

NORTH/WEST PASSAGE



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Evaluation of Rural 511 Phone Service

Project 12.4

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1. INTRODUCTION

The North/West Passage (NWP) pooled fund program focuses on cross-border intelligent transportation systems (ITS) coordination along the I-90 and I-94 corridors through the states of Washington, Idaho, Montana, Wyoming, North Dakota, South Dakota, and Minnesota, as illustrated in **Figure 1**.



Figure 1: North/West Passage Members

Since traveler information dissemination has experienced significant changes in the past

decade as the access to information for travelers planning trips or while enroute has increased, the NWP members are interested in the state of practice and trends in 511 phone service. The advent of new technologies, such as smart phones, mobile applications, and widespread access to the Internet, has reduced travelers' reliance on phone calls as a resource for traveler information.

This report examines the NWP state of practice and trends in 511 phone service in NWP states to determine its potential future role in effectively satisfying travelers' needs for information by documenting:

- Types of information available through NWP state 511 phone services.
- Trends in use and costs for NWP state 511 phone services.
- Changes made to NWP state 511 phone services to better serve travelers.
- Discussion of the role of 511 phone service as a component of states' traveler information strategies.
- Alternate approaches to delivering 511 phone service.

The report is based on interviews, discussions and data provided by the NWP states. In addition, the following states outside the NWP were interviewed, or studied, to understand why they moved away from delivering traditional 511 phone services:

- Kentucky
- Missouri
- North Carolina

2. HISTORY OF 511 PHONE SERVICE

The first traveler information phone systems were deployed in North Dakota and South Dakota in 1996. By 2001, there were more than 300 phone numbers covering various regions of the United States to satisfy the public's demand for traveler information. To reduce confusion created by the many different phone numbers, the Federal Communications Commission assigned the three-digit phone number 5-1-1 to be used for traveler information throughout the country. The first 511 phone number was deployed in the Cincinnati, Ohio area in 2001. Other states and regions quickly followed. The 511 phone number became the primary resource for public agencies to share current traffic, road conditions and other traveler information with travelers.

In the last decade, several changes in technology have impacted the use of phone systems for traveler information. These include the creation of the smart phone and mobile devices and the expansion of wireless access through cellular and other wireless networks. As a result, 511 phone service, which was once the primary source of traveler information, is now one of many tools that the public can use. According to the Federal Highway Administration report *Next Generation Traveler Information System: A Five Year Outlook*¹, travelers also currently use:

- State-supported web sites that include digital maps and a broader range of information than available through phone.
- State-supported mobile applications that travelers access through smartphones and other mobile devices.
- Radio and television.
- Enroute traffic information via Dynamic Message Signs (DMS) and Highway Advisory Radio (HAR).
- In-vehicle systems that can receive up-to-date traveler information, often as part of vehicle navigation or infotainment systems.
- Third-party services, such as Google Traffic, HERE, and Waze that have proven to be popular and reliable sources of traveler information.

The increased availability of traveler information has allowed travelers to indicate their preferences, and therefore the use of 511 phone has decreased while the popularity of other tools has increased. As a result, state departments of transportation that provide 511 phone service are exploring how to best satisfy the needs and preferences of travelers within their budget constraints. The options states throughout the United States have considered include modifying, rebranding, or even eliminating 511 phone services.

¹Federal Highway Administration, *Next Generation Traveler Information System: A Five Year Outlook*, (USDOT, 2015), 19, (<https://ops.fhwa.dot.gov/publications/fhwahop15029/fhwahop15029.pdf>)

3. NORTH/WEST PASSAGE STATE 511 PHONE SERVICE

All seven NWP states provide Interactive Voice Response (IVR) 511 phone service. IVR allows travelers to input requests by voice or phone keypad, and a computer responds with current traveler information specific to the request. For example, a traveler can request current traffic conditions for a specific road and will respond with any active events that may impact traffic on that road.

3.1 Traveler Information Provided

While all NWP states' 511 phone services provide basic traveler information such as incidents that may impact travel, each has unique features to satisfy the needs of their states' travelers. For example, the Idaho and Minnesota systems provide an option for commercial-vehicle specific information, and Washington provides information about ferries in the Puget Sound. The following is a brief description of the types of information provided by the NWP states. Table 1 summarizes the types of information that each NWP state provides.

Traffic

Traffic traveler information includes **Traffic Conditions** and **Incidents**. **Traffic Conditions** are information regarding such things as congestion and travel times. Conditions typically estimate the travel times or delays along a route. **Incidents** reflect information such as work zones, crashes, road and lane closures and other events that may impact traffic. Incidents typically report planned and unplanned events and may or may not include estimates of their impact on travel times.

Weather

Weather information includes **Weather Conditions** and **Winter Road Conditions**. **Weather Conditions** are information such as temperature, storm warnings, wind, precipitation and visibility. **Winter Road Conditions** are the conditions of the roadway impacted by weather and winter maintenance operations, such as the presence of ice and snowplow activity.

Commercial Vehicle Specific Information

Commercial Vehicle Specific information typically includes information that is of interest to commercial vehicle operators but not necessarily the general public, such as temporary height, width and weight restrictions, trailer bans, and weather events that will impact trucks, such as high winds. While many states may report some of this information through its 511 phone systems, Table 1 notes the states who have a menu option specifically for commercial vehicle operators.

Transit

Access to transit information can be provided multiple ways by 511 phone systems. Note that an agency may provide transit information in more than one of the following ways:

Provided: Transit information such as routes and schedules, is directly provided by the 511 phone system.

Transfer: The 511 phone system is able transfer the caller to the phone systems of transit providers in the state.

Contact: The 511 phone system provides the caller with contact information, such as phone numbers or web addresses, for transit providers in the state.

Tourism

Similar to transit, access to tourism information can be provided multiple ways by 511 phone systems. Note that an agency may provide tourism information in more than one manner:

Provided: Tourism information such as tourist sites and operating hours is provided directly by the 511 phone system.

Transfer: The 511 phone system is able to transfer the caller to the phone systems of tourism information services.

Contact: The 511 phone system provides the caller with contact information, such as phone numbers or web addresses, for tourism information services.

Variations exist in how states disseminate certain types of information. For example, some states only report road conditions when there is precipitation or snow, while others report conditions even when dry and clear. Montana and Wyoming allow the National Parks within their states to call in and record information about park road conditions within the 511 system. The National Park information is not generated by the IVR, but is available through 511.

All NWP state 511 systems have the ability for “floodgate” messages. Floodgate messages typically are about critical issues and are broadcast to callers at the beginning of their 511 call. These messages may include Amber Alerts or events that will have a significant impact on travel over a wide area.

Idaho, Minnesota and Washington can personalize information for the caller, usually based on recognizing the phone number the caller is using. Personalization may include a caller’s ability to establish preferences for the area and type of information they want to hear, or it may be the system asking a recognized caller if they want to receive information for the same route as on their previous call.

3.2 511 Phone System Evolution

There have been few changes to the 511 phone services in the seven participating NWP states over the last five years. Some have taken advantage of technological improvements to upgrade voice recognition and speech capabilities or transitioned to more efficient phone systems. However, the types of information and how it is reported to travelers are largely unchanged.

3.3 Phone System User Demographics

The NWP states have not performed any formal assessment of 511 users in the last five years that would provide specific data about user demographics. However, during interviews, the states indicated:

- 511 phone service is more popular with rural travelers than urban travelers.
- 511 phone service is more popular with older citizens than with younger.
- Wyoming indicated many of its phone service users are truckers, particularly on Interstate 80.

Table 1: 511 Phone Traveler Information Provided by State

State (National 511 #)	Traffic		Weather		Commercial Vehicle Specific Info	Transit	Tourism	Other
	Traffic Conditions	Incidents	Weather Conditions	Winter Road Conditions				
Idaho 1-888-432-7623		✓		✓	✓	Transfer / Contact		<ul style="list-style-type: none"> - Provides seasonal load restrictions - accepts caller comments - Voice or keypad input
Minnesota 1-800-542-0220		✓		✓	✓	Transfer / Contact		<ul style="list-style-type: none"> - Accepts caller comments - Voice or keypad input
Montana 1-800-226-7623		✓	✓	✓			Transfer	<ul style="list-style-type: none"> - accepts caller comments - Voice or keypad input
North Dakota 1-866-696-3511		✓		✓			Transfer	<ul style="list-style-type: none"> - Provides seasonal load restrictions - Provides commercial vehicle information in traffic information but not through a specific “trucker” menu - Accepts caller comments - Voice or keypad input
South Dakota 1-866-697-3511	✓	✓		✓				<ul style="list-style-type: none"> - accepts caller comments - Provides commercial vehicle information in traffic information but not through a specific “trucker” menu - Keypad input
Washington 1-800-695-7623	✓ <i>Congestion in metro areas</i>	✓	✓	✓		Transfer		<ul style="list-style-type: none"> - Provides ferry info - Provides express lane info - Provides mountain pass weather information - Voice or keypad input
Wyoming 1-888-996-7623		✓		✓			Contact	<ul style="list-style-type: none"> - Provides commercial vehicle information in traffic information but not through a specific “trucker” menu. - Accepts caller comments - Voice or keypad input

4. USE TRENDS FOR NORTH/WEST PASSAGE 511 PHONE SERVICE

Seven NWP states participated in this project and provided data on their 511 phone service and its use.

Figure 2 is a map of the participating states including the following data:

- POP – State’s 2015 population according to the US Census Bureau.
- URBAN – Total urban state highway mileage according to the Federal Highway Administration.
- RURAL – Total rural state highway mileage according to the Federal Highway Administration.

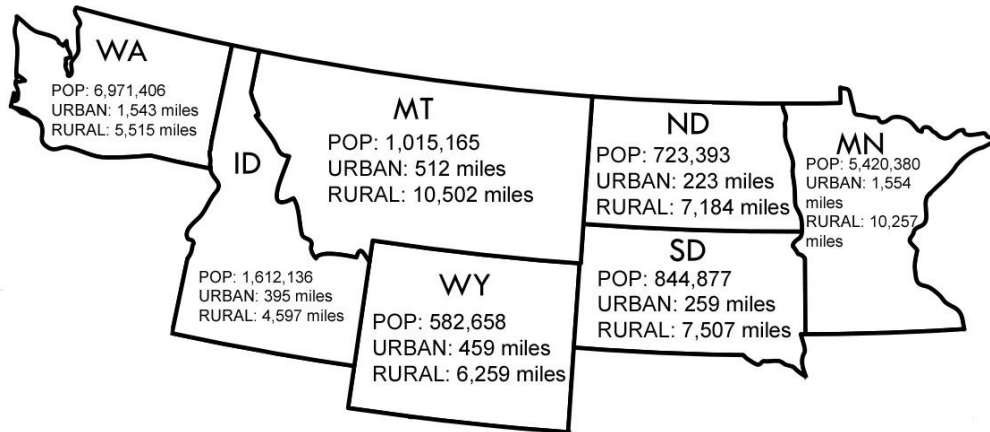


Figure 2 – NWP States – Population, Urban Highway Mileage, and Rural Highway Mileage

The population is highest on the ends of the North/West Passage states (Washington and Minnesota), due to the metropolitan areas of Seattle and Minneapolis/St. Paul. However, it is important to note that the majority of state highway miles in every state is rural.

This section summarizes the use trend from 2011 to 2016 as available from the states. Note that not all states were able to provide consistent data for the entire range of years.

Use by state does not directly correlate to population, highway miles or vehicle miles traveled (VMT). This is because of a range of factors, such as:

- **Marketing of 511.** Travelers’ awareness of phone service impacts its popularity, and each state undertakes its own marketing and publicity campaigns. This includes who is targeted as well as where, how, and how often 511 services are marketed. For example, some states may reduce marketing for the phone service to promote the mobile application.
- **Alternative traveler information services.** While all NWP states offer web sites and mobile applications in addition to the 511 phone systems, the alternative systems vary in their functionality and the information they provide. How accessible the alternatives are and the types of information provided may be in part responsible for how many travelers choose them over telephone.
- **Weather and road characteristics.** The 511 phone service is most used during winter months, and particularly during extreme weather. Weather trends impact each state differently, such that one state that has heavy snowfall one winter, another may have a mild winter. The demand during severe weather can explain some of the variation among states in the same year, and in one state across several years.

4.1 Phone Service Use by Year

Figure 3 summarizes the overall use of 511 phone service for the reporting NWP states. The graph represents the call volume received by the NWP state’s 511 phone systems since 2011, which is the first year for which data was available from all states. The graph also shows the total call volume of all reporting states to indicate the overall trend in 511 call volume in the NWP states.

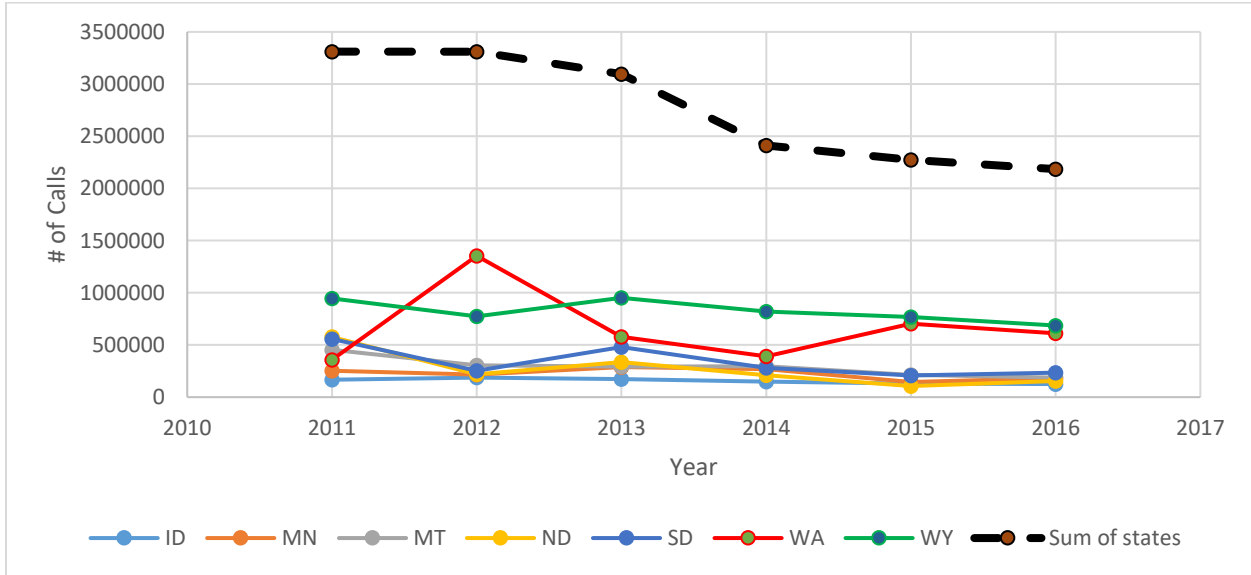


Figure 3 – 511 Call Volume for Reporting NWP States – 2011 to 2016

As Figure 3 shows, total 511 call volume in the reporting NWP states has decreased 34% since 2011. The figure also shows the generally declining trend in 511 call volume for each reporting state. As previously discussed, use can vary based on severe weather or other extreme events. For that reason, while the figure shows a general decline, there are spikes in some years. Note that the decline appears to correspond with the increased access to smart phones, which has risen from ownership by 35% of adults in 2011 to 77% of adults in 2018², as well as the availability of traveler information through third parties such as WAZE.

4.2 Phone Service Use by Peak Month and Peak Day

While annual use is down, the NWP states’ 511 phone services are still most popular when travelers need information to determine whether and how to make safe trips, such as during severe weather. Peak Month and Peak Day 511 phone service use provide a view of the trend in 511 call volume during the times of highest demand.

Peak month or day is the month or day in each year in which each state received its highest call volume. In some cases, the peak month can account for more than 30% of the state’s annual call volume. **Figure 4** shows the trend in peak call volume of 511 phone service by NWP state and the total for all states, from 2011 to 2016.

Note that the peak month varies by year, meaning it is not necessarily the same month for each year. However, the peak months for all states were during winter or fall and coincided with severe weather.

² Pew Internet Project - <http://www.pewinternet.org/fact-sheet/mobile/>

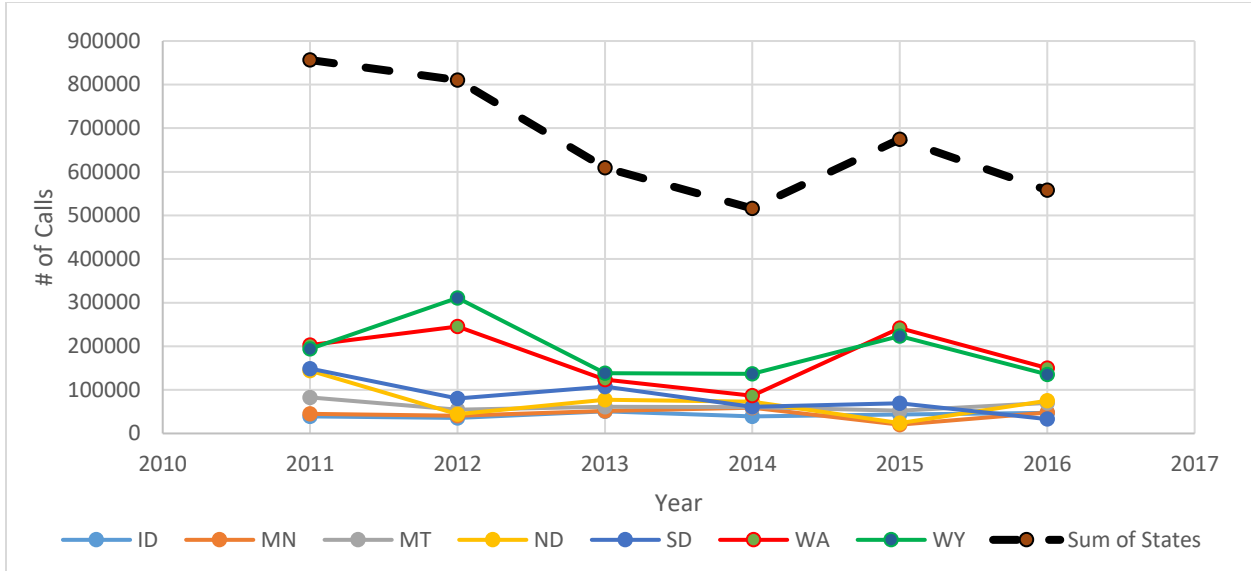


Figure 4 – 511 Call Volume in the Peak Month for Reporting NWP States – 2011 to 2016

Since 2011, the decline in 511 phone service use during peak months is similar to the decline in annual use at 35%. However, there is more volatility, and were only 21% fewer calls in 2015 than the peak year of 2011. In addition, Wyoming and Washington have received heavy call volumes during single months as recently as 2015. This trend is consistent with the perception of the states that while overall call volumes may be declining, 511 phone service is still important to travelers during major events.

Figure 5 shows the trend in 511 call volume during the peak day by year for the four NWP states that provided daily data from 2011 to 2016, and the total peak day call volume by year of those NWP states. Note that this data set only includes four states (Montana, North Dakota, South Dakota and Wyoming). The peak day call volumes can show more volatility because they are more directly related to unpredictable events such as severe weather.

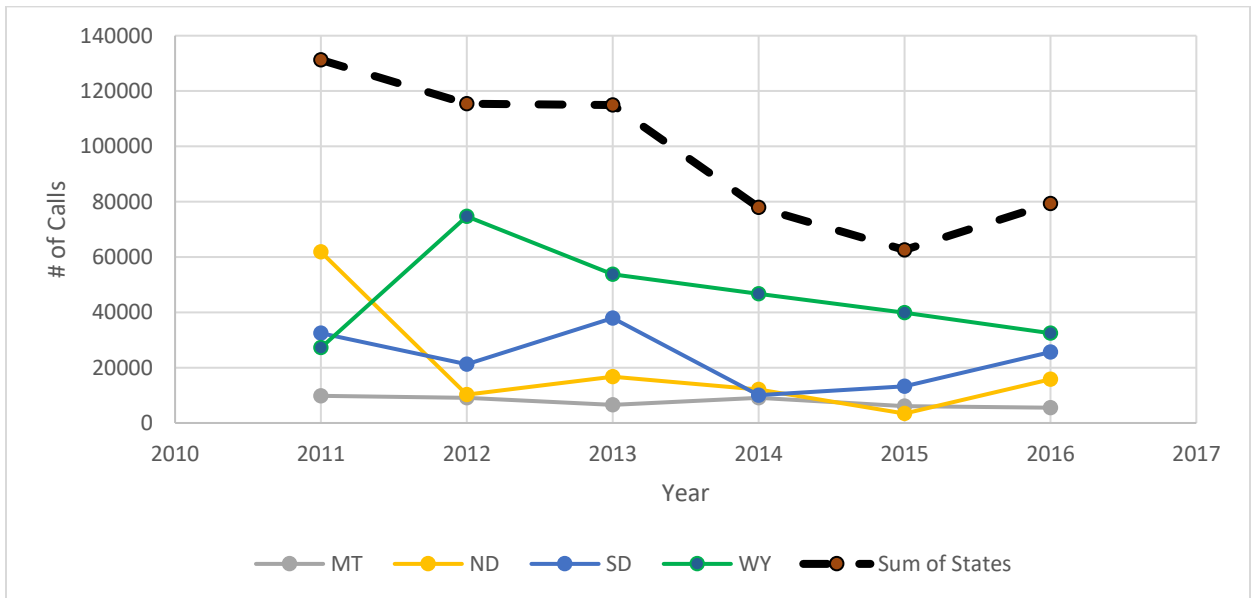


Figure 5 – 511 Call Volume in the Peak Day for Reporting NWP States – 2011 to 2016

The peak day also shows a decline over the years, but significantly more volatility. Wyoming had its highest single day use in 2012, and North Dakota’s system saw more use in a single day in 2016 than it had since 2013. Similarly, South Dakota had one of its highest use days in 2016. This again indicates that, even though overall use of 511 declines, there is a continued reliance by travelers on 511 phone during major events.

4.3 Cost per Phone Call

The operations costs for operating 511 services were provided by five NWP states for 2013 to 2016. Those costs include annual hardware, software, support and telecommunications. They do not include system upgrades and other one-time costs that are not directly related to the systems’ operations.

Figure 6 shows the trend in the cost to the five states for each 511 phone call it receives. The chart also shows the aggregate average cost for the five states. The cost per call is determined by taking the annual direct cost of a state’s 511 phone system and dividing it by the number of calls the 511 system responded to.

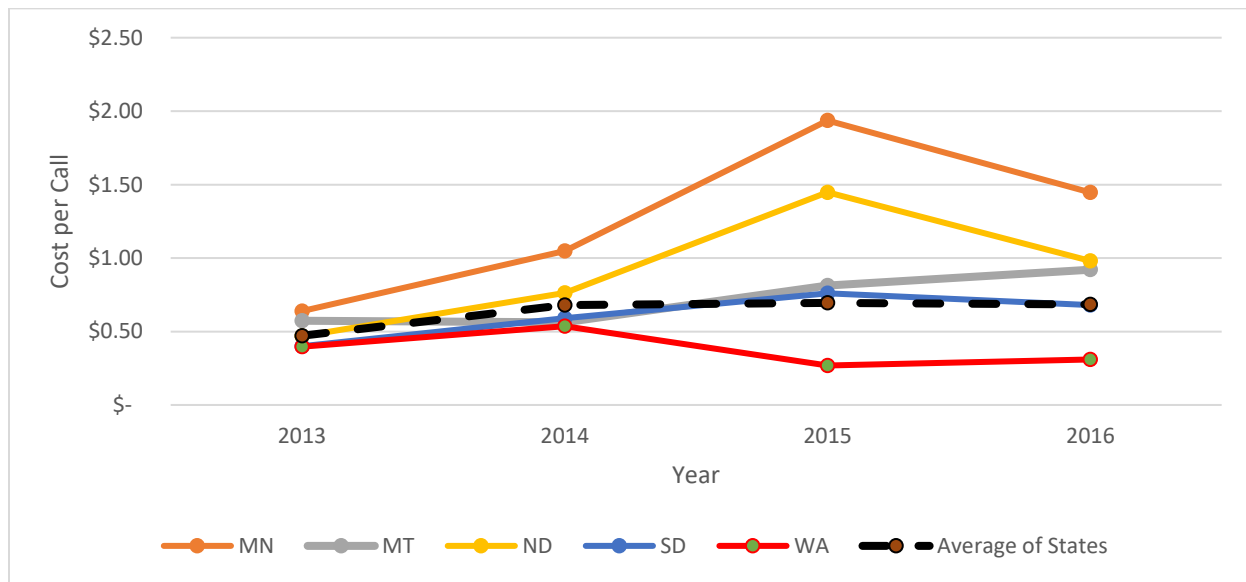


Figure 6 – State Cost per 511 Call

In aggregate of the four states reporting costs, the average cost per call has risen about 45% from 2013 to 2016, from 47 cents to 68 cents.

The costs have varied significantly across states, from a low of \$0.27 per call for Washington in 2013, to \$1.94 per call for Minnesota in 2015. There are many explanations for the wide range in costs:

- States use different developers and providers for the 511 service.
- Different state 511 phone systems provide different features, meaning varying levels of system sophistication.
There may be variance in the accounting of operations costs by state.
- Fixed costs contribute to the rise in costs over time as well. As call volumes decrease, fixed costs tend to remain constant or increase and are spread over a smaller number of calls, increasing the cost per call

5. THE FUTURE OF 511 SERVICE IN NORTH/WEST PASSAGE STATES

This section discusses the observations of the NWP states in discussing their plans for the 511 phone services. The states were asked if they plan to make any changes or to discontinue the service in light of the decreased use.

5.1 Planned Changes to 511 Phone Service

In recent years, some NWP states have made changes to their 511 phone services to take advantage of advances in IVR and telecommunications technologies. Washington also revised the structure of its phone tree to improve its efficiency. South Dakota added the ability to alert travelers of the potential for road conditions to worsen over the next 24 hours.

However, most members have not made changes to the features of their phone systems or the types of information they provide. Some states indicated that investment on improvements have been spent on other traveler information mediums, such as mobile applications and web sites. Others stated that their phone system users have come to expect specific information, and the states want to continue serving those existing users.

Marketing for 511 phone service may be decreasing. North Dakota markets its mobile application more than the phone service. Minnesota is considering changing the branding of their traveler information to deemphasize the telephone.

5.2 The Role of 511 Phone Service

All seven NWP states stated that despite decreasing use, 511 phone service provides a valuable service and they will continue to provide 511 phone service. There are also legislative support and funding to continue. The reasons given by the states for continuing to support the service include its role in providing Traveler Information for:

- Rural areas of several states that have poor Internet and cellular coverage, and where phone service is the most reliable way to receive traveler information. According to the US Census Bureau, three of the seven NWP states have lower than average high-speed Internet access.³
- Older populations may rely on the phone and landline phone service. The percentage of each state's population that is 65 years or older ranges from almost 14% (Wyoming) to over 16% (Montana).⁴
- Peak demand during winter that, despite overall declines, is still high enough to justify the 511 phone service. In all years, the peak months for NWP states were between December and April.
- Service that is not dependent on the Internet, so it provides a measure of redundancy in case of disruptions in other services.

While none of the NWP states have discontinued providing 511 phone service, several indicated they are monitoring use in consideration of how to allocate future traveler information expenditures.

³ "Measuring America: A Digital Nation," US Census Bureau, https://www.census.gov/library/visualizations/2016/comm/digital_nation.html, March 23, 2016

⁴ "The US States with the Oldest Populations," WorldAtlas, <https://www.worldatlas.com/articles/the-us-states-with-the-oldest-population.html>, March 8, 2018

6. STATES WITH ALTERNATIVES TO TRADITIONAL 511 PHONE SERVICE

As part of the review of NWP 511 phone service, the NWP states were asked if they were aware of states that did not provide a statewide 511 phone service or had significantly reduced the service. The intent was to identify and contact those states to gather an understanding of their decision. The NWP states identified Kentucky, Missouri and North Carolina. The following summarized the findings based on a document review in Kentucky and interviews with 511 representatives from Missouri and North Carolina.

6.1 Kentucky

In August 2016, the Kentucky Transportation Center published the *Synthesis of Kentucky's Traveler Information Systems*⁵ which showed that 511 phone service call volume was sharply decreasing, including a decrease of 40% in the previous two years. At the same time, visitors to the web site and mobile application increased. A survey of Kentucky drivers revealed that a majority get information through digital content providers such as Google and Waze. Government-provided services such as the 511 phone service are less popular among drivers, and only garner a fraction of the traffic of online services and traditional media, such as radio and television. While the synthesis did not make any recommendations, it indicated that the state may benefit from reevaluating its role in providing traveler information.

In November 2016, the Kentucky Transportation Cabinet announced it would discontinue 511 phone service and launched a new online website (Goky.ky.gov). A related traveler information mobile application provided by the same contractor as the phone service was discontinued alongside the phone service, and the state now works with Waze to provide mobile traveler information. In discontinuing the two services, Kentucky shifted all traveler information data management to in-house Cabinet staff with the intention of having greater control and ownership of that data.

Kentucky had delivered 511 phone service since 2000, however, they noted the declining call volume and the content-rich environment allowed by the web site as reasons for ending support for phone use. Kentucky also has said that discontinuing the phone and mobile application support will save the state approximately \$750,000 per year⁶.

Travelers who dial 511 in Kentucky now hear a brief phone message directing them to the web site. They are also directed to dial a different number (877-FOR-KYTC) to request motorist assistance or to report an incident.

6.2 Missouri

While Missouri offered 511 phone service in the St. Louis area, a statewide system has never been offered. In 2007, the Missouri Department of Transportation (MoDOT) contracted with a vendor to provide an IVR 511 service funded through sponsorship ads within the calls. There was no direct cost to MoDOT. This service was available only in the St. Louis area and was developed in part to address traffic concerns from a large construction project that shut down 10 miles of I-64. The vendor deployed sensors and provided travel times on the 511 phone service for approximately five to six years. The 511 phone system handled approximately 2,000 calls each month and fewer than 100 calls on a typical day.

⁵ Chris Van Dyke, Jennifer Walton, James Ballinger, "Synthesis of Kentucky's Traveler Information Systems," (Kentucky Transportation Center, 2015), 49

⁶ "GoKY website replaces 511 phone line for Kentucky traffic and roadway information," (Kentucky Transportation Cabinet), <http://kentucky.gov/Pages/Activity-stream.aspx?n=DepartmentofTransportation&prld=45>

When the system was terminated, MoDOT sought another vendor willing to operate a statewide service statewide using the sponsorship model. This approach was pursued but ultimately not feasible for the vendor to deliver a “free” system. As a result, MoDOT elected not to do statewide 511. MoDOT then pursued continuing a free service in St. Louis only, but could not find a vendor willing to operate a sponsored system in the St. Louis area. It is important to note that there was little public comment when 511 phone service was discontinued.

Instead of a 511 phone service, the MoDOT now provides statewide traveler information through its web site (traveler.modot.org) and mobile application. In addition, MoDOT provides a 24/7 customer service line where callers can speak to a live person, including requesting traveler information (888-275-6636).

6.3 North Carolina

North Carolina discontinued its IVR-based 511 system in 2016 and replaced it with a combination of live operators and recorded messages. The new system can be reached within the state using 511 or from outside the state using (877) 511-4662. North Carolina’s solution is unique because it uses inmates from a women’s penitentiary to give callers traveler information based on the caller’s request for location.

The live service is available on weekdays and state holidays. Eight inmates provide the live service. They view the state traveler information web site (DriveNC.gov) while speaking with callers. Overnight and weekends, the system provides a recorded message directing travelers to visit the state’s web site. The system also allows for the state to record messages about emergencies or other major events for callers. The operators of the system can direct calls to the live callers, to Transportation Management Center (TMC) staff or to the recorded messages, depending on volume of traffic and staffing levels.

The reasons North Carolina cited for replacing the IVR system were cost, complexity and customer satisfaction. North Carolina paid approximately \$360,000 per year for the IVR system. The new solution costs significantly less. A total cost was not provided, but currently the state pays inmates one dollar per day, or \$40 per week for eight inmates working full-time, plus an additional \$30,000 to the prison and the cost of telecommunications. State staff indicated that the IVR was complex to maintain and operate, and the new process is much simpler and requires less staff time. In addition, the switch to live operators allowed them to avoid going through an Request for Proposal (RFP) process to replace the existing IVR system. North Carolina states that the live operators achieve a very high level of customer satisfaction and that callers prefer speaking to a live person.

Before changing its 511 system to live operators, North Carolina had used inmates in their tourism division to provide information. The inmates could view the state’s traveler information and describe conditions to callers. The success of using the inmates in tourism was beneficial for the switch because the inmates were already trained.

The primary disadvantage of using inmates as live operators appears to be capacity. On average, North Carolina receives about 130 “good” calls a day. A good call is defined as one in which the caller is seeking traveler information. North Carolina 511 also receives about 70 “bad” calls, which include wrong numbers, hang-ups and static noise. If a larger number of calls are received, they can be routed to a recording or to TMC staff. To reduce the number of 511 calls received, North Carolina does not actively promote the service. They have had to contact partners, such as other states and the National Weather Service to have them no longer direct people to North Carolina’s 511 phone service.

7. CONCLUSION

The decline in 511 phone use is happening in the NWP states and nationwide. While some states have determined that it no longer makes financial sense, the NWP states have determined that it remains a valuable component of their overall traveler information strategies. They do not perceive it as competing with the emerging dissemination methods, such as social media and mobile applications. Rather, it complements them and expands the reach of traveler information. The FHWA's 2015 *Next Generation Traveler Information System: A Five Year Outlook* report concurs that phone is still an important element of an effective traveler information dissemination strategy, particularly given the demographics of the NWP states. The report notes the decline but states that demand for phone is still "strong."

As technologies and demographics continue to change the NWP states will continue to monitor the use of their 511 phone system to determine its effectiveness in reaching travelers. In particular, the trends that may impact future 511 phone use include:

- Generational shifts to an aging population that is familiar with mobile and Internet technologies.
- Shifting transportation patterns, including the use of transit, rideshare and decreasing vehicle ownership among younger people.
- The increased connectivity and improved access to high-speed Internet in rural areas.
- The use of "Big Data" that results in more tailored and on-demand information that may not be conducive to phone dissemination.
- The rise of third-party traveler information by private-sector providers such as Google, INRIX, Tom-Tom and WAZE
- The continuing increase of mobile application use and the evolution of mobile technologies.
- Connected vehicles and the increasing availability of in-vehicle systems to broadcast and react to traveler information.

There may be a day that the impacts of the trends cause states to reconsider their traveler information strategies. However, that day is not in the near future and 511 phone service remains a key element for the NWP states and their travelers.