specify)

106. How frequently do you ride on the following types of road components?

	Always	Often	Sometimes	Rarely	Never
On the shoulders of two lane roads (paved)	○	○	○	○	○
On the shoulders of two lane highways (paved)	○	○	○	○	○
On the shoulders of multilane highways (paved)	○	○	○	○	○
Bike lanes on roads	○	○	○	○	○
Sidewalks	○	○	○	○	○
Bike/walking path/trail	○	○	○	○	○

107. When traveling in the roadway, which way do you mostly face?

- ○ Facing traffic (i.e. against the direction of traffic)
- ○ With traffic (i.e. traveling in the same direction as traffic)

* 108. Are bike paths or shared-use paths available within a quarter mile of where you live? (Bike paths are typically separated facilities located away from a roadway.)

- ○ Yes
- ○ No

Bicycles

109. Are there any reasons why you choose not to use bike paths? Select all that apply.

- ☐ Poor surface condition
- ☐ Doesn't lead where I need to go
- ☐ Too crowded
- ☐ Doesn't feel safe
- ☐ Other (please specify)

* 110. Are bike lanes on a roadway available within a quarter mile of where you live? (Bike lanes are facilities typically located on a roadway.)

- Yes
- No

Bicycles

111. Are there any reasons why you choose not to use bike lanes if they are available? Select all that apply.

- Poor surface condition
- Don't feel comfortable with cars
- Too crowded
- I feel safer on the sidewalk
- Other (please specify)

112. If you have felt unsafe while riding your bike on or near a roadway, why? Select all that apply.

- Presence of motorists
- Uneven walkways or roadway surfaces
- Dogs or other animals
- Other bicycle or pedestrian traffic
- Lack of room
- Obstacles blocking path
- Not maintained
- Not applicable
- Other (please specify)

113. If a motorist made you feel unsafe, how did they do so? Select all that apply.

- Cut me off
- Honked at me
- Almost hit me/near miss
- Just the presence of the motorist was threatening
- Drove too fast
- Not applicable/Don't make me feel unsafe
- Other (please specify)

* 114. Have you ever been in a crash with an automobile while riding a bicycle?

- Yes
- No
- I prefer not to answer

Bicycles

115. Did this crash with an automobile occur on public or private property?

- On public property
- On private property

116. While riding a bicycle, where did this crash with an automobile occur?

- Off-road/Trail
- At or in an intersection
- Non-intersection road crossing
- Along the roadway
- Other (please specify)

117. Which of the following occurred as a result of the crash with an automobile? Select all that apply.

No damage or injury

Property damage only

Personal injury/Injury to others

Fatality

Other (please specify)

118. In your opinion, what might have been done to prevent the crash with an automobile?

119. What are some road characteristics you have observed or place that made you feel safer while riding in mixed traffic? Select all that apply.

Signage that cautions automobile drivers that non-traditional and non-motorized vehicles (i.e. ATVs) may be present

Pavement markings that section off an area for non-traditional and non-motorized vehicle (i.e. ATVs) use

Wider lanes

Wider shoulders

Lighting

Not applicable

Other (please specify)

* 120. Have you ever been in a crash riding a bicycle that involved a different non-traditional and/or non-motorized mode (such as ATVs, snowmachines, or pedestrians)?

- Yes
- No
- I prefer not to answer

Bicycles

121. Did this crash occur on public or private property?

- On public property
- On private property

122. While riding a bicycle, where did this crash occur?

- Off-road/Trail
- At or in an intersection
- Non-intersection road crossing
- Along the roadway
- Other (please specify)

123. Which of the following occurred as a result of the crash? Select all that apply.

- No damage or injury
- Property damage only
- Personal injury/Injury to others
- Fatality
- Other (please specify)

124. In your opinion, what might have been done to prevent the crash?

125. Do you do anything to make yourself more visible? Select all that apply.

- Use headlight
- Use taillight
- Wear fluorescent or reflective clothing
- Wear other lights on self or belongings
- Use additional reflectors
- Accessorize with safety flags (or similar objects)
- Other (please specify)

126. If you use these features to make yourself more visible, when do you use them?

- Day time only
- Night time only
- Both
- N/A

127. How often do you wear a helmet when riding?

- Always
- Often
- Sometimes
- Rarely
- Never

Pedestrians

The following questions are about walking/exercising as a pedestrian.

128. How many individuals, including yourself, walk as a means of traveling in your household?

- 1
- 2
- 3
- 4
- 5
- 6+

129. How many of these individuals are under the age of 16?

- 0
- 1
- 2
- 3
- 4
- 5
- 6+

130. On average, how many miles do you travel by walking in a month?

- Less than 10
- 10-25
- 26-50
- 51-100
- More than 100

131. On average, how many days out of the month do you walk as a means of traveling?

- 1-3
- 4-6
- 7-10
- 11-15
- 16-20
- 21-31

132. I walk for:

- Only recreational uses (e.g., exercise, trail walking/hiking, etc.)
- Mostly recreational uses
- Some recreational and some utilitarian uses
- Mostly utilitarian uses (e.g., errands, daily travel, etc.)
- Only utilitarian uses

133. What is the average length of your walking trip?

- Less than 1 mile
- 1-3 mile
- 4-6 miles
- 7-10 miles
- 11-15 miles
- 16-20 miles
- 21-30 miles
- 30+ miles

134. Why do you most commonly walk as a means of traveling? Select all that apply.

- Commuting or for work
- Commuting or for school
- Recreation/exercise
- Personal trips (i.e., errands, picking up someone, visiting others)
- Required for my job
- Drop off/Pick up someone
- Visit a friend or relative
- Other (please specify)

135. How frequently do you travel on the following types of road components as a pedestrian?

	Always	Often	Sometimes	Rarely	Never
On the shoulders of two lane roads (paved)	◯	◯	◯	◯	◯
On the shoulders of two lane highways (paved)	◯	◯	◯	◯	◯
On the shoulders of multilane highways (paved)	◯	◯	◯	◯	◯
Bike lanes on roads	◯	◯	◯	◯	◯
Sidewalks	◯	◯	◯	◯	◯
Bike/walking path/trail	◯	◯	◯	◯	◯

136. Are walking path(s) available within a quarter mile of where you live?

◯ Yes

◯ No

137. If there are walking paths available, how often do you use them?

◯ Always

◯ Often

◯ Sometimes

◯ Rarely

◯ Never

◯ N/A or not available

138. Are there any reasons why you choose not to use these paths? Select all that apply.

Poor surface condition

Doesn't lead where I need to go

Too crowded

Doesn't feel safe

Other (please specify)

* 139. Are sidewalks available within a quarter mile of where you live?

- Yes
- No

Pedestrians

140. If sidewalks are not available, where do you walk?

- In the road
- On the shoulder of the road
- Along the side of the road
- N/A
- Other (please specify)

141. When walking on the roadway, which direction do you mostly face?

- Facing traffic (i.e. against the direction of traffic)
- With traffic (i.e. traveling in the same direction as traffic)
- I don't walk on the roadway

142. What are some road characteristics you have observed or place that made you feel safer while walking in mixed traffic? Select all that apply.

- Signage that cautions automobile drivers that non-traditional and non-motorized vehicles (i.e. ATVs) may be present
- Pavement markings that section off an area for non-traditional and non-motorized vehicle (i.e. ATVs) use
- Wider lanes
- Wider shoulders
- Lighting
- Not applicable
- Other (please specify)

143. If you have felt unsafe while walking on or near a roadway, why? Select all that apply.

Presence of motorists

Uneven walkways or roadway surfaces

Dogs or other animals

Other bicycle or pedestrian traffic

Lack of room

Obstacles blocking path

Not maintained

N/A

Other (please specify)

144. If a motorist made you feel unsafe, how did they do so? Select all that apply.

Cut me off

Honked at me

Almost hit me/near miss

Just the presence of the motorist was threatening

Drove too fast

Not applicable/Don't make me feel unsafe

Other (please specify)

* 145. Have you ever been hit by an automobile while walking?

- Yes
- No
- I prefer not to answer

Pedestrians

146. Were you hit by an automobile on public or private property?

- On public property
- On private property

147. While walking, where were you hit by an automobile?

- Off-road/Trail
- At or in an intersection
- Non-intersection road crossing
- Along the roadway
- Other (please specify)

148. Which of the following occurred as a result of this incident? Select all that apply.

- No damage or injury
- Property damage only
- Personal injury/Injury to others
- Fatality
- Other (please specify)

149. In your opinion, what might have been done to prevent the crash with an automobile?

* 150. Have you ever been hit when walking by a non-traditional and/or non-motorized vehicle (i.e. ATV or bicycle)?

- Yes
- No

Pedestrians

151. Were you hit on public or private property?

- On public property
- On private property

152. While walking, where were you hit?

- Off-road/Trail
- At or in an intersection
- Non-intersection road crossing
- Along the roadway
- Other (please specify)

153. Which of the following occurred as a result of this incident? Select all that apply.

- No damage or injury
- Property damage only
- Personal injury/Injury to others
- Fatality
- Other (please specify)

154. In your opinion, what might have been done to prevent this?

155. Do you do anything to make yourself more visible as a pedestrian? Select all that apply.

- Wear fluorescent or reflective clothing/shoes
- Wear other lights on self or belongings
- Travel only in well-lit areas
- N/A
- Other (please specify)

156. If you use these features to make yourself more visible as a pedestrian, when do you use them?

- Day time only
- Night time only
- Both
- N/A

Dogsled/Dog-Powered Transportation

The following questions are about dogsleds and dog-powered modes of transportation.

157. How many individuals, including yourself, use dog-powered modes of transportation in your household?

- 1
- 2
- 3
- 4
- 5
- 6+

158. How many of these individuals are under the age of 16?

- 0
- 1
- 2
- 3
- 4
- 5
- 6+

159. In which of the following ways do you typically use your dog/dog team? Select all that apply.

Transportation

Racing-related activities (competitive, sprint, distance, clubs, etc.)

Other recreational activities (camping, skijoring, bikejoring, etc.)

Gathering Resources (trapping, hauling wood or water, etc.)

Other (please specify)

160. On average, how many miles do you travel by dog sled or another dog-powered mode in a year?

- Less than 100
- 100-250
- 251-500
- 501-1,000
- More than 500

161. Which types of activities do you typically engage in with your dog/dog team? Select all that apply.

Sledding/Mushing

Skijoring

Scootering

Bikejoring

Carting/Rig/Sulkie

Sulkie

Canicross

Other (please specify)

162. I ride my dogsled/dog-powered mode for:

- Only recreational uses (e.g., hunting, trail riding, etc.)
- Mostly recreational uses
- Some recreational and some utilitarian uses
- Mostly utilitarian uses (e.g., errands, daily travel, etc.)
- Only utilitarian uses

163. In general, how did you learn to use these dog-powered modes of transportation? Select all that apply.

Formalized Training

Received training from friend or relative

Self-taught

Other (please specify)

164. How many years have you been engaged in dog-powered travel/activities?

- Less than 1
- 1-2
- 3-5
- 6+

165. On average, how many days out of the month do you use a dog-powered mode of transportation?

- 1-3
- 4-6
- 7-10
- 11-15
- 16-20
- 21-31

Dogsled/Dog-Powered Transportation

166. Are there adequate trails near where you live?

- Yes
- No

167. How do you typically access these trails?

- Using dog-powered mode directly from my home
- Haul dogs/gear by automobile to trail head
- Other (please specify)

168. On average, how far do you typically travel to access trail systems?

- 0 - 1 miles
- 2 - 5 miles
- 6 - 10 miles
- 11 - 20 miles
- 20+ miles

169. How frequently do you travel across the following types of road components with your dog/dog-team?

	Always	Often	Sometimes	Rarely	Never
On the shoulders of two lane roads (paved)					
On the shoulders of two lane highways (paved)					
On the shoulders of multilane highways (paved)					
Bike lanes on roads					
Sidewalks					
Bike/walking path/trail					

170. If traveling with your dog/dog-team in the roadway, which way do you mostly face?

- Facing traffic (i.e. against the direction of traffic)
- With traffic (i.e. traveling in the same direction as traffic)
- Not applicable

171. Why do you most commonly use a dog-powered mode of transportation? Select all that apply.

Commuting or for work

Commuting or for school

Recreation/Exercise

Personal trips (i.e., errands, picking up someone, visiting others)

Other (please specify)

172. If you have felt unsafe while traveling with your dog/dog-team on, adjacent to, or near roadways, select all that apply.

Motorists (while operating on or near roads)

Road crossings on blind corners

Road or driveway crossing that is higher than trail

Obstacles blocking path (such as debris or berms of snow)

Narrow trail or path

Too much mushing traffic

Other non-motorized user traffic (skiing, fatbiking, snowshoeing, etc.)

Other motorized user traffic (such as snowmachines/snowmobiles)

N/A

Other (please specify)

173. If a motorists made you feel unsafe, select all that apply.

Cut me off

Drove very close to me

Honked at me

Almost hit me

Drove too fast

Just the presence of the motorist was threatening

N/A

Other (please specify)

* 174. Have you ever been in a crash with an automobile while using your dog/dog-team?

- Yes
- No
- I prefer not to answer

Dogsled/Dog-Powered Transportation

175. Did your last crash with this automobile occur on public or private property?

- On public property
- On private property

176. While using your dog/dog-team,where did your last crash occur?

- Off-road/Trail
- At or in an intersection
- Non-intersection road crossing
- Along the roadway
- Other (please specify)

177. Which of the following occurred as a result of this crash with an automobile? Select all that apply.

- No damage or injury
- Property damage only
- Personal injury/Injury to others
- Fatality
- Other (please specify)

178. In your opinion, what might have been done to prevent this crash with an automobile?

Dogsled/Dog-Powered Transportation

179. Does riding with your dog/dog-team in mixed traffic seem to reduce your safety?

- Yes
- No
- N/A

180. What are some road characteristics you have observed in another town or place that made you feel safer? Select all that apply.

- Signage that cautions automobile drivers that non-traditional and non-motorized vehicles (i.e. ATVs) may be present
- Pavement markings that section off an area for non-traditional and non-motorized vehicle (i.e. ATVs) use
- Wider lanes
- Wider shoulders
- Lighting
- Not applicable
- Other (please specify)

* 181. Have you ever been in a crash while riding with your dog/dog-team that involved a different non-traditional and/or non-motorized vehicle (for example ATVs, snowmachines, skiers, pedestrians, or bicycles)?

- Yes
- No
- I prefer not to answer

Dogsled/Dog-Powered Transportation

182. Did this crash occur on public or private property?

- On public property
- On private property

183. While using your dog/dog-team, where did this crash occur?

- Off-road/Trail
- At or in an intersection
- Non-intersection road crossing
- Along the roadway
- Other (please specify)

184. Which of the following occurred as a result of the crash? Select all that apply.

- No damage or injury
- Property damage only
- Personal injury/Injury to others
- Fatality
- Other (please specify)

185. In your opinion, what might have been done to prevent this crash?

186. Do you do anything to make yourself more visible when riding with your dog/dog-team? Select all that apply.

- Wear bright colors
- Wear fluorescent or reflective clothing
- Wear other lights on self or belongings
- Ensure I have reflectors
- Accessorize with safety flags or similar objects
- N/A
- Other (please specify)

187. If you use features to make yourself more visible when riding with your dog/dog-team, when do you use them?

- Day time only
- Night time only
- Both
- N/A

188. How often do you wear a helmet when riding with your dog/dog-team?

- Always
- Often
- Sometimes
- Rarely
- Never

Crash Reporting

The following questions are about unreported crashes that occurred on public property.

* 189. As either an ATV, snow machine/snowmobile, agricultural vehicle, or dogsled/dog-powered mode user, have you been involved in an unreported crash on public property involving an automobile in the last five years?

- Yes
- No
- Prefer not to answer
- Question does not apply to me

* 190. As either a bicyclist or pedestrian, have you been involved in an unreported crash on public property involving an automobile in the last five years?

- Yes
- No
- Prefer not to answer
- Question does not apply to me

* 191. In the last five years, have you been involved in an unreported crash on public property involving two non-automobile modes (i.e., ATV and bicycle, snow machine and dogsled, etc.)?

- Yes
- No
- Prefer not to answer
- Question does not apply to me

Crash Reporting

192. Consider your most recent unreported crash on public property. What transportation type were you using when this crash occurred?

- ATV
- Snowmachine/snowmobile
- Agricultural vehicle
- Dogsled/dog-powered mode
- Bicycle
- Pedestrian/walking
- Other (please specify)

193. Consider your most recent unreported crash on public property. Why was this crash unreported? Check all that apply.

- No property damage
- No personal injury
- Property damage only (minor)
- Personal injury (minor)
- Lack of reportable information
- Prefer not to answer

Other (please specify)

194. Did this unreported crash on public property involve any operators under the age of 16?

- Yes
- No
- Prefer not to answer

Respondent Characteristics

The questions in this section help us to ensure that we have obtained a representative sample of the population. Please be reminded that your responses are anonymous.

195. Do you have a (State Issued) Driver's License?

- Yes
- No

196. What is your employment status?

- Employed full-time
- Employed part-time
- Not currently employed

197. What description best describes your occupation?

- Salaried / Employee
- Self-Employed
- Student
- Retired
- Homemaker
- Other (please specify)

198. How would you best describe your job category?

- Sales/Service
- Clerical/Admin support
- Manufacturing, construction, maintenance, or farming
- Professional, managerial, or technical
- Other (please specify)

199. What age range describes you?

- 18-25
- 26-30
- 31-40
- 41-50
- 51-60
- Over 60

200. What is your sex?

- Male
- Female
- Other

201. What is your marital status?

- Single
- Married or with partner
- Separated, divorced, or widowed
- Other (please specify)

202. What is your highest completed education level?

- ◯ Less than high school diploma
- ◯ High school diploma or equivalency
- ◯ Some college, no degree
- ◯ Associate degree
- ◯ Bachelor's degree
- ◯ Graduate or professional degree

203. What is your approximate annual household income?

- ◯ Under $25,000
- ◯ $25,000 - $49,999
- ◯ $50,000 - $74,999
- ◯ $75,000 - $99,999
- ◯ $100,000 - $124,999
- ◯ $125,000 or more

* 204. What state do you primarily live in?

- ◯ Alaska
- ◯ Idaho
- ◯ Washington
- ◯ Oregon
- ◯ Montana
- ◯ Other (please specify)

205. What is the zip code of the community that you primarily live in?

206. Please feel free to provide any general comments or feedback about the survey or additional information here.