PROMOTING CSET OUTREACH ACTIVITIES THROUGH SAFETY DATA MANAGEMENT AND ANALYSIS IN RITI COMMUNITIES

FINAL PROJECT REPORT

by

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for

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16. Abstract

Traffic crashes are one of the leading causes of death among all people in the United States, but the rates among American Indian and Alaska Native (AIAN) populations are significantly higher than other groups. In fact, rural areas in general are disadvantaged from a traffic safety perspective due to the lack of funding and challenges in safety improvement decisions. This may contribute to the much higher fatality rate on rural roadways than on urban roadways. Additionally, there is a known issue of underreporting of fatal crashes of tribal members. Thus, an increased focus on rural, isolated, tribal, and indigenous (RITI) community traffic safety is necessary in order to progress towards zero fatalities. The need for quality data is recognized, and even included in many tribal transportation plans, but implementation and collection of the data varies. Quality data enables better safety analysis and enables greater support for traffic safety improvements. An easy-to-use and multisource database would enable tribes throughout the state and other rural communities to more readily manage data and apply for improvement funding. In order to reach this point, it is necessary to have agreements with tribes on crash data collection and usage, and understand local customs, needs, and current practices. This research aimed to form trusting and lasting relationships with tribal leaders in Washington State in order to facilitate crash database management and traffic safety analysis in their communities. The outreach activities included meetings with local tribal leaders, interviews, and attendance and presentations at tribal conferences. Ultimately a formal research agreement was signed with one tribe in Washington State granting access to the fatal and serious injury crash data they had collected.

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS				
Symbol	**When You Know**	**Multiply By**	**To Find**	**Symbol**
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS				
Symbol	**When You Know**	**Multiply By**	**To Find**	**Symbol**
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
°C	Celsius	1.8C+32	Fahrenheit	°F
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
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EXECUTIVE SUMMARY

This report presents some of the challenges facing rural, isolated, tribal, and indigenous (RITI) communities, with an emphasis on those challenges relating to traffic safety. American Indian and Alaska Native (AIAN) communities in particular are disadvantaged from a traffic safety perspective due to the higher rates of fatal and serious injury crashes that occur among their population. Overall fatalities for AIAN people are significantly higher than for non-AIAN people, and this trend is the same when comparing on pedestrian fatalities, impaired driving fatalities, and unrestrained fatalities.

Despite these higher rates of fatal crashes and risk factors, traffic safety improvements are not made as readily as in urban areas, in part due to the lack of data to help obtain state or federal funding. Additionally, while the current data shows the traffic fatality rate is higher for AIAN people than non-AIAN people, this difference is even starker when accounting for underreporting of collisions. With varied crash data collection practices in place throughout the tribes in Washington State, it is important to gain an understanding of what data is collected and how it is currently managed and used. Once this is done, data analysis and visualization can be conducted in order to gain better insights regarding traffic safety issues facing the communities. However, before any of this is possible, strong and trusting relationships with the communities in question must be formed.

This research report presents the activities that the researchers conducted in the process of forming lasting relationships with the tribes in Washington State. A meeting with a tribal liaison first allowed the researchers to gain valuable knowledge about communications customs and strategies that should be used, and also opened the door to later meetings and conferences. Presenting the project with an emphasis on collaboration and finding context- and culturally-sensitive solutions is paramount to forging beneficial relationships. From the various meetings and communications with tribal leaders, a sense of the baseline data was obtained and a formal research agreement with one tribe was signed, symbolizing the commitment both parties have to find equitable solutions for improved traffic safety, and in particular tribal crash data collection.

CHAPTER 1. INTRODUCTION

1.1. General Background

Rural, isolated, tribal, and indigenous (RITI) communities are often overlooked for transportation improvements, which causes a certain disadvantage in terms of traffic safety. This is a major equity concern, especially as technology continues to develop at a fast rate while implementation is focused in urban areas. The technological nature of many urban transportation improvements creates an even starker contrast to improvements in rural areas, where often relatively simple infrastructure improvements can have a significant impact. However, without the deserved attention, these RITI communities face their transportation issues with limited funding and other resource limitations. If you have a right to get there, you have a right to get there safely, and the systemic disadvantage RITI communities face is directly at odds with this mentality. The cultural and environmental diversity found in RITI communities are two reasons why these areas deserve greater attention to traffic safety analysis.

The Vision Zero program adopted in the United States and Washington State aims to eliminate traffic fatalities by 2030, yet there is a discrepancy between traffic safety improvements in RITI and urban communities. In 2000, Washington State became the first state in the United States to adopt formal policy aimed at reducing roadway fatalities to zero and was influenced by Sweden's Vision Zero program, started in 1997. The program has been a significant point in the conversation regarding traffic safety, with 42 cities adopting their own plans. This clearly suggests that the nation as a whole, adequately recognizes the public health issue posed by traffic collisions. However, while there has undoubtedly been significant research and practical improvements in the realm of traffic safety to support the goals of Vision Zero, it is also clear that attention to RITI community needs is lacking.

Figure 1, below, depicts the trend of fatalities from 2005 - 2014 throughout Washington State (Washington Traffic Safety Commission 2016). It is important to note that the overall trend is promising, but recent years have seen an increase in fatalities. Because of this increase, there exists a performance gap between reaching the goal of Target Zero and the current trend that is seen. While this is from the most recent Strategic Highway Safety Plan, more recent state fatality data suggests that the performance gap has continued to increase since 2014.

While the Plan does include notes on the need to focus on rural areas and includes statistics for American Indian and Alaska Native (AIAN) communities, only cursory statistics are provided to indicate this performance and there is limited discussion of solutions to mitigate crashes in rural areas specifically. Figure 2, below, depicts the difference in rural and urban crashes throughout the entire nation from 2007 – 2016. This figure shows a promising downward trend in fatality counts for both urban and rural crashes, with a faster decrease in rural fatalities. However, Figure 3, below, depicts the crash rate for urban and rural areas throughout the nation for the same time period (National Highway Traffic Safety Administration 2018). Crash rate is a more useful measure because it takes into account the frequency of crashes per vehicle mile traveled (VMT). This trend is also promising, but it is important to note that rural fatalities still occur at a rate of nearly 2.5 times that of urban fatalities. The evidence reinforces the disproportionate need for rural areas to receive attention and support to better address traffic safety.

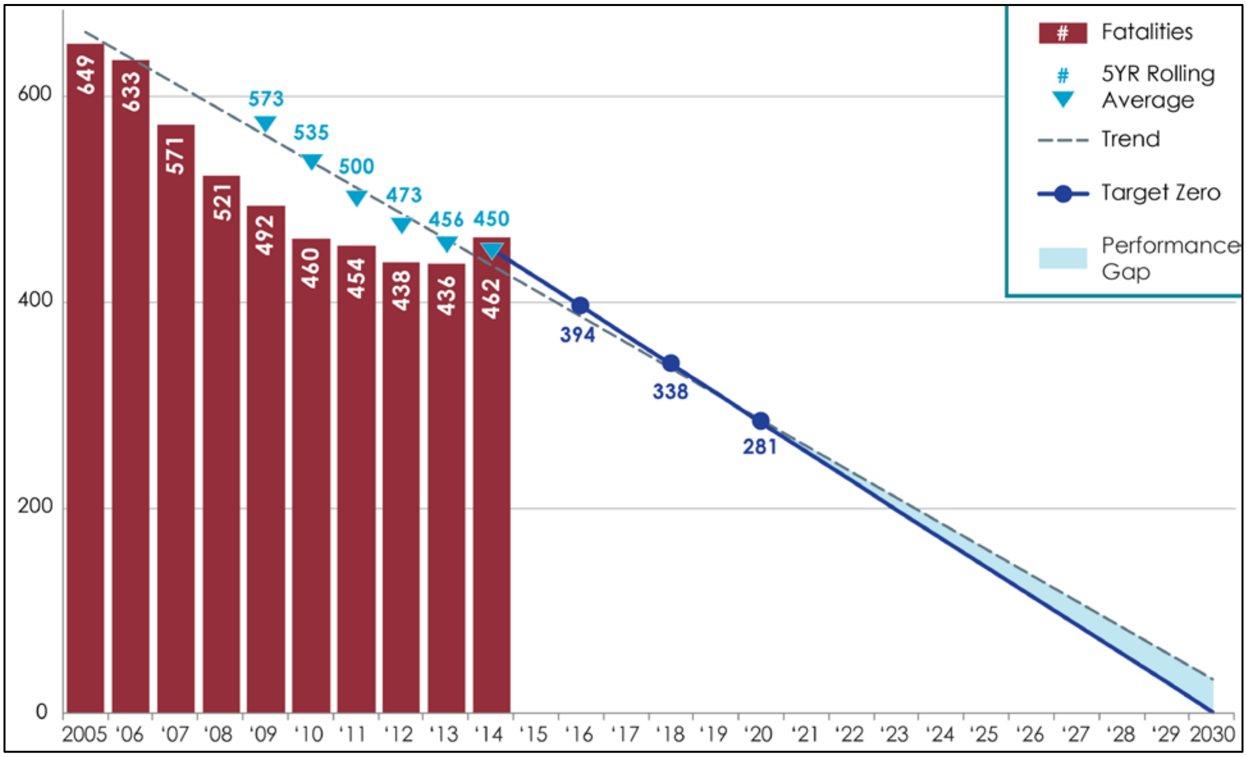

Figure 1 Trend of Fatalities in Washington State

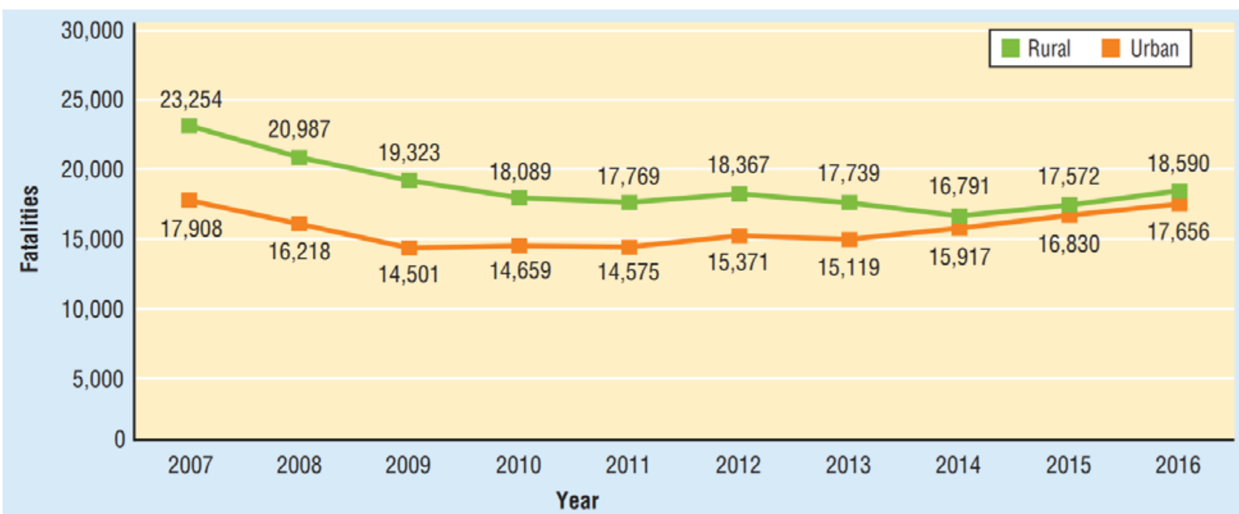

Figure 2 Fatality Counts in Rural and Urban Areas

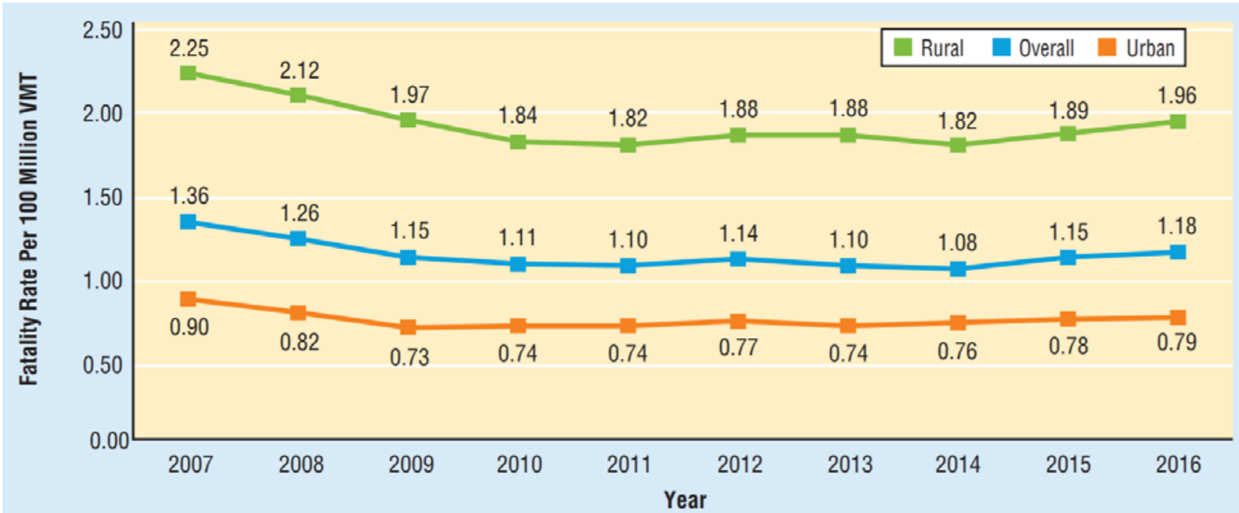

Figure 3 Fatality Rates in Rural and Urban Areas

This project focused primarily on addressing the issue in regard to AIAN communities in Washington State by forging strong relationships with tribal leaders and communities to better understand their needs and local traffic safety issues. AIAN communities are not the only population disadvantaged from a traffic safety perspective, however with both political and cultural differences to navigate and respect, there is a need to dedicate a thorough research effort to work with them. By approaching AIAN tribes in Washington State with a willingness to collaborate to find successful solutions and to honor their culture and respect their sovereignty, it will be possible to establish ongoing relationships that can be expanded to other rural communities. This outreach work laid the foundation for tribal traffic safety data analysis, allowing for more informed decision-making and more targeted traffic safety improvements. While members of many tribes were met through this project and many expressed interest in collaborating, they are only mentioned by name if a formal research agreement was made.

1.2. Problem Statement

The disadvantage facing RITI communities in terms of traffic safety is even clearer when looking at crash data in recent years. To be more specific, the data highlight the challenges facing AIAN communities – according to the national Fatality Analysis Reporting System (FARS), the fatal crash rate among the AIAN community is higher than any other race in Washington State (National Center for Statistics and Analysis, 2015). This holds true when accounting for deaths both on and off tribal lands. Figure 4, below, shows the fatality rate for AIAN and non-AIAN races in Washington State using data from 2002 – 2011. Note that the fatality rate for AIANs is 4 times that of non-AIANs. A similar case is found when comparing pedestrian fatality rates among AIANs and non-AIANs. Figure 5, below, shows this comparison - note that the AIAN pedestrian fatality rate is nearly 5 times that of the overall non-AIAN pedestrian fatality rate. While this data is from 2002 – 2011, the rates are still very similar; the Washington Traffic Safety Committee reports that as of 2016, the AIAN pedestrian crash rate was 5 times that of the non-AIAN pedestrian crash rate. They also reported that as of 2016, the overall fatality rate for AIANs was 4.2 times that of the non-AIAN fatality rate (Washington Traffic Safety Commission June 2018).

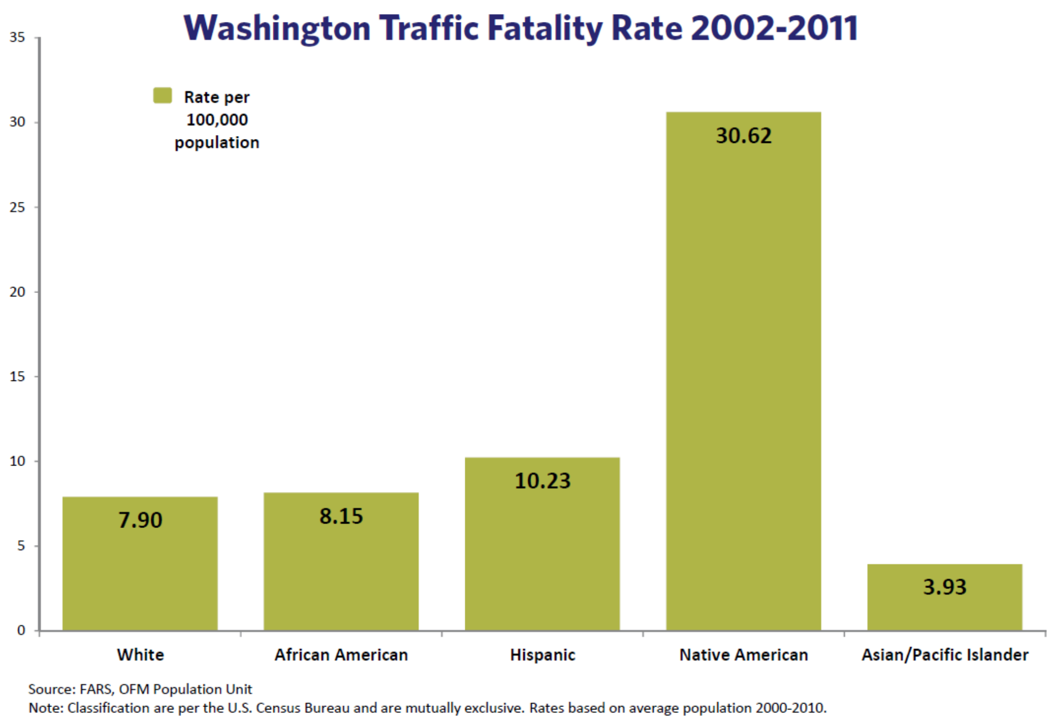

Figure 4 Comparison of Fatality Rate for AIAN and non-AIAN in WA State

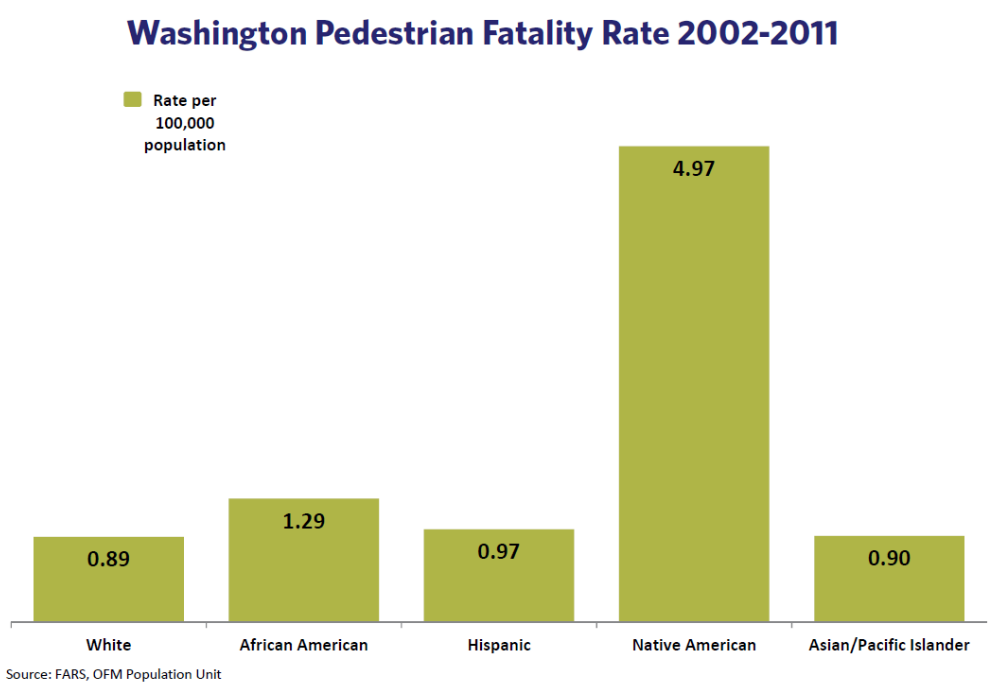

Figure 5 Comparison of Pedestrian Fatality Rate for AIAN and non-AIAN in WA State

Of particular concern to AIAN tribes in Washington are behavioral-related fatalities, such as crashes where occupants are unrestrained, traveling at high speeds or above the speed limit, or under the influence of drugs and/or alcohol. Pointedly, the fatality rate per 100,000 population of unrestrained occupants in AIAN crashes is 9 times that of all non-AIAN crashes combined for years 2007-2016 in Washington (Washington Traffic Safety Commission June 2018). It is also recognized that RITI communities may not have the resources to collect quality traffic safety data. AIAN communities are separate sovereign entities that are not required to collect or share all data with United States citizens. The baseline level of data available and the quality of this data varies by tribe and rural community. Accessing this data to form a more uniform database is a multi-faceted problem that requires consistent and fulfilling outreach activities. The current lack of uniform data collection and quality control approaches impedes efforts to conduct thorough analysis and hinders the ability to secure federal and state funding for transportation improvements. Any solution must be culturally sensitive and collaborative, allowing more efficient knowledge transfer and continuous management of a database system. The outreach activities conducted with AIAN communities and progress made can be modeled to repeat with other tribes as well as other rural communities throughout Washington State.

CHAPTER 2. LITERATURE REVIEW

2.1. Traffic Crash Analysis Methods

While RITI communities are indeed disadvantaged from a transportation safety perspective, there has been growing amounts of research addressing some of the primary concerns. There are some unique challenges to overcome when performing rural crash data analyses, such as geospatial randomness, missing data or poor data quality, and lower data volume. There are also challenges in working with RITI communities in terms of effective communication, solution strategies, and understanding local needs. Context- and culturally-sensitive solutions are the only acceptable solutions for any type of work but are especially important when working with RITI communities.

Traditional traffic safety analysis is conducted using regression models. The primary goal is often a crash frequency prediction or an injury severity prediction relying on police report data. However, there are several known downfalls to this modeling technique, such as being unable to handle overdispersion and underdispersion, as well as not accounting for spatial or temporal characteristics. Additionally, the reliance on police reports alone presents a challenge despite the availability and difficulty in using other data sources – for instance, it has been found that police report crash datasets will often underreport the occurrence of non-injury or property damage only crashes (Yamamoto, Hashiji and Shankar 2008). There have also been noted inaccuracies in the true injury severity of a traffic crash, such as incidents of no reported injuries eventually requiring a hospital visit, or apparent serious injuries being discharged from the hospital early (McDonald, Davie and Langley 2009). Given these and other challenges faced by traditional traffic safety analysis methods, many models have been developed or applied for crash frequency prediction, crash severity prediction, and crash clearance time prediction. There has been some advancement in crash data sources used for analysis, but most are still at the cutting-edge and not always available, such as the linkage of police reports to hospital reports. Despite the challenges of relying on police report data, it is likely that data used in later RITI-focused projects will come from police reports. There have been a multitude of studies relying solely on police report data that have helped the industry better understand traffic crashes and their underlying causes, and with the deployment of increasingly accurate methods it is possible to better account for or even estimate errors from police reports.

Crash frequency modeling has historically been conducted using basic Poisson models in practice; this is not suitable given that Poisson models cannot handle overdispersion, underdispersion, or a large amount of zero count data which is typical in crash data. The negative binomial model emerged as an option to handle overdispersed data. While this modeling method is consistently used in practice, it has its own weaknesses, most relevant to this and following research being the inability to handle underdispersion, occurring when the crash count mean is greater than variance in particular when crash count volumes are low (Lord and Mannering 2010). These are characteristics that could be reasonable to expect when dealing with rural crash data, emphasizing the need for more advanced modeling techniques to be used in later projects related to RITI communities and data analysis. One way to handle underdispersion of crash data has been the development of Conway-Maxwell-Poisson models (Lord, Geedipally and Guikema 2010). Other advanced modeling methods that have been used for traffic crash analysis in order to address various challenges of prior models or otherwise improve accuracy include random-effects models (Shankar, et al. 1998), spatial and temporal correlation models (Aguero-Valverde and Jovanis 2006, Wang and Abdel-Aty 2006), random parameters count models (Wu, et al. 2013, Castro, Paleti and Bhat 2012), and several different neural networks (Zeng, et al. 2017, Abdelwahab and Abdel-Aty 2001).

2.2. Rural and Tribal Related Crashes

When comparing rural crashes to urban crashes, it is clear that the fatality rate on rural roads in higher than on urban roads even when controlling for crash severity (Muelleman, et al. 2007). This suggests that the distance to medical attention could be a factor diminishing survivability of rural crashes. The scarcity and distance to medical resources is related to the spatial characteristics of rural areas. Given the many miles of urban roads with relatively low vehicle miles traveled (VMT), it is necessary to consider spatial correlation when investigating rural crashes (Aguero-Valverde and Jovanis 2008). In addition to spatial characteristics, rural fatal crash rates are more heavily influenced by behavioral instances such as alcohol impairment, speeding, and overtake maneuvers (Kloeden, et al., 2001; Wu, et al., 2014; Wu, et al., 2016). The National Highway Traffic Safety Administration (NHTSA) found seatbelt use was low in AIAN communities and funded programs to help address this, though it continues to be a high contributing factor in serious injury and fatal crashes (Leaf and Solomon 2005). These behavioral instances are more difficult to directly address with traffic engineering solutions, though proper data management can lead to identifying locations suitable for crash modification factors determined to be useful. Outreach programs can also be created to help educate communities about the unique issues they face, but this will likely be more successful if the instruction comes from members of the community itself (Hill and Myers 2016). Effective tribal crash reporting can help identify areas needing greater attention and safety improvements. The data can also be used to obtain funding to implement the improvements identified through data analysis (National Academies of of Sciences, Engineering, and Medicine 2014).

Tribes do report some fatal crashes to the national Fatality Accident Reporting System (FARS) through agreements with the states and federal government, though this data is found to be significantly under the actual count of fatal crashes that occur on tribal roads (Ragland, et al. 2014). The underreporting could be the result of jurisdiction issues or lack of available resources and training. Regardless of the cause, relying on FARS data is typically not sufficient for complete local analysis and is not sufficient for tribal use when applying for safety improvement funding. This project tried to fill the gap in the research by creating lasting relationships with Washington State tribes in order to achieve a higher level of local tribal traffic safety analysis. Besides the known high-risk factors for tribal crashes and recent push for programs supporting data-driven decision making, only some research has been completed to help realize improved local data collection, management, and analysis. More research is needed in order to gain a better understanding of the crashes that occur on tribal roads and to improve the overall traffic safety in tribal communities.

Some efforts to improve local crash data collection and analysis have been completed in recent years. University of California – Berkeley researchers in their SafeTREC lab created a Tribal Traffic Safety Data tool. This tool uses their statewide crash data and overlays shapefiles from tribal lands and allows tribes to register and upload their own data. Importantly, this tool is only available to tribal members that have been verified, and the tool was created in collaboration with National Indian Justice Center (National Indian Justice Center 2019). It was also emphasized that simply analyzing the current data is not sufficient enough, and that building connections and collaborating on the work is a crucial step towards action in improving traffic safety (Ragland, et al. 2014).

Researchers at the University of Wyoming developed a methodology to work with tribes to address the rural nature of their crashes and lack of crash data. The primary goal of the method was to identify collision hot spots, and a secondary goal was to address gaps in crash data collection. A case study with the Wind River Indian Reservation was included to showcase the success of the methodology. Notably, part of the implementation plan was listed as "communication, coordination, and cooperation," though this seems to take prominence after the methodology is developed (Shinstine and Ksaibati 2013). While the Wyoming project was successful, outreach activities should be prominent from the beginning.

There has also been work to improve crash reporting and analysis for tribal reservations. As a result, tribes throughout the nation recognize many of the contributing factors impacting traffic safety on their roadways. The response has been a greater effort to improve traffic crash reporting. Notably, however, it has been found that in regards to improved traffic crash data collection and management the most difficult barrier to overcome is the political relationship between tribes and the state and national governments (Bailey and Huft 2008). Other work has showed that currently available data and processes can only provide a broad perspective on tribal traffic safety conditions, and that to obtain any substantial progress it is important to work with tribal communities at a much more localized level and in particular with tribes that have implemented programs to achieve the goal of reduced fatalities (Vichika, Carlson and Schertz 2015). Additionally, recent research has found geospatial information systems (GIS) to be particularly useful for tribal safety analysis, as a tool to both analyze and visualize crash data. Researchers from the University of Minnesota have successfully created tools based on GIS for hot spot identification, pedestrian crash analysis, and overall crash mapping (Horan, et al. 2018).

The body of research has found several notable conclusions regarding tribal traffic safety, primarily focused on how crash data is lacking and working at the community level tends to yield more promising results. However, work to form relationships with tribes prior to conducting the safety research or creating the tools and methodologies has been lacking. In order to truly understand the needs of the tribal communities, it is important to form these connections first. The outreach activities conducted for this research helped establish connections and foster understanding for safety work that will follow.

CHAPTER 3. RESEARCH PLAN

3.1. Research Objectives

This research aimed to address some of the challenges related to effective communication and solution finding when working with RITI communities. Because of the separate sovereignty of American Indian and Alaska Native tribes, the focus was on forming concrete, lasting relationships with them, their leaders, and key stakeholders throughout Washington State. This allows for more seamless collaboration and information exchange, as well as stronger, more sustainable solutions. In order to create a more lasting solution, instead of a one-time analysis, it is important that the communities are invested themselves and involved in decisions regarding what is needed. The purpose of forming these relationships is to create a uniform traffic safety database management system which can be used by the communities themselves, in connection with Washington Department of Transportation (WSDOT) and other relevant parties as necessary. Outreach activities revolved around finding influential, interested, and driven individuals in RITI communities to begin the process of bridging the gap between urban and rural traffic safety solutions. Methods to connect with leaders reflect success found in previous studies in other states, but with the clear distinction of forming these relationships prior to conducting the analysis. The connection between tribes, state organizations, and other rural communities is a key outcome of the larger research plan achieved through this and other projects.

3.2. Preparation Efforts

To achieve the broad goal of this research, it was necessary to connect with Washington tribes and their leaders. In order to do so effectively, respectfully, and sustainably a meeting with tribal leaders at the University of Washington was organized. This served to build a profile of the AIAN communities in Washington State and identify key members to contact, in addition to learning more about the AIAN culture and current issues.

Mr. Iisaaksiichaa Ross Braine, director of the Intellectual House, an AIAN community center on the UW-Seattle campus, was the primary stakeholder at the meeting. He shared instruction, advice, and strategies for effectively communicating the project goals and purpose to other stakeholders that may be interested. He indicated that he wanted the project to succeed, was excited that this project was in place, and acknowledged traffic safety is an important public health issue that tribes are facing. Because of this, he was instrumental in connecting the researchers with tribal leaders in the transportation industry. Without this initial meeting, the researchers might not have been able to connect with the most interested parties and tribes, and future meetings would likely not have been as successful.

Advice given included emphasizing collaboration and commitment for continuous work with the tribes, as well as clearly communicating flexibility and willingness to follow tribes' wishes surrounding data privacy and ownership. Additionally, this meeting was crucial to the project development because it granted insight to ethical, cultural, and legal considerations that may be unique to tribal research, and thus require special attention. For instance, necessary steps to pursue a research agreement and what to expect from such an agreement was discussed. Researchers should expect to form the relationships with stakeholders and present their case prior to applying for a research agreement in order to facilitate and expedite the process. Some tribes may not be willing to enter into such an agreement for a variety of reasons, though with the help of the Director of the Intellectual House, some potentially interested tribes were identified. In fact, one of the key outcomes of this preparatory meeting was progress made in pinpointing which tribes might have the greatest initial interest in collaborating, and which stakeholders were already doing similar work or had implemented tribal safety plans.

Figure 1, below, shows the 29 federally recognized tribes in Washington State, each with its own characteristics, including varying sizes, organization, and resources. Each orange zone represents a reservation or tribal area. Clearly, their size varies quite substantially, and this is often reflected in their organization and available resources, which can impact their willingness to enter into a research agreement and share crash data. Table 1, also below, lists these tribes, their size, whether they have a Tribal Transportation Plan in place, and the most recent year this plan was submitted. The Federal Highway Administration (FHWA) has a tribal traffic safety committee that has supported the adoption of Tribal Transportation Plans to help tribes successfully apply for grants. They have a publicly available list of tribes throughout the nation that have adopted plans. However, it is important to note that even if a tribe has not submitted a Tribal Transportation Plan to the FHWA, they can still apply for grants and may even have well-structured traffic safety committees or plans independently. If a tribe is known to have their own plans but has not submitted a Tribal Transportation Plan, this will be noted with a double-asterisk (**). This effort was conducted independently from the preparatory meeting and outreach activities but did reinforce what was learned from that meeting.

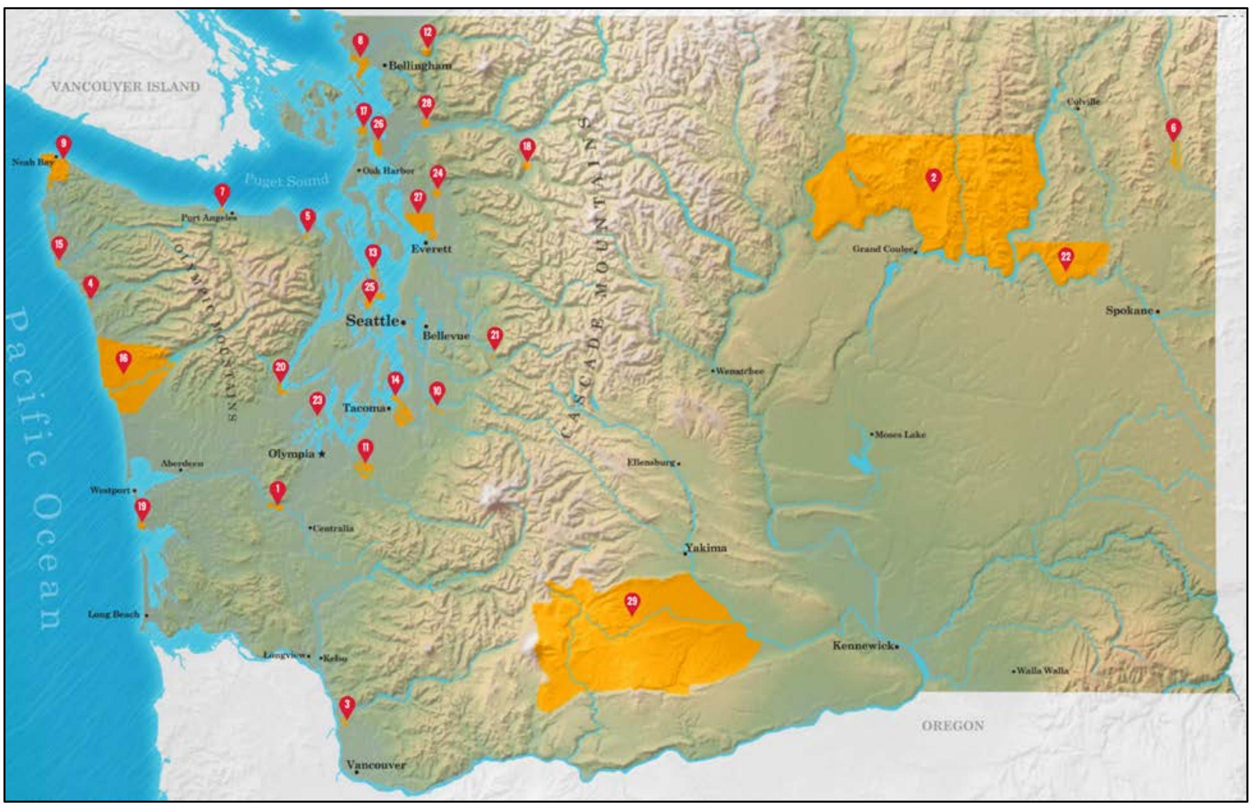

Figure 6 Washington Tribes Map

Table 1 List of Washington Tribes

Tribe Name	Enrolled Members	Size (acres)	Tribal Transportation Plan	Year Enacted
The Confederated Tribes of the Chehalis Reservation	833	4,438	Yes	2016
The Confederated Tribes of the Colville Reservation	9,365	1.4 million	Yes**	-
Cowlitz Indian Tribe	4,149	152	No	-
Hoh Indian Tribe	102	443	No	-
Jamestown S'Klallam Tribe	548	13.5 (1000+ owned outside reservation)	Yes	2016
Kalispel Indian Community of the Kalispel Reservation	470	292	Yes	2016
Lower Elwha Tribal Community	776	1,000	No	-
Lummi Tribe of the Lummi Reservation	4,483	13,000	Yes**	2015
Makah Indian Tribe of the Makah Indian Reservation	1,500	30,000	Yes	2011
Muckleshoot Indian Tribe	3,606	3,920	Yes	2016
Nisqually Indian Tribe	650	1,000	Yes	2011
Nooksack Indian Tribe	2,000	2,720	No	-
Port Gamble S'Klallam Tribe	1,234	1,303	No	-
Puyallup Tribe of the Puyallup Reservation	4,000	18,270	Yes	2015
Quileute Tribe of the Quileute Reservation	2,000	1,000	No	-
Quinault Indian Nation	2,453	208,150	No	-
Samish Indian Nation	1,200	200	No	-
Sauk-Suiattle Indian Tribe	200	23	No	-
Shoalwater Bay Indian Tribe of the Shoalwater Bay Indian Reservation	237	665	Yes	2017
Skokomish Indian Tribe	796	5,000	Yes	2014
Snoqualmie Indian Tribe	650	N/A	No	-
Spokane Tribe of the Spokane Reservation	2,153	154,000	Yes**	2015
Squaxin Island Tribe of the Squaxin Island Reservation	650	1,715	Yes	2016
Stillaguamish Tribe of Indians of Washington	237	64	Yes	2015
Suquamish Indian Tribe of the Port Madison Reservation	890	7,657	No	-
Swinomish Indian Tribal Community	778	8,155	Yes	2017
Tulalip Tribes of Washington	4,800	22,567	No	-
Upper Skagit Indian Tribe	504	84	Yes	2014
Confederated Tribes and Bands of the Yakama Nation	8,870	1,371,918	Yes**	2017

CHAPTER 4. OUTREACH ACTIVITIES

To turn the preparatory procedures into action, the researchers contacted the stakeholders that were recommended by the Director of the Intellectual House. This included emailing the people of interest to introduce the project and express interest in collaborating for a successful solution. There were responses from some but not all of those who were contacted. This was expected based on the information given by the Director of the Intellectual House. Despite this, many did remember the initial email if the researchers were eventually able to meet and speak with them in person. It was important to have face-to-face meetings whenever possible for greater success and to form stronger relationships. Face-to-face meetings are inherently more personal and fluid, which is invaluable when forming new relationships. From the initial preparatory meeting at the Intellectual House, the researchers were invited to attend the Tribal Leadership Summit, during which it was be possible to speak to some tribal leaders and gain connections to tribal transportation planners. Attending the event led to an invitation to another conference, and from there several other connections and conferences were introduced. This became one way to mark progress of the project, as participation in conferences increased from attendance to sponsorship and then to presentation. The project participated in several conferences, including the aforementioned Tribal Leadership Summit, the Affiliated Tribes of Northwest Indians Conference, and the Bureau of Indian Affairs Northwest Tribal Transportation Symposium. These events are discussed in detail in the following sections, including the level of participation and specific outcomes of each.

4.1. Tribal Leadership Summit – 2018

The researchers were invited to attend and present a poster during the annual Tribal Leadership Summit on May 11, 2018, where leaders from throughout Washington convened to discuss tribal issues, projects, and future strategies with University leaders. The Tribal Leadership Summit took place at the Intellectual House on the University of Washington campus, which is a longhouse-style building that serves as a learning and gathering place for AIAN members of the University of Washington. The event was hosted by the Director of the Intellectual House, who knew specific stakeholders that would be interested in the project. While there was no transportation-centric discussion at the Summit, the researchers were able to speak with many tribal leaders and were subsequently invited to another, larger conference that would have a transportation section. The communications strategies learned from the Director were implemented in the presentation poster and proved vital. The Director made sure to introduce the researchers to key attendees and included an overview of the research in the Summit agenda and pamphlets. This derived from the initial meeting with the Director of the Intellectual House, proving the importance of such a connection. In discussions with attendees, the researchers emphasized collaboration, tribal data ownership, and a desire to help the cultural heritage survive – focusing on traffic safety as a public health issue helped to root the research in other relevant topics that were discussed at the Summit. Figures 7 and 8, below, show the researchers with several of the event organizers and stakeholders.

Figure 7 Christopher Gottsacker discussing the project with a tribal councilmember at the Tribal Leadership Summit, 2018

Figure 8 Christopher Gottsacker, Ziqiang Zeng, members of the University of Washington Intellectual House, and tribal councilmembers behind the project poster that was displayed at the Tribal Leadership Summit, 2018

Additionally, the support garnered from the Tribal Leadership Summit resulted in the researchers being invited to several other events, including the following year's summit in April 2019, this time with a primary presentation spot on the agenda. Interviews at the 2018 Tribal Leadership Summit also confirmed attendance and sponsorship of the Affiliated Tribes of Northwest Indians (ATNI) Conference later that month.

4.2. Affiliated Tribes of Northwest Indians Conference – 2018

The second conference attended was the Affiliated Tribes of Northwest Indians (ATNI) Midyear Conference from May 21-24, 2018 in Yakama Nation at the Legends Casino Hotel. In addition to attending the conference, part of the CSET funding was used to become a silver sponsor of the event, increasing the visibility of the project by displaying the logo and having the project announced to attendees. This generated greater interest in the project with more people stopping by the poster after the announcement. Sponsorship was deemed crucial because it showed commitment to American Indian goals, community, and growth in the Northwest. There were many attendees at this conference, with several well-attended presentations on several key tribal issues. One of the breakout topics was concerned with traffic transportation planning and safety, during which the Tribal Transportation Planning Organization (TTPO) held its quarterly meeting. Prior to, during, and following this meeting, the researchers met and interviewed tribal transportation leaders from different tribes in Washington State. There were leaders from 4 tribes that were especially interested, and the Confederated Tribes of the Colville Reservation expressed interest in collaborating immediately. This began the process of applying for access to the crash data this tribe had collected. The Confederated Tribes of the Colville Reservation had received funding from the Washington Traffic Safety Commission to help support their own initiative of mapping fatal and serious injury crashes in the last decade. The result of this process was similar to the ultimate goal of CSET projects, and deemed a great place to start, but the process itself was not ideal because it was not sustainable and replicable. Figure 3, below, shows the researchers in attendance at the 2018 ATNI Conference. Following the conference, the interested tribal transportation leaders scheduled a phone conference to further discuss the project and invite the researchers to the Bureau of Indian Affairs Northwest Tribal Transportation Symposium, during which TTPO would have another meeting. The phone conference served to discuss the research plan in more detail and how it aligned with their own goals. Ultimately, the tribal planners were interested in continuing the discussion with a focus on basic data management, analysis, and visualization. Some interest was also expressed for DRIVE Net, a visualization platform created by the University of Washington STAR Lab with the support of the Washington Department of Transportation (WSDOT). The link to WSDOT was seen as potentially useful given that WSDOT could possibly grant some funding for safety improvements.

Figure 9 Ziqang Zeng, Theresa Sheldon, Christopher Gottsacker, and Kris Henrickson at the Affiliated Tribes of Northwest Indians Conference, 2018

4.3. Bureau of Indian Affairs Northwest Tribal Transportation Symposium – 2019

The Bureau of Indian Affairs (BIA) held a tribal transportation conference in Spokane, WA in February 2019. The event consisted of networking, keynote addresses, and presentations by various tribal leaders and national traffic safety experts that work closely with tribes. The TTPO held another meeting as a part of this conference, which included a presentation by Kwis Logan of the Confederated Tribes of the Colville Nation, with whom a research agreement was in the process of being written. The researchers gave their own presentation immediately following. The succession of one tribal safety project after another generated increased interest in the capabilities of the Smart Transportation Applications and Research Laboratory (STAR Lab) research team and in the Digital Roadway Interactive Visualization and Evaluation Network (DRIVE Net) platform to analyze and visualize results. Subsequently, a site visit was organized for tribal leaders and planners from the Confederated Tribes of the Colville Nation to have a greater understanding of the technology used in the Lab, and how analysis models can be implemented and scaled to fit their own needs. The meeting site visit also helped the researchers understand the challenges facing the tribe and why they had to manually map serious injury and fatal crashes. It seems there is some resistance and challenges regarding the link between different departments, so that updates and information for a crash may not be transferred to each dataset. This presents a notable problem to solve and is one that the research team may be able to approach later. While this outreach project has been completed, it is crucial to note that outreach activities should never cease in order to maintain a trusting and mutually beneficial relationship with the tribes in Washington State. This conference presentation was primarily intended to showcase progress made in other related CSET projects, but new connections were made, and current relationships strengthened, thus continuing the impacts of this outreach project.

Using all these opportunities and separate communications and follow ups, our research team was able to communicate with leaders from 23 federally recognized tribes in Washington and finally established positive connections with twelve tribes, including Colville, Spokane, Muckleshoot, Swinomish, Yakama, Makah, Quinault, Skokomish, Puyallup, Lummi, Tulallp, and Sauk-Suiattle. Four of these tribes, i.e., Colville, Spokane, Muckleshoot, and Swinomish, have established strong connections with our research team. Ultimately, a formal research agreement with Colville has been signed and this set up a success example for us to work with other tribes for safety data collection and analysis.

CHAPTER 5. RESULTS AND DISCUSSION

The outcomes of this outreach project were substantial. Via numerous conversations and interviews with tribal members, valuable insight to their specific desires was gained. The researchers were able to interview or present to over 23 tribal leaders and transportation officials from at least 13 different tribes or tribal organizations via email, phone, and/or in person. These conversations generated interest in the coming projects and helped form trusting relationships that are expected to last beyond the scope of these projects. Beginning with the local University Director of the Intellectual House, it was possible to reach more interested and influential stakeholders in an efficient manner. Doing so also gave a sense of credibility. Though names of some tribes are omitted from this report, the tribal leaders represent several different tribes in Washington State, including four strong connections, and ultimately a formal research agreement with the Confederated Tribes of the Colville Reservation.

The formal research agreement with Colville came after more than two months of communications and planning between the researchers and the tribe leaders. The process involved applying for access to the tribal crash data, followed by the formal research agreement which is what ultimately was needed for access to be granted. The agreement was drafted by the Confederated Tribes of the Colville Reservation and signed by all parties. Some important considerations in the agreement included that the tribe maintains ownership of all data and any publication as a result of the data analysis must be approved by the tribe. This was expected based on previous conversations. Once the agreement was submitted, the data request was fulfilled. The data includes fatal and serious injury crashes over a period of 10 years. There is a low number of crash cases, possibly due to only fatal and serious injury crashes being included. The fulfilment of this data request is seen as a major success for the outreach project, as it lays the foundation for other tribes to share data and allows researchers to begin analysis work.

The dataset is not the only outcome of the outreach project, despite this outreach project being concluded, the activities will not end. As such, members from the tribe which shared its data will be visiting the Lab to discuss preliminary results, capabilities, and future work. The researchers have been invited to attend and present at the next TLS, as a portion of this year's summit will focus on transportation safety. This event is scheduled for April 24, 2019. Further, the researchers have been invited to attend the upcoming ATNI conference in Spokane in May 2019, and will possibly be invited to present at this event as well. It is unclear if the researchers will be invited to present as a part of the larger conference or at the TTPO meeting that occurs in conjunction with the conference. Regardless, this is a very exciting and promising result of the outreach project because it shows a commitment to the relationship by both the researchers and the tribal leaders.

CHAPTER 6. CONCLUSION

RITI communities face unique challenges when it comes to traffic safety. While research has been conducted regarding rural crashes, most traffic safety improvements and funding goes towards urban areas. Tribes in particular are disadvantaged from a traffic safety perspective because of this lack of funding. One of the major barriers to achieving funding is quality crash data collection, management, and analysis. With varied data collection practices in place and difficulties in sharing this data with state and federal officials, the problem of traffic safety within these communities is only made worse. American Indian and Alaska Native populations are at a higher risk of traffic fatalities than other population groups, which is known despite the lack of quality data and probable underreporting of crashes. To fill this gap, the UW team working on this project have made continuous efforts to conduct a series of outreach activities with various RITI communities, especially tribes, in Washington State. The outreach activities are crucial to forming lasting connections and to help understand local needs and challenges regarding crash data management.

By first connecting with local leaders who could aid in communication strategies and provide instruction regarding local customs, a level of trust and commitment was obtained. It was from these face-to-face meetings that more outreach activities could be achieved, such as attending and presenting at numerous conferences. The sphere of influence grew with each meeting and conference, as more and more stakeholders were introduced to the research project and team. By meeting so many people with local investment in improving traffic safety, the needs and wants of the tribes were understood more fully. For instance, the tribes spoken to are primarily interested in geospatial analysis, hotspot analysis, and methods or products to increase quality data collection, as well as reducing behavioral-related fatalities such as impaired driving and unrestrained driving. By utilizing the connections made, actively listening to the needs of the communities, and focusing on collaboration, a formal research agreement with the Confederated Tribes of the Colville Reservation in Washington State was signed which will allow data sharing, knowledge, and research.

The outreach effort is only successful if it continues through future projects. More conferences and meetings are scheduled to this end, and they will serve as opportunities to collaborate on projects, update project progress, and reach a broader audience. These meetings will be both formal and informal, as the nature of the relationship is professional but also comfortable. As per the research agreement signed with one Washington State tribe, at least quarterly updates will be given regarding project progress. This ensures that future work will remain collaborative and local input will be strongly considered. Any software products or methodologies created will be taught to the tribal stakeholders as part of a knowledge transfer program, so that eventually the tribes can independently manage the safety tools. Finally, it is desirable to form research agreements with additional tribes and other rural communities to have a larger impact and improve traffic safety equity around the state.

Future work includes projects focused on the creation of a regional RITI traffic crash database with management practices, analysis, and visualization incorporated. Including tribal data is a key step towards this goal, as it is paramount the AIAN community be included in the database improvement effort. With a more well-rounded and well-managed database that incorporates local roadway and driver characteristics, it is possible to conduct more accurate and meaningful analysis for RITI areas. With the broader scope of a regional database it is also possible to incorporate broader analysis that could also yield meaningful results. The first step towards lowering traffic fatalities and injuries in

Washington State is understanding the cause and occurrence of these crashes, and making targeted, data-driven decisions to implement effective countermeasures. With the future analysis enabled by this outreach effort, it is possible for local jurisdictions to better address their own traffic safety issues and obtain necessary funding for improvements.

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