# Iowa 511 Traveler Information System User Analysis

**Final Report**
**July 2015**

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**16. Abstract**

This study provides the Iowa Department of Transportation (DOT) with a user analysis of the Iowa 511 Traveler Information System.

The researchers assessed the Iowa 511 system using survey results and usage data. The system was evaluated by examining the trends in users, usage characteristics, and the use of competitors (e.g., traveler information systems from the private sector).

The study resulted in a number of recommendations. Knowledge of how travelers utilize Iowa 511 will support short-term improvements and long-term programmatic decision making.


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# IOWA 511 TRAVELER INFORMATION SYSTEM USER ANALYSIS

**Final Report**
**July 2015**

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## ACKNOWLEDGMENTS

The authors would like to thank the Iowa Department of Transportation for sponsoring this research.

## EXECUTIVE SUMMARY

This study assessed the Iowa 511 Traveler Information System using survey results and usage data for the 511 phone, websites, and mobile apps maintained by the Iowa Department of Transportation (DOT). The Iowa 511 system was evaluated by examining the trends in users, usage characteristics, and the use of competitors (e.g., traveler information systems from the private sector).

### Conclusions and Recommendations

- Usage of the Iowa 511 system was highest during winter months and extreme weather events and Iowa 511 helps travelers plan their trips. After receiving information from Iowa 511, 66% of the 283 Iowa 511 users from the online survey respondents had changed their routes, 63% had changed their departure times, and 49% responded that Iowa 511 had helped them to be better prepared.

  *Continue to focus on providing high quality traveler information during peak usage periods.*

- Increased awareness about Iowa 511 could lead to increased usage. The Motor Vehicles Division (MVD) survey found that 4% of respondents (37 of 850) were not aware that Iowa 511 existed and only 24% of respondents had used Iowa 511.

  *Marketing the Iowa 511 brand to help increase public awareness could potentially lead to increased usage.*

- Those who commute within short distances close to home are likely to be more familiar and confident with their driving environments and possibly also have more flexible arrangements, which reduce the need to seek traveler information for Iowa DOT-maintained roadways. However, Iowa 511 currently does not cover county and local roads so it is probably less attractive to the commuters on local roadways.

  *Increasing Iowa 511 information coverage and details could increase the market share.*

- Traveler expectations are changing along with technology innovations. More than 50% of Iowa 511 web visits were made from mobile devices in the past two years. However, Iowa 511 was the only one providing phone service among all the traveler information providers used by MVD survey respondents. While the trend is to acquire traveler information through internet, 22% of those surveyed Iowa 511 users accessed Iowa 511 information by phone only.

  *Regular user feedback and data-driven decision-making are quintessential for keeping up with changing needs and expectations.*

- The MVD survey showed that primary competitors for overall usage were Google Maps and in-car navigation systems. Use of Google Maps was highest among the youngest driving ages (18 to 30), who were 38% more likely to use Google Maps than those over 60. In-car navigation systems tended to attract middle-aged users (31 to 40) and users with daily workday commute distances greater than two miles.

  *It is important to understand the market share of the competing traveler information providers to better align the Iowa 511 system for optimal return on investment.*

- Providing more camera images with higher quality and integration with other applications, such as WAZE, were the most desired features by current Iowa 511 users from the online survey. Both MDV and online survey respondents indicated that ease of use and accessibility as well as graphic design of the website and apps are important.

  *Given the desired features/services by the MVD and online survey respondents, it is critical to provide reliable and real-time information, improve information coverage and details for a variety of public needs, integrate with other information services, disseminate information through the media that can reach a wide range of the target audience, and help ensure Iowa 511 distribution benefits users across significantly different geographic areas, incomes, ages, etc.*

- The currently used Google Analytics provided several summaries of Iowa 511 web usage data, but limited flexibility in terms of the default queries, which restricted potential insights that could be gained from the data. The raw web logs could be used to develop improved analytical constructs. Other logs, such as the usage of roadway cameras and other specific tools, will be very helpful in future evaluations of the Iowa 511 Traveler Information System.

  *This study demonstrated a need for better data gathering using improved web logging.*

## INTRODUCTION

Traveler information systems can provide travelers with details on the most efficient routes and motivate changes in traveler departure times to help them avoid congested conditions. On July 21, 2001, the Federal Communications Commission (FCC) designated 511 as the nationwide travel information telephone number. The Iowa Department of Transportation (DOT) launched the first stage of its 511 Traveler Information System, which included the 511 phone service and website, in 2002.

Iowa 511 provides real-time information on road traffic conditions, accidents, road closures, road construction, weather conditions, and other information of interest to the public. Currently Iowa 511 disseminates information to the public via phone service, websites, social networks, and mobile apps. Knowledge of how travelers utilize Iowa 511 will support short-term improvements and long-term programmatic decision making.

Numerous studies have found that traveler information systems can offer the benefit to the public in travel time savings, vehicle operating cost savings, crash cost savings, and vehicle emission reduction (Raine et al. 2014). For the DOTs, traveler information systems can save the operational costs incurred by direct inquiries from travelers (Deeter et al. 2014).

The potential disadvantage of traveler information systems is the audio and cognitive distractions if used by drivers while driving. A study by Patten et al (2004) found that audio and cognitive in-vehicle distractions can increase the time drivers focus on the center of the road and decrease their time scanning the wider road environment.

A study by the University of Minnesota makes recommendations for the next generation Minnesota 511 Traveler Information System, and the primary suggestion is to incorporate select features from traffic information applications developed by the private sector, such as voice commands, route guidance, saved places, and travel time estimates, while taking into account the cognitive workload and visual distraction (Morris et al. 2014). This study points out that the 511 system as a publicly funded traveler information system has a greater responsibility compared to the applications from the private sector to account for distraction and ensure the safety of system users.

In a National Cooperative Highway Research Program (NCHRP) report, the authors state the critical factors that affect the successful implementation of real-time traveler information systems are the collection of real-time transportation system status data and the delivery of this data in the form of information that can influence traveler decision making (Robinson et al. 2012). Regarding the future outlook of publicly funded traveler information systems, this research summarized the following perspectives based on a nationwide survey of transportation agencies in 2012:

- Partner more with the private sector
- Take advantage of smartphones and new social media
- Make sure funding is available for expansion

In a recent Federal Highway Administration (FHWA) report that reviewed 49 industry practices for the design, development, maintenance, and use of a road condition reporting system (RCRS), the authors identified three "emerging best practices": introducing citizen reporting into RCRSs, integrating transit data, and integrating third party tools (Deeter et al. 2014).

In November 2014, Iowa became the fourth state to integrate citizen reporting into its 511 system. Data from the private sector (e.g., Google) and other public entities (e.g., the National Weather Service) have also been adopted in Iowa 511. And additional Iowa 511 developments in data fusion and exchanges with the third parties are on the way to meet the public's needs.

This study assessed the Iowa 511 system using survey data and website usage statistics from Google Analytics. The system was evaluated by examining the trends in users, usage characteristics, and the use of competitors (e.g., traveler information systems from the private sector).

## DATA SOURCES

Multiple data sources were used to gain insights into the usage of Iowa 511 within the state.

### Traveler Information System Survey–Motor Vehicle Division (MVD)

Using input provided by the Iowa DOT and the research team, Iowa State University's Survey and Behavioral Research Services (SBRS) designed a survey questionnaire to gauge the usage of traveler information systems by Iowa road users. This Traveler Information System–Motor Vehicle Division (MVD) survey focused on awareness and usage of the Iowa 511 system.

The survey consisted of 22 questions, which addressed the sources for obtaining information on road construction and closures, weather-related delays, and travel times/routes and also included questions regarding driving patterns and basic demographics. (The survey questionnaire and responses are included in the appendices.)

Data were collected in driver's license stations in nine Iowa cities—Ankeny, Carroll, Cedar Rapids, Council Bluffs, Dubuque, Fort Dodge, Ottumwa, Mason City, and Spencer—representing both urban and rural areas.

A total of 850 participants responded to the survey. As shown in Figure 1, the survey respondents provide a reasonable sample of driver ages. Figure 2 shows the distribution of Iowa 511 users surveyed from the various cities. Response statistics are included in the appendices.

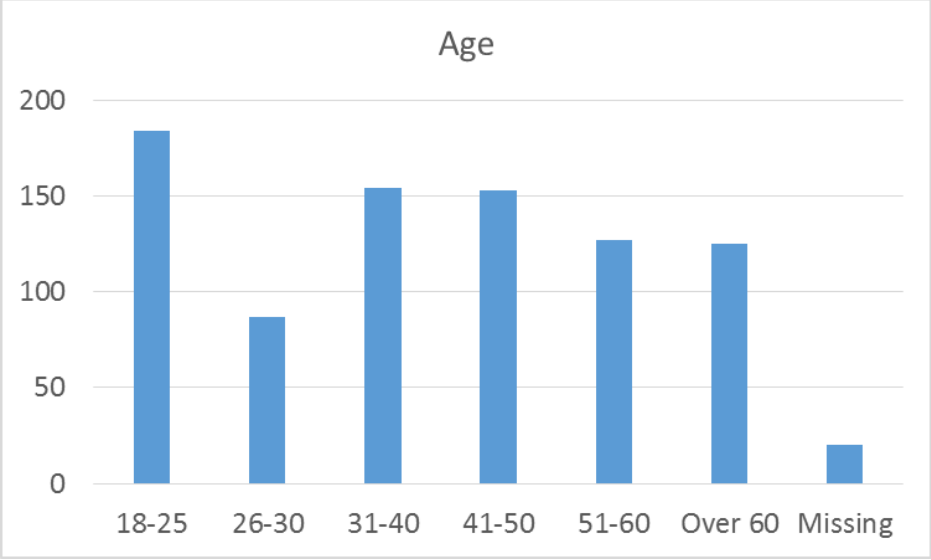



**Figure 1. Age distribution of MVD survey participants**


**Figure 2. Iowa 511 users by zip code (MVD survey)**

### Web, App, and Phone User History

The Iowa 511 website and mobile apps include the low-bandwidth (LB) website, high-bandwidth (HB) website, mobile third generation (3G) website, Trucker website, and mobile apps (highway version and Truckers' version). Google Analytics was used to obtain data on the historical usage of these sites. The data were collected for four years from June 1, 2011 through May 31, 2015. The 511 phone call logs for the same period from Verizon were used to calculate Iowa 511 phone call statistics.

### Traveler Information System Survey–Online

An online survey questionnaire similar to the MVD survey was delivered to current Iowa 511 users and Iowa DOT employees by email, and also posted on multiple online portals. The online survey was available starting May 20, 2015 and results were collected for this study until June 15, 2015. In total, 362 respondents, of which 296 were Iowa DOT employees, completed the survey during this timeframe. Figure 3 shows the age distribution of the participants.

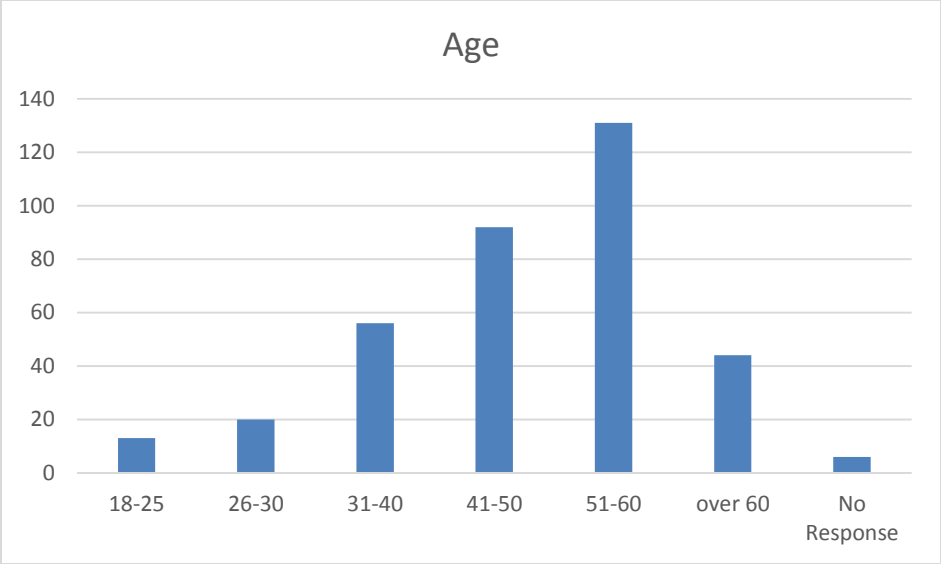



**Figure 3. Age distribution of online survey participants**

This dataset was not representative of the typical driving population and therefore was not used for statistical modeling. However, the responses and preliminary statistics are included in the appendices to highlight Iowa 511 usage, particularly among Iowa DOT employees.

**Precipitation and Snowfall Information**

The National Weather Service (NWS) Cooperative Observer Program (COOP) database was used to obtain historical snowfall and precipitation information. The data were collected from 118 sensors located across Iowa, as shown in Figure 4. Daily precipitation and snowfall data since January 1, 2013 were obtained for all 118 sensors.

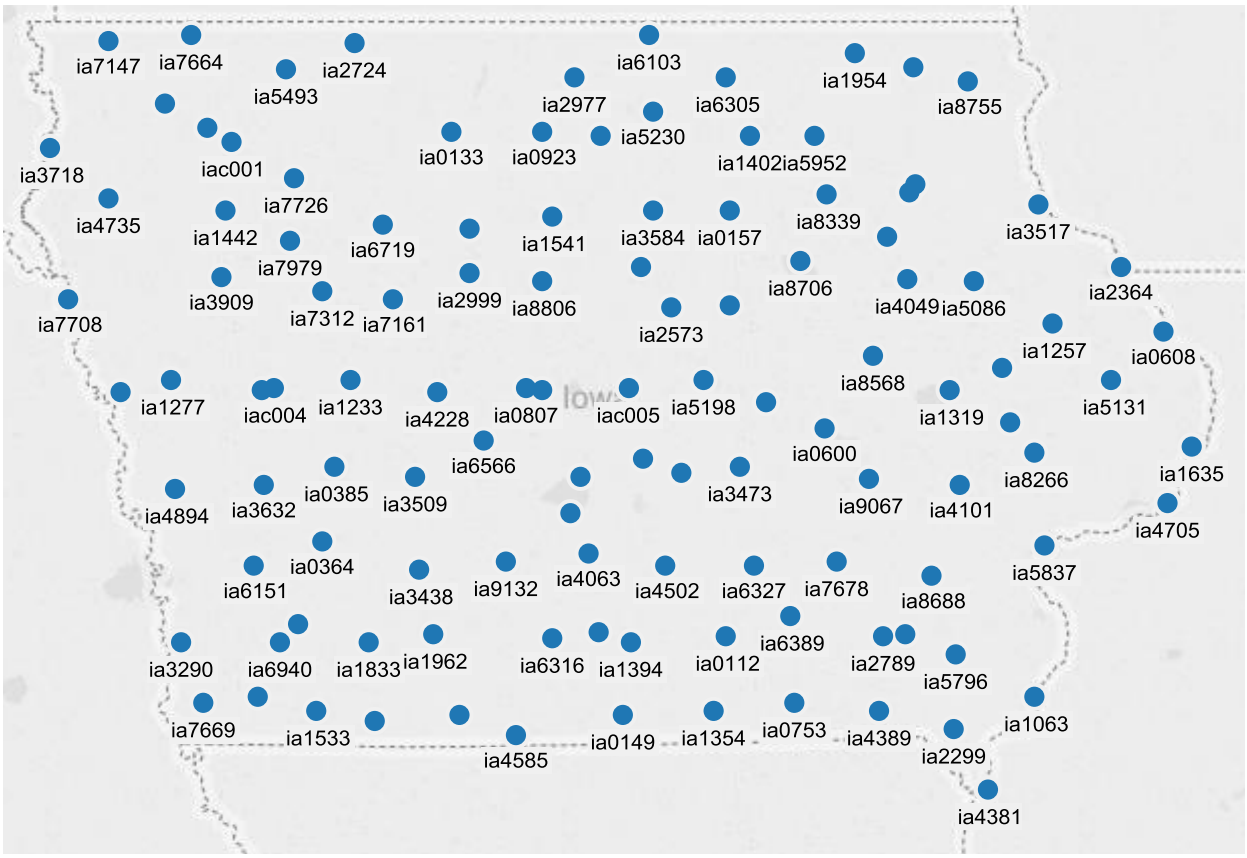



**Figure 4. NWS COOP weather station locations**

## DATA ANALYSIS

### Who Uses the 511 System? (Source: MVD Survey)

Characterization of Iowa 511 system users is important to better understand usage trends, allocate available development resources, and market the service. The question of who uses the Iowa 511 system was answered using the exploratory analysis and statistical models developed from the Traveler Information System Survey conducted at the nine MVD driver's license stations.

The MVD survey results showed the following:

- 19% (165/850) of respondents did not use any traveler information system during the six months prior to May 2015.
- 70% (598/850) of the respondents had never used Iowa 511.

Among the 204 respondents who had used Iowa 511 system:

- The websites (LB and HB) were the most frequently used information mediums.
- 51% (105/204) had visited Iowa 511 websites.
- 37% (76/204) had used the Iowa 511 phone service, and 22% (44/204) used only phone service.

The usage rate of each Iowa 511 information medium is shown in Figure 5.

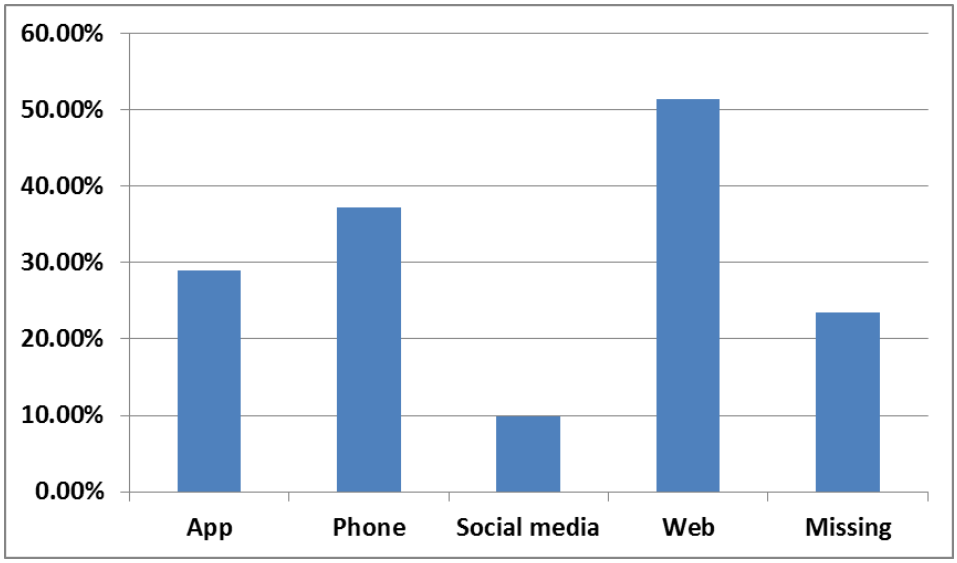



**Figure 5. Mediums used by Iowa 511 system users (204 of 850 respondents from MVD survey)**

These usage rates were calculated based on the usages of 204 Iowa 511 users from the MVD survey. The usage rates of the Iowa 511 apps and social media (Facebook and Twitter) were 29%

(59/204) and 10% (20/204), respectively. Among the 204 respondents who had used Iowa 511, the most frequently used feature was Road Report (81% or 165/204 users) as shown in Figure 6. The Road Report includes information on roadwork, closures, restrictions, and warnings. (The Iowa DOT also reported that, as of June 1, 2015, 4,574 Iowa 511 users had subscribed to the personalized road report service.)

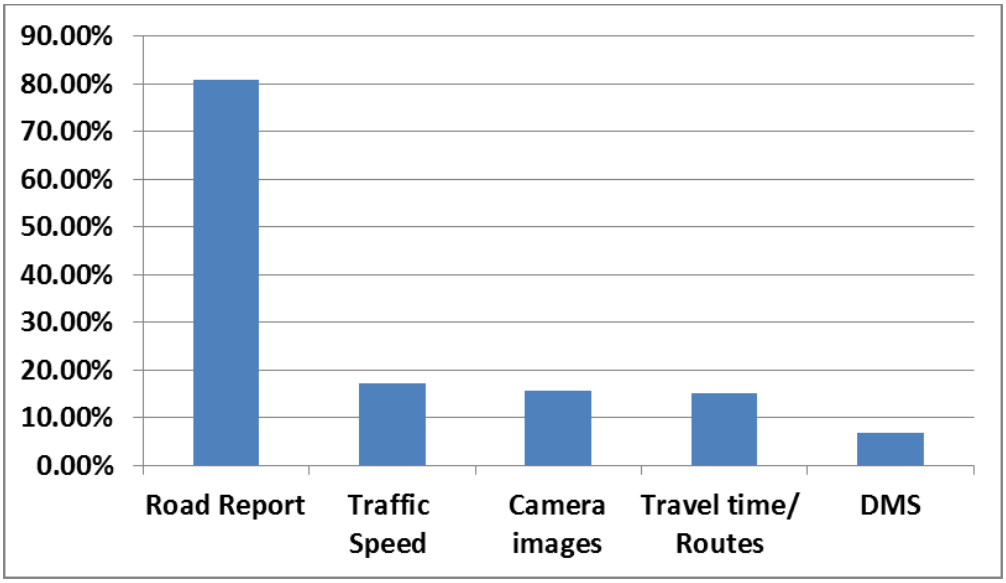



**Figure 6. Iowa 511 feature usage by system users (204 of 850 respondents from MVD survey)**

Other top used features from the MVD survey results were Traffic Speed (17% or 35/204 users), Camera Images (16% or 32/204 users), Travel Time/Routes (15% or 31/204 users), and Dynamic Message Sign (DMS) messages (7% or 14/204 users). These top used features are based on the respondents' reported usage of each feature during the six months prior to May 2015. With expanding feature availability, the usage rates might change over time; however, the significantly high usage of the Road Report indicates a majority of Iowa 511 users were motivated by the needs for road surface conditions, construction, and incident information, and potentially, Iowa 511 has an advantage over other applications in providing this information.

Statistical models were developed to examine the differences among Iowa 511 users versus the users of alternatives (e.g., Google Maps, Waze). (The details of the statistical modeling are included in the appendices.) Several factors, such as age, commute distance, and city location, were examined to ascertain differences in use among various segments of the driving population.

The statistical analysis showed age and commute distance to possibly be determinants of those choosing to use the Iowa 511 system. Travelers aged 31 to 60 and those with daily commute distances greater than two miles were more likely to use Iowa 511. Compared to the other age groups, travelers aged 31 to 60 were 9.5% more likely to use Iowa 511 over other travel information systems. Travelers who commute more than two miles were 7.8% more likely to use

Iowa 511. The potential reasons for usage characteristics as found by the model can be the following:

- Those who commute within short distances close to home are familiar and confident with their driving environments and possibly have more flexible arrangements, which reduce the need to seek traveler information for Iowa DOT-maintained roadways.
- Iowa 511 currently does not cover county and local roads so it is less attractive to the commuters on local roadways.
- There are no national standards for developing real-time traveler information systems so the implementation of the 511 system can be different, which requires interstate travelers to adjust as they travel from one jurisdiction to another. Some other traveler information systems, such as Google Maps and in-car navigation systems, are more user-friendly in this way when traveling nationwide.

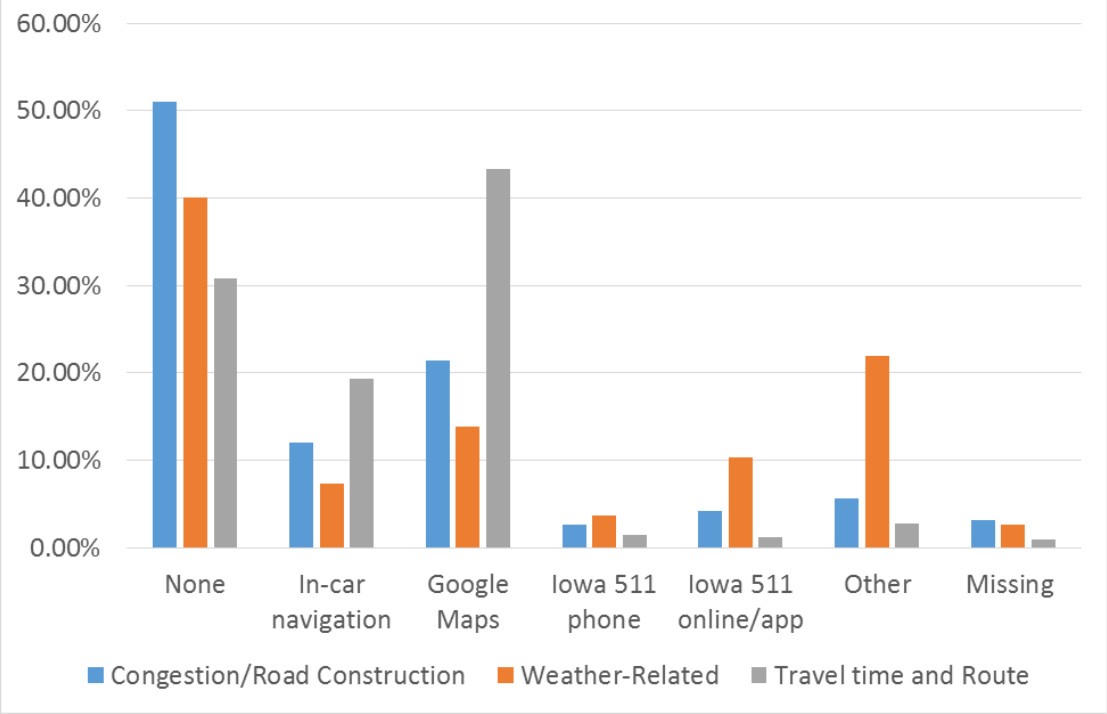
In the statistical analysis, no consistent trends were exhibited with respect to the Iowa cities where the MVD surveys were conducted. This implies that, for the same age group and commute distance, the users sampled from all nine MVD sites were equally likely to use Iowa 511.

***Insights***

- 19% of surveyed population did not use any traveler information system during the past six months prior to May 2015
- 24% of respondents had used Iowa 511
- Use of Iowa 511 was 9% more likely among those aged 31 to 60 and also more likely among those with weekday commute distances more than two miles
- No significant differences in the usage rates of Iowa 511 across the surveyed MVD sites
- Increasing Iowa 511 information coverage and details, such as the information on major arterials not maintained by the state, could increase the market share

**Who are the Competitors? (Source: MVD Survey)**

It is important to understand the market share of the competing traveler information providers to better align the Iowa 511 system for optimal return on investment. The MVD survey data were used to describe the role of competitors to Iowa 511. The traveler information systems used by the respondents are shown in Figure 7.




**Other: TV/News (2%, 11.18%, 0.59%); Radio (1.88%, 2.59%, 0.12%); Phone apps other than 511 (0.82%, 4.24%, 1.06%)**

**Figure 7. Traffic information services used by MVD survey respondents**

For congestion, road construction, and closure information:

- Nearly half (49%) of the respondents had sought this information in the six months prior to May 2015, mostly from Google Maps (24% or 182/850) or in-car navigation (12% or 102/850).

For weather-related traveler information:

- About 60% (588/850) of respondents had sought weather-related travel information in the six months prior to May 2015.
- Respondents mainly used information from TV, radio, and phone apps other than 511.
- Most respondents checked weather-related information before a trip (33% or 286/850) or en route (15% or 126/850).

For travel time information:

- About 69% (588/850) of respondents had sought travel time information in the six months prior to May 2015.
- Google Maps was most frequently used for travel time information.
- Travelers generally check travel time before a trip (33% or 262/850) or en route (30% or 282/850).

Statistical analyses showed that Google Maps captures a larger market share in traveler information seekers between 18 and 30 years old. Respondents in this age group are 38% more likely to use Google Maps. Also, compared to the respondents over 60 years old, the usage rate of Google Maps was 25% higher among those 31 to 40, 20% higher among those 41 to 50, and 14% higher among those 51 to 60.

The probability of using in-car navigation systems was also found to be related to age group and commute distance. People between the ages of 31 and 40 were 9% more likely to use in-car navigation systems, while those with daily commute distances greater than two miles were 7% more likely to use in-car navigation systems. (Details about the statistical modeling are included in the appendices.)

Compared to Google Maps and in-car navigation systems, Iowa 511 provides both current and future road construction and closure information, and it integrates Google traffic speed.

The MVD survey respondents reported that ease of use, followed by the accuracy of information, were the most critical factors affecting their choice of a specific traveler information system. To increase Iowa 511 users, the system needs to disseminate information in the form expected by travelers, and also consider the different needs for commuters, local travelers, tourists, long-distance travelers, and commercial-vehicle operators. Marketing the 511 brand to help increase public awareness about Iowa 511 could potentially lead to increased usage.

The MVD survey showed Iowa 511 is the only one providing a phone service among all the traveler information providers used by the respondents. For 22% of Iowa 511 users, the phone service is the only 511 information medium they used.

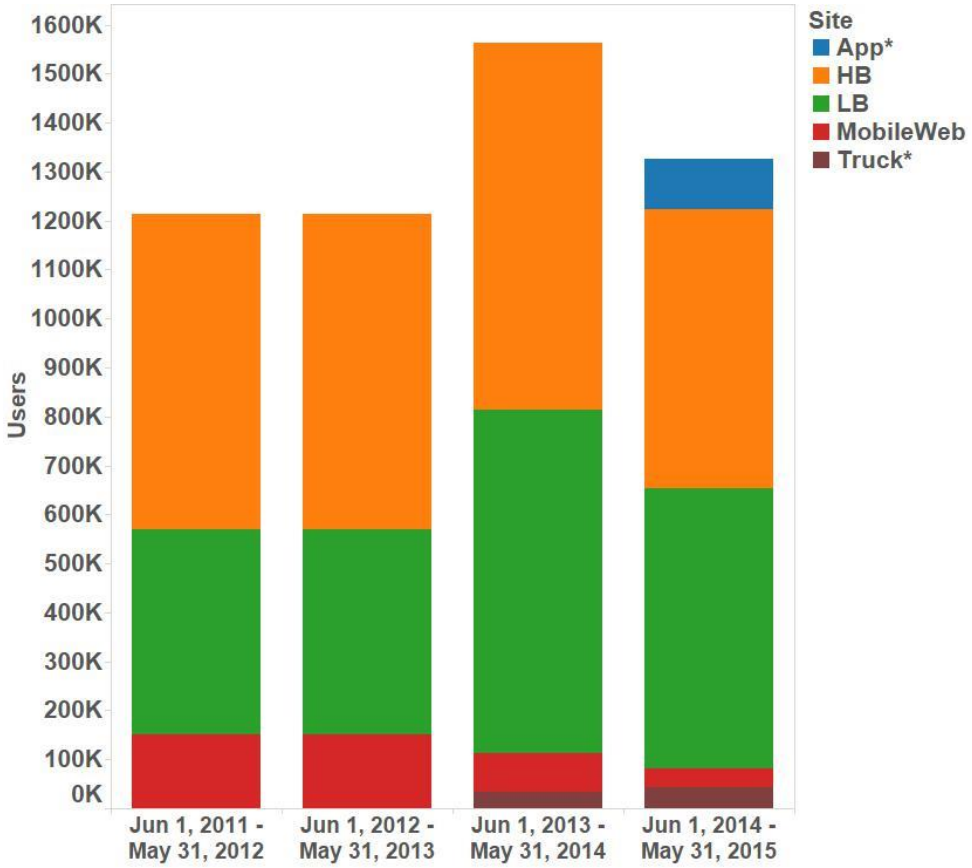
Studies in literature also found that the reliability of information affected whether the traveler would pay attention to the advice from a traveler information system (Ben-Elia et. al. 2013). As a publicly funded traveler information system provided by the Iowa DOT, Iowa 511 may have a strong advantage over its competitors in collecting and maintaining high quality data from multiple sources. By ensuring the accuracy and timeliness of information, Iowa 511 can build and maintain public trust and fulfill the benefits of a statewide traveler information provider and partner.

***Insights***

- Primary competitors for overall usage were Google Maps and in-car navigation systems
- Use of Google Maps was highest among the youngest driving ages (ages 18 to 30), who were 38% more likely to use Google Maps than those over 60 years old
- In-car navigation systems tended to attract middle-aged users (31 to 40) and users with daily commute distances greater than two miles
- Iowa 511 is the only one providing phone service among all the travel information providers used by the respondents and, while the trend is to acquire traveler information through internet websites, 22% of those surveyed Iowa 511 users access 511 information by phone only

**How is Iowa 511 Being Used? (Sources: Google Analytics Web Logs and NWS COOP Historical Weather Data)**

Iowa 511 disseminates information on the internet through the low-bandwidth (LB) website, high-bandwidth (HB) website, mobile 3G website, mobile app, and social media (Facebook and Twitter). As of May 31, 2015, the Iowa 511 websites and mobile apps have served an average of about 4,000 users each day over the past two years, and each web visit lasts for an average of about 2.6 minutes. The LB and HB websites were most frequently visited. Figure 8 shows the total users for each 12-month period from June 2011 through May 2015.

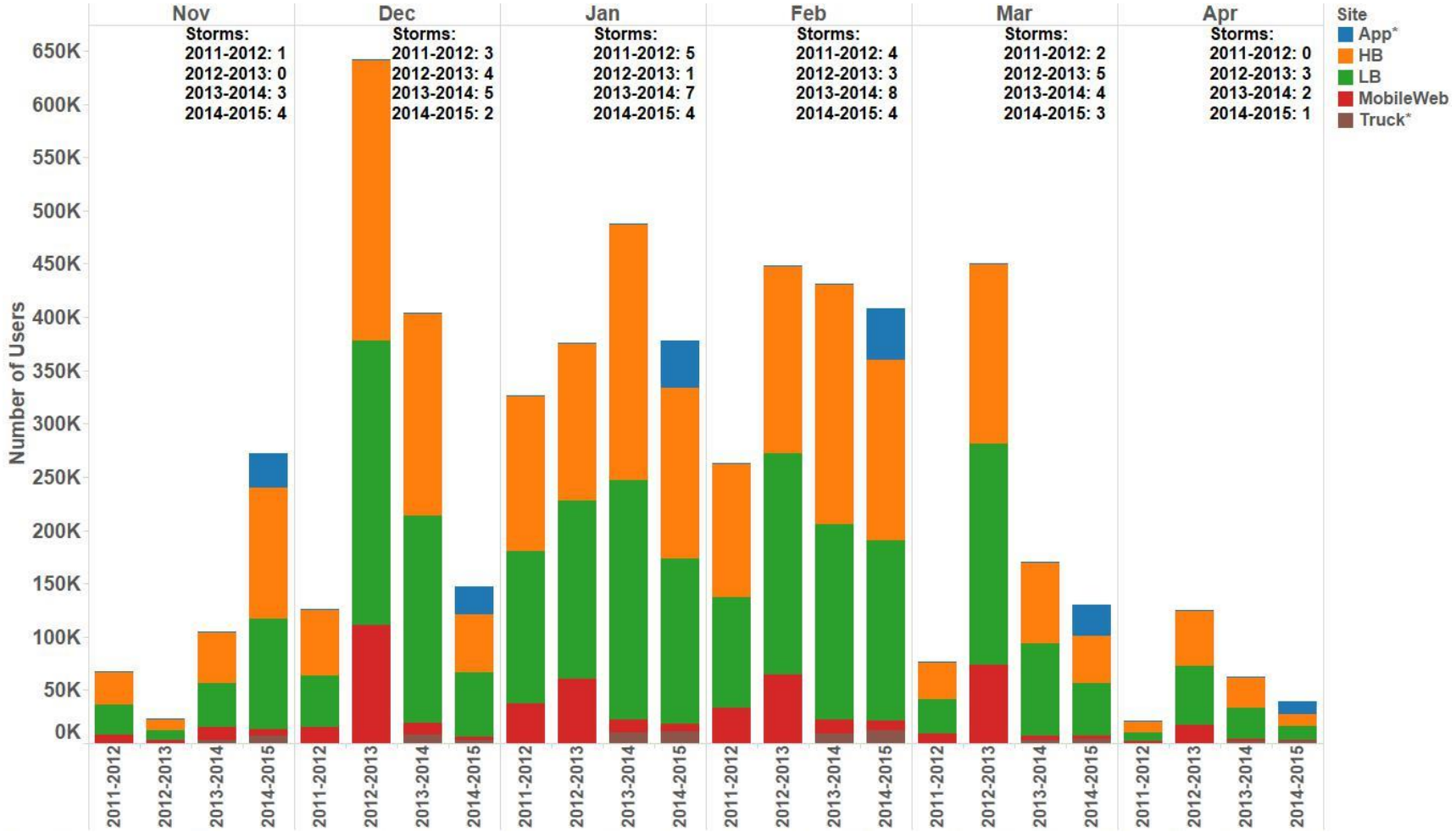



*No data for mobile apps before June 2014 or for Trucker's site before September 2013

**Figure 8. Users of Iowa 511 websites and mobile app**

One user was defined as a web visitor that had at least one visit within the selected date range. The Iowa 511 Trucker's site and mobile apps were released in June 2012 but the web logs were not available until September 2013 and June 2014, respectively. Compared to the 2013-2014 period, the total number of websites users decreased by roughly 10.7% in the 2014-2015 period. Some of it might be attributed to a less severe winter. The users of Iowa 511 in the past four winters are shown in Figures 9a and 9b.

January and February were the peak months for both 511 websites and phone usage, while the most usage occurred in December 2012 during which two storms brought a swath of 8- to 12-inch snows across Iowa and other states in the Midwest. The number of Iowa 511 users seems related to the frequency and severity of winter storms.




*No data for mobile app before June 2014 and Trucker's site before September 2013

**Figure 9a. Iowa 511 websites and app usage during winter months**

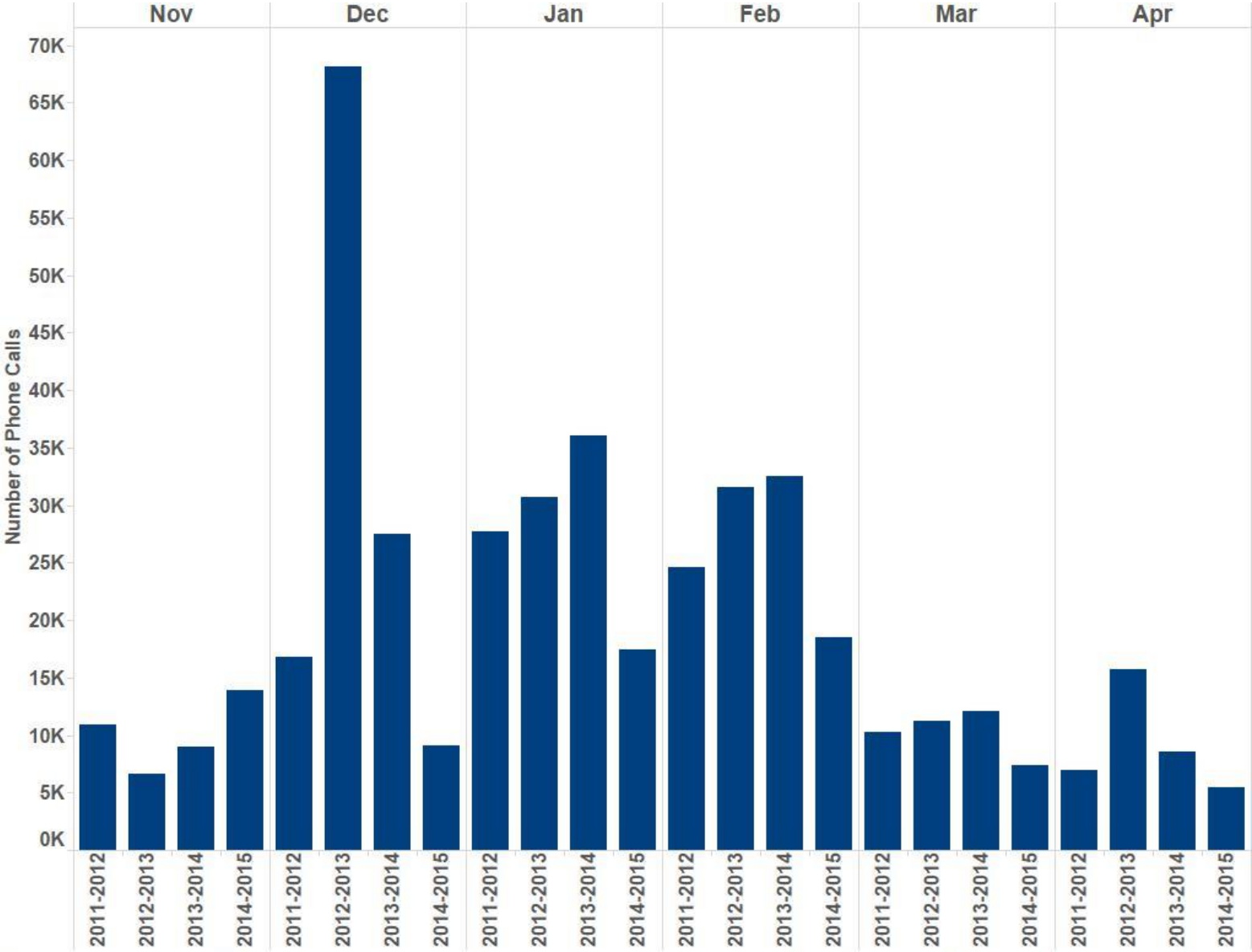



**Figure 9b. Iowa 511 phone service usage during winter months**

*Statistical Analysis*

The following statistical analysis provides some insights into how Iowa 511 usage corresponds to precipitation and snowfall. To identify the trend in Iowa 511 usage, long-term data gathering is needed.

Very high correlation was observed across all forms of 511 information dissemination. The correlation coefficients between each website/app with others are shown in Table 1, where the values from zero to one indicate no correlation to total positive correlation.

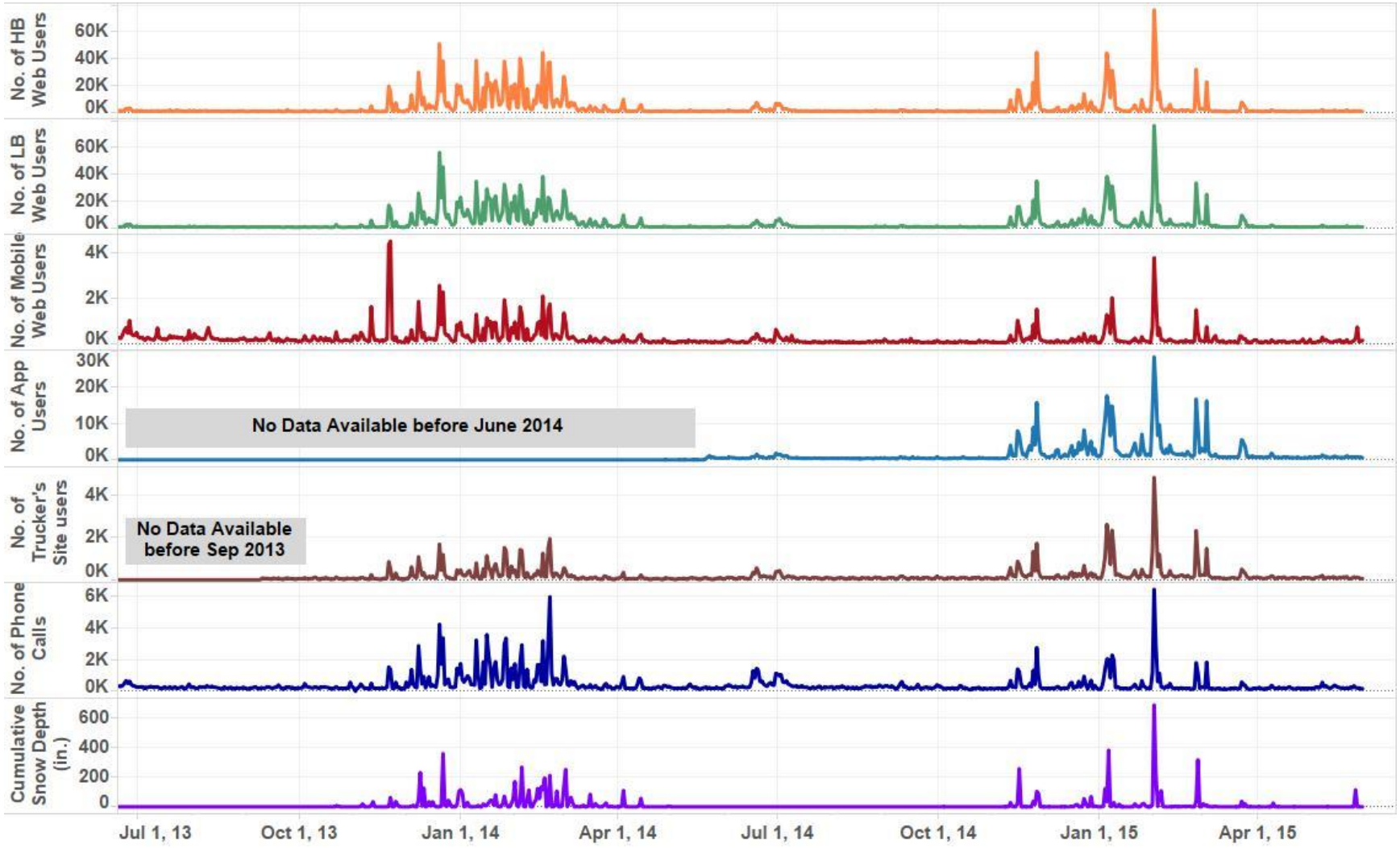
**Table 1. Correlation matrix for different Iowa 511 information mediums**

| | **LB** | **HB** | **Mobile Web** | **App** | **Phone** |
|---|---|---|---|---|---|
| **LB** | 1.00 | 0.99 | 0.95 | 0.98 | 0.94 |
| **HB** | 0.99 | 1.00 | 0.95 | 0.96 | 0.94 |
| **Mobile Web** | 0.95 | 0.95 | 1.00 | 0.90 | 0.95 |
| **App** | 0.98 | 0.96 | 0.90 | 1.00 | 0.87 |
| **Phone** | 0.94 | 0.94 | 0.95 | 0.87 | 1.00 |

Scale: 0 = no correlation and 1 = total positive correlation

The high correlation coefficients imply that the usage of all Iowa 511 mediums simultaneously peaks. As an example, the usages of all websites and the phone service increase during a severe winter storm. The historical data showed that snow and winter months are the primary cause of the increase in usage for all Iowa 511 information disseminating mediums. The daily usage of Iowa 511 online and phone services from June 2013 to May 2015, as well as the snow depth accumulated at the 118 NWS COOP weather stations (Figure 4), are shown Figure 10.

The Iowa 511 usage spikes of all information mediums simultaneously occurred on days with heavy snow, as shown in Figure 10. Usage is relatively stable during the seasons other than winter, and the flooding in Iowa during the summer of 2014 could be the reason for the summer month increases seen last year.




Cumulative snow depth and precipitation are the total amount observed at all 118 weather stations shown in Figure 4.
The increased usages seen in summer months are possibly related to the flooding conditions.

**Figure 10. Time series plot of daily users across different Iowa 511 information mediums and cumulative snow depth**

Statistical models were developed to better understand the factors contributing to the usages of Iowa 511 phone, websites, and mobile apps from June 2013 to May 2015. The statistical models compared the numbers of daily users in each month to a base case scenario, which was the number of users on an average day of June 2013 with no precipitation or snowfall. The users in the base scenario and the elasticities for precipitation and snowfall are shown in Figure 11. (The detailed modeling results are included in the appendices.)

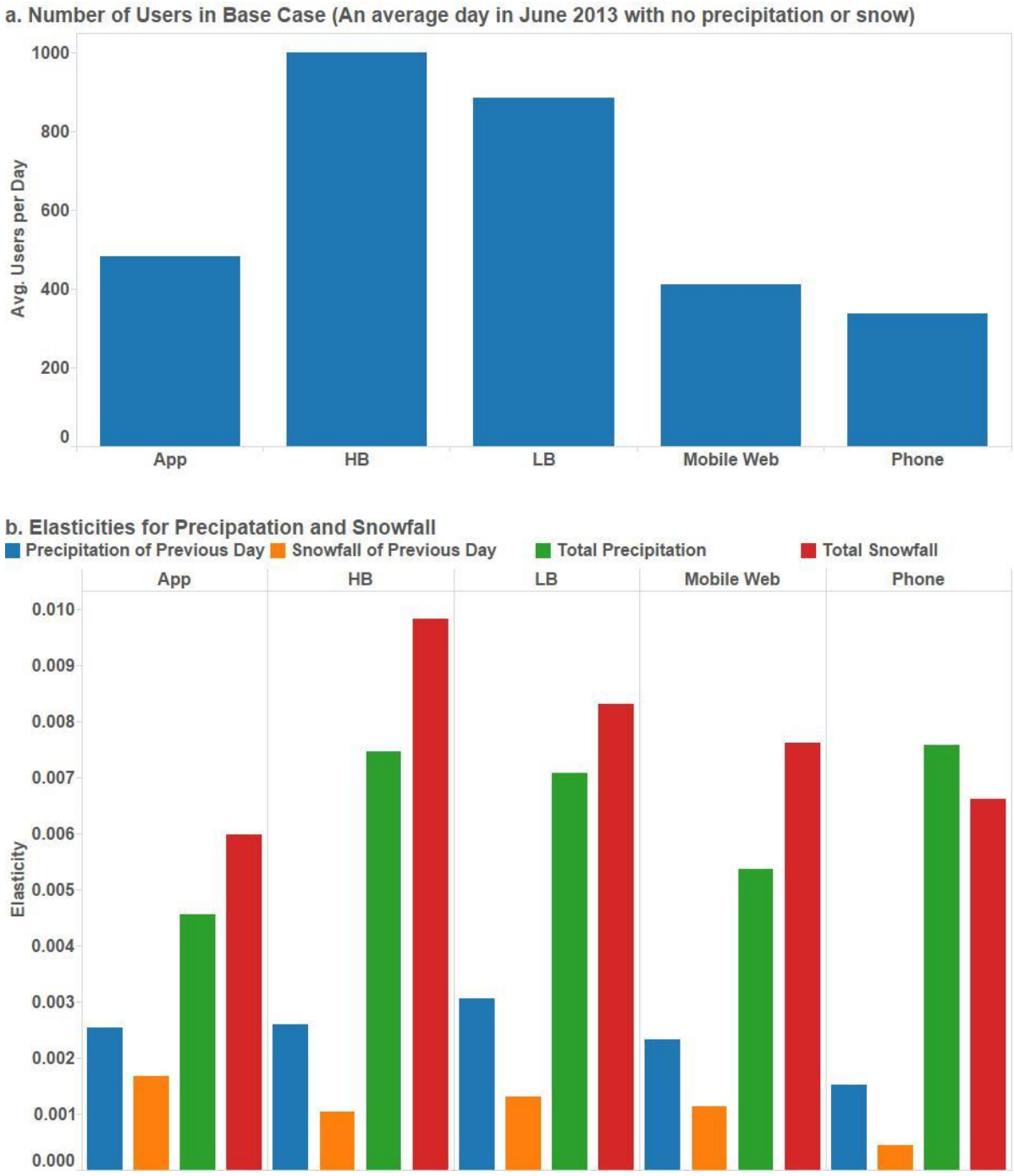



**Figure 11. Modeled number of users and impact of precipitation and snowfall**

The precipitation and snow impacts are measured by elasticity. The elasticity is a measure of responsiveness in Iowa 511 usages (or demand for use of Iowa 511) to a change in a relevant factor. As an example, a unit elasticity for snowfall will imply that the number of users increases by 1 unit if the snowfall is increased by a unit.

The top graph in Figure 11 shows the number of Iowa 511 users in the base scenario of a summer day without any precipitation. Both rain and snowfall increase the usage significantly, as indicated by the elasticities shown in the bottom graph in Figure 11. Moreover, the snowfall and precipitation from the previous day are also found to have an impact on the usage rates. It should be noted that even though elasticities for total precipitation are low, a widespread snowfall can quickly increase the number of users. As an example, an inch of snow across all 118 sensors can lead to a 94% increase in LB users.

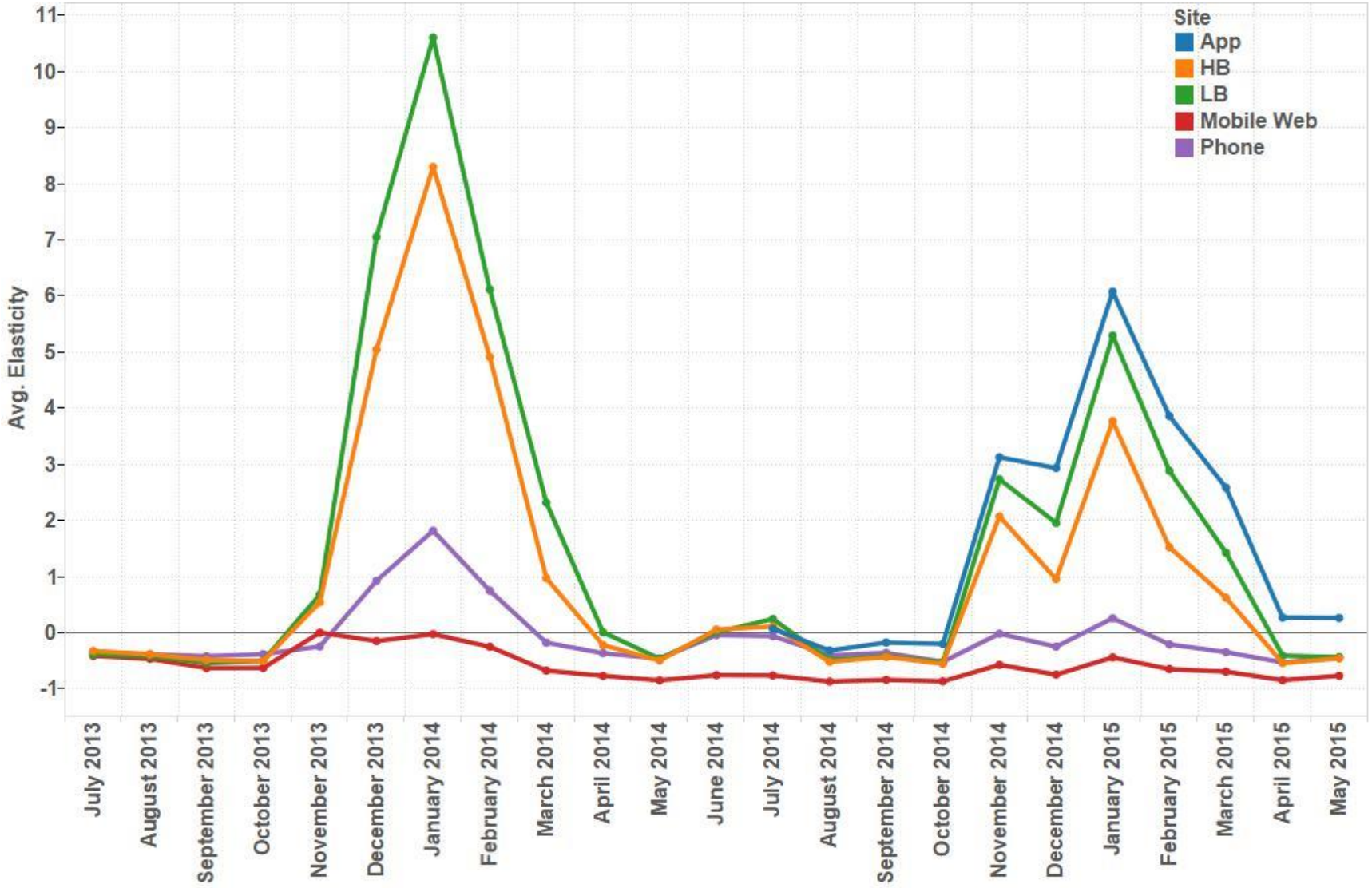
Figure 12 compares the usage of Iowa 511 by month after accounting for the changes caused by snowfall and precipitation. Again, the number of users in an average day in June 2013 is used as the base scenario to compare with the other months. In this figure, the increases in usage due to snowfall and precipitation are not represented.

Note that winter months have higher usage than other months, the month of January in particular (for both years shown) had the highest usage, even though the effects of precipitation and snowfall were not factored in on this part of the analysis. This could imply users are generally more concerned with traveler information during winter months, and thus, check the road conditions more regularly.

Compared to the other 511 information mediums, the increase of users during winter months is significantly lower for phone service and the mobile 3G website. When compared to the winter months of 2013-2014, a reduction in HB and LB website users was seen for the winter months of 2014-2015, which could be partially due to the fact that the winter of 2014-2015 was relatively milder than the preceding year.

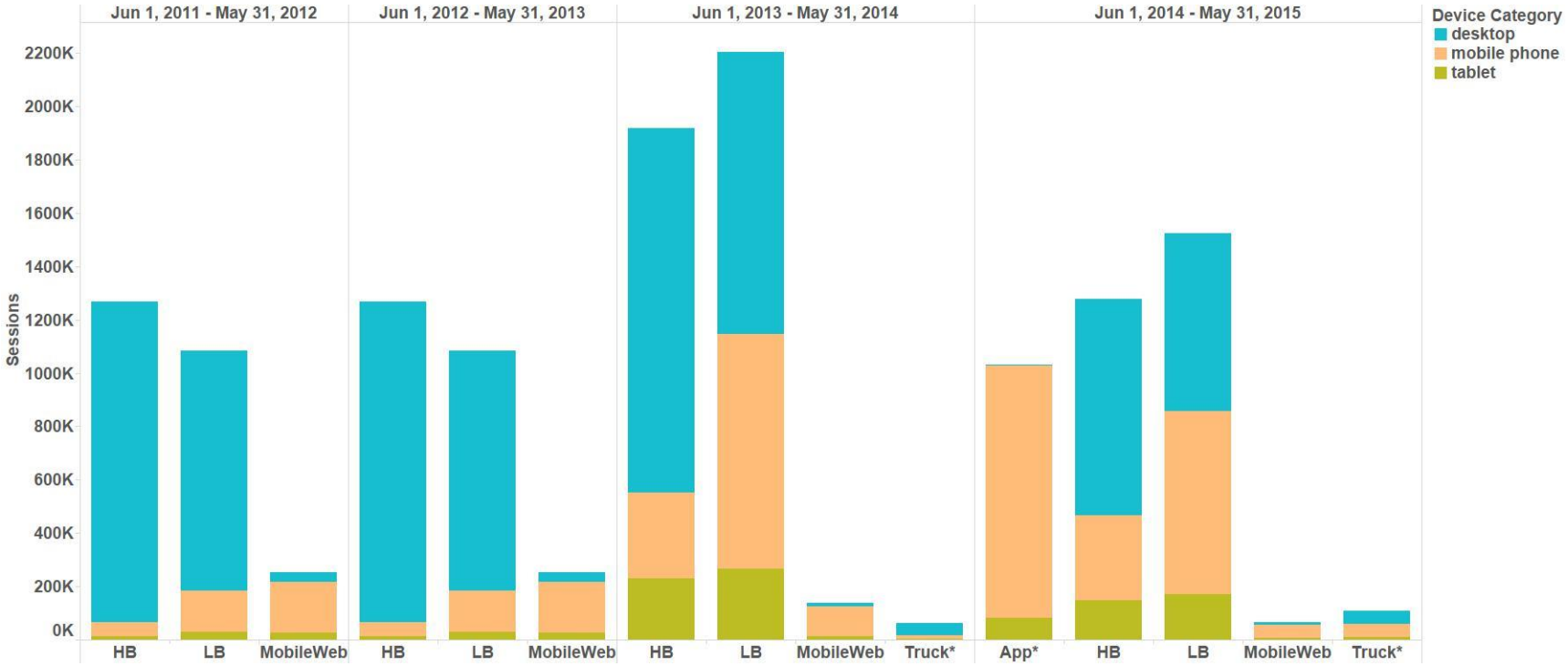
No data were available to compare the usage of the 511 mobile apps to the previous year; however, with the wide usage of smartphone and other mobile devices in the past few years, it becomes increasingly important to disseminate information through mobile apps and social media outlets. Figure 13 shows, in the past two years, more than 50% of web sessions came from mobile devices (phone and tablets). A session is the time period a user is actively engaged with the website or app, and it can be seen as a visit to the Iowa 511 website.

In addition to disseminating information to the public, Iowa 511 social media (via Facebook and Twitter) could be used as a tool for crowdsourcing. A survey conducted by the University of Texas at Austin found that 38% of survey respondents were willing to share dynamic traffic incident information with their social media groups, and when a transportation information hub was created on Facebook, it was well received (Qiao et al. 2011).




The elasticities here reflect the changes in users without the impacts of precipitation and snowfall.

**Figure 12. Monthly elasticities for number of users on different Iowa 511 mediums**




*No data for mobile apps before June 2014 or Trucker's site before September 2013

**Figure 13. Percentage of devices in Iowa 511 website traffic**

*Comparison to Other States*

The majority of Iowa 511 users were from Iowa, and Des Moines had more users overall and particularly June 2013 through May 2014, even without including usage results for Urbandale and West Des Moines. Figure 14 shows the 12 cities that had the most Iowa 511 users.

Iowa 511 out-of-state users were mostly from Chicago, Illinois; Minneapolis, Minnesota; and Omaha, Nebraska. To compare Iowa 511 with the 511 services from these neighboring states, Google Analytics web log data for Minnesota and Nebraska 511 systems were obtained and compared to Iowa 511 web log data. Given that Nebraska 511 data were only available from late September 2014, the data from October 2014 through May 2015 were used in this comparison.

Figure 15 shows the users of the three 511 systems from October 2014 through May 2015. Note that the Minnesota and Nebraska 511 systems do not have separate websites and apps for truckers like the Iowa 511 system does.

The three states shared the same general trend in monthly usage with November through February as peak usage periods, although Nebraska 511 had considerably fewer users than Iowa 511 and Minnesota 511 year round. Iowa 511 had the most users in January and February 2015, and Minnesota 511 had the most users in October and December of 2014 and March, April, and May of 2015.This might be related to more winter storms and other severe weather events in Minnesota than in Iowa during those months.

***Insights***

- Significant increases in Iowa 511 website usage were found during the winter months. This trend was consistent across all Iowa 511 information dissemination mediums. LB and HB website usage peaked in January with increases of 4% to 11% in web traffic.
- Precipitation and snowfall events were found to significantly affect usage of Iowa 511. Statistical analyses of Iowa 511 web traffic and historical weather data showed that, for a statewide storm with an average of one inch of snow for each of the 118 weather stations across Iowa, the 511 usage increased by 70% to 118% beyond the already increased usage during the winter months.
- More than 50% of Iowa 511 web visits originated from mobile devices in the two years prior to May 2015.

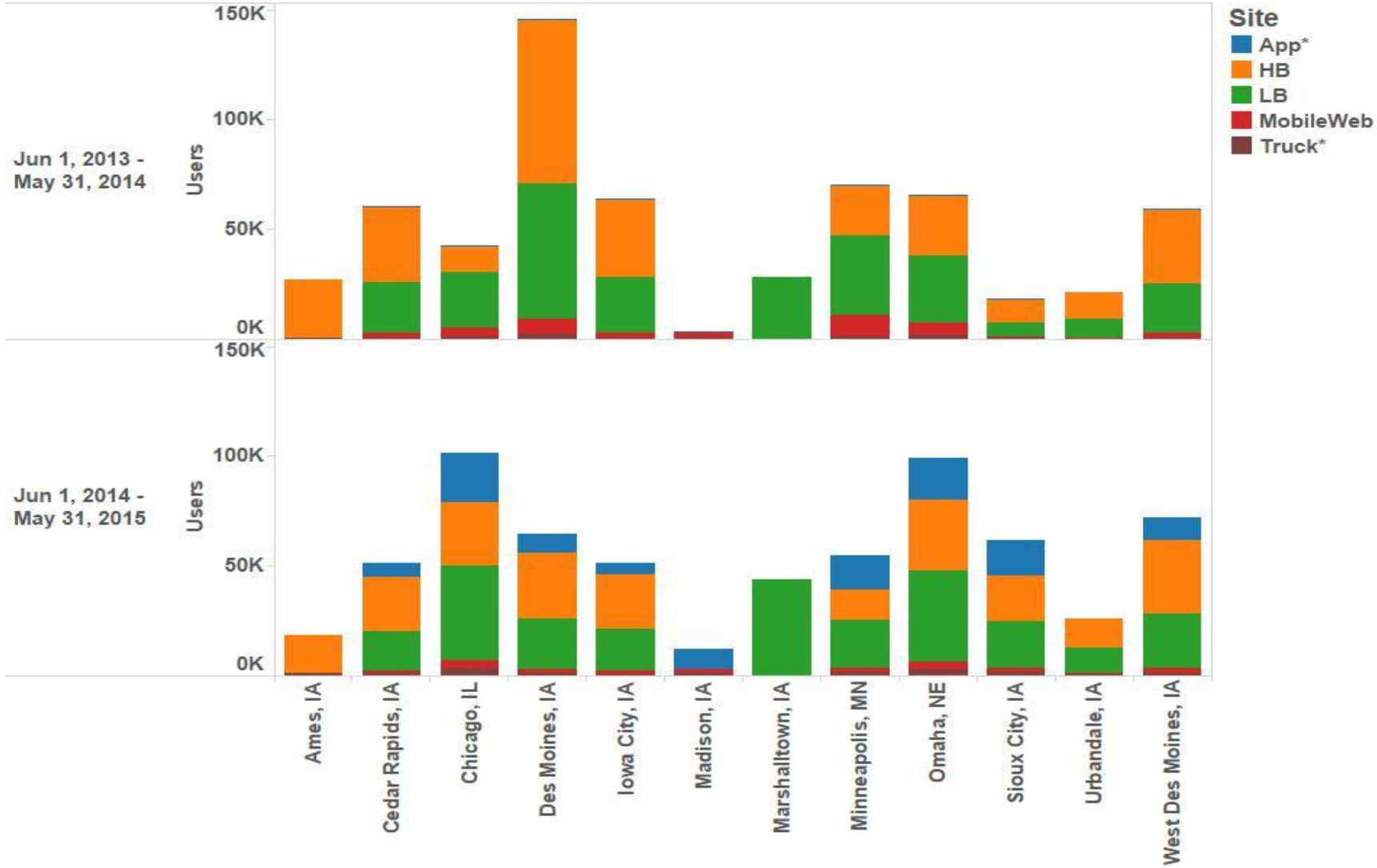



**Figure 14. Iowa 511 website and mobile app users by city**

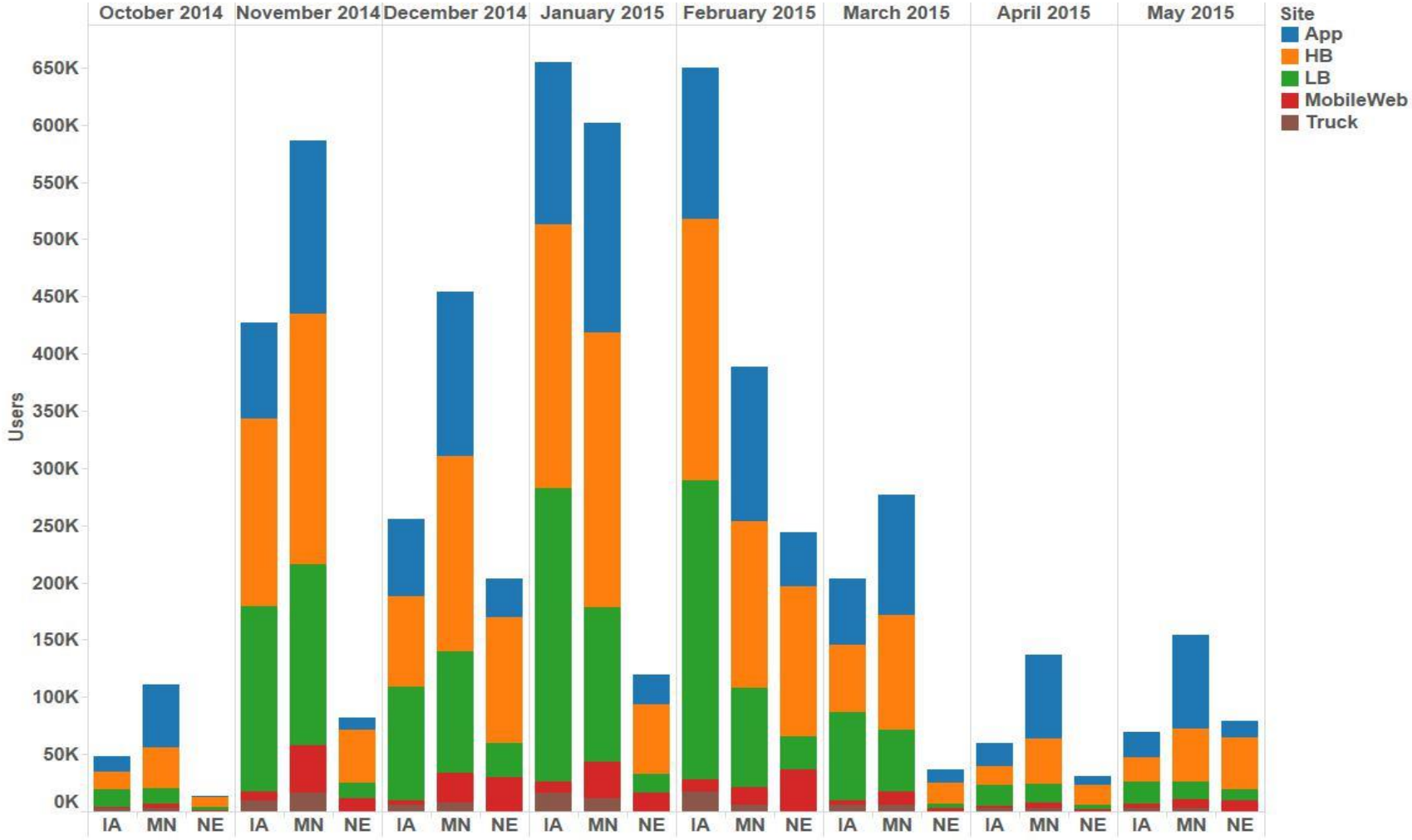



**Figure 15. Users of websites and mobile apps for 511 systems in Iowa, Minnesota, and Nebraska**

**How Can 511 Support Travelers' Decisions? (Source: Online Survey)**

The online survey was designed for current Iowa 511 users. About 78% (283/362) of survey respondents had used Iowa 511. The spatial distribution of these users is shown in Figure 16.

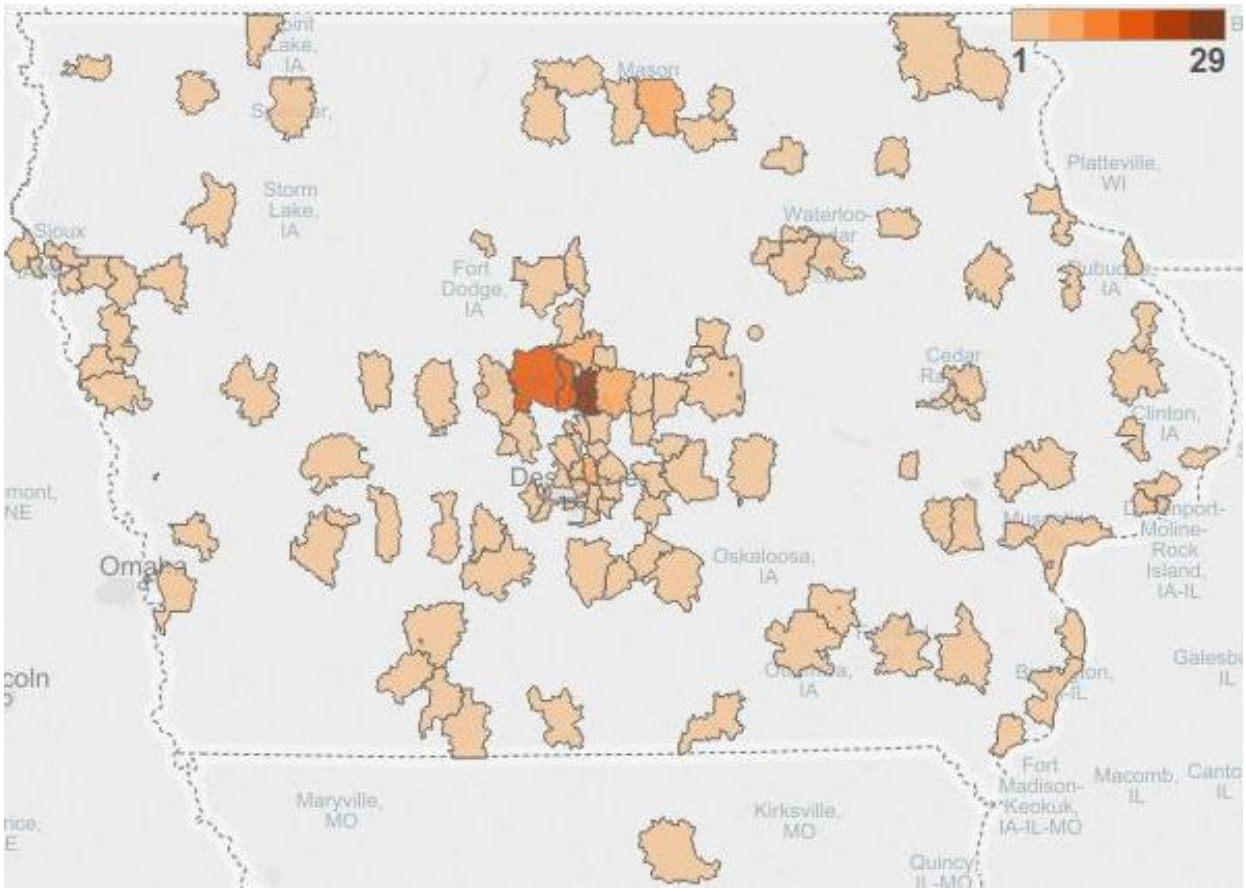



**Figure 16. Iowa 511 users by zip code (online survey)**

Users from Ames and Boone accounted for 16% and 7%, respectively, as most users completing the survey were employees of the Iowa DOT located in Ames.

Among the 61 non-Iowa DOT respondents:

- About 83% (51/61) had used Iowa 511 and 72% (44/61) used more than one information medium of Iowa 511.
- Iowa 511 websites and apps were the most used media, followed by Iowa 511 Twitter and Facebook.
- About 64% of Iowa 511 users (32/51) commute between two cities. A daily weekday commute longer than two miles appeared to encourage use of Iowa 511.

Iowa 511 helps travelers plan their trips before departure and provides real-time information en route. For the 283 Iowa 511 users in the online survey, Iowa 511 had the most impact on their route choices and departure times:

- 66% (186/283) had changed the route for their trips.
- 63% (178/283) had changed their departure times.
- 49% (138/283) responded that Iowa 511 had helped them to better prepare for their trips.

***Insights***

- Iowa 511 helps travelers plan their trips and provides real-time information en route. The online survey showed that, after receiving information from Iowa 511, 66% of users had changed their route, 63% had changed their departure times, and 49% responded that Iowa 511 had help them to better prepare for their trips.

## USER FEEDBACK (SOURCES: MVD AND ONLINE SURVEYS)

Through the MVD survey and the online survey, respondents were asked to provide comments on the current Iowa 511. About 15% of the MVD survey respondents and 20% of online survey respondents provided feedback. Among the 126 respondents who provided feedback through the MVD survey, 37 (or 29%) were unware of any Iowa 511 services.

### What New Features on Iowa 511 are Needed?

The desired features/services by the respondents are summarized in Table 2.

**Table 2. New features suggested for Iowa 511 by respondents**

| MVD Survey | | | Online Survey | | |
|---|---|---|---|---|---|
| **Comments** | **Frequency** | **Percentage** | **Comments** | **Frequency** | **Percentage** |
| **Don't know 511-Advertising** | 37 | 4.35% | **None** | 19 | 5.26% |
| **Not sure** | 19 | 2.24% | **More Cameras** | 8 | 2.22% |
| **Phone App**** | 7 | 0.82% | **Integrating with other services** | 8 | 2.22% |
| **Weather/traffic/road conditions**** | 4 | 0.47% | **Construction Updates**** | 7 | 1.94% |
| **Rest Area Locator**** | 4 | 0.48% | **Other** | 6 | 1.66% |
| **None** | 3 | 0.35% | **Not sure** | 5 | 1.39% |
| **Alternative Routes** | 2 | 0.24% | **Weather Updates**** | 4 | 1.11% |
| **Delay Updates*** | 2 | 0.24% | **Delay Updates*** | 3 | 0.83% |
| **Emergency services** | 1 | 0.12% | **Simplify** | 3 | 0.83% |
| **Exit lane locator** | 1 | 0.12% | **Traffic Updates on local arterials** | 3 | 0.83% |
| **Identify police officer location** | 1 | 0.12% | **Alternative Routes**** | 2 | 0.55% |
| **Information signs on roads**** | 1 | 0.12% | **Rideshare and Public Transport Information** | 2 | 0.55% |
| **Integrate different services** | 1 | 0.12% | **Alerts signup**** | 1 | 0.28% |
| **Aerial maps of cities** | 1 | 0.12% | **Phone Options**** | 1 | 0.28% |
| **Quick reference guide how to link** | 1 | 0.12% | **More frequent updates** | 1 | 0.28% |
| **Simplify** | 1 | 0.12% | **Text Alert**** | 1 | 0.28% |
| **Call back** | 1 | 0.12% | **Traffic Incident Alerts**** | 1 | 0.28% |
| | | | **RV Routes** | 1 | 0.28% |
| | | | **Travel Time Updates**** | 1 | 0.28% |

****Existing features**
***Coming soon**

Due to the lack of knowledge of current Iowa 511, some MVD survey respondents suggested features that were already provided, such as a phone app and weather/traffic/road conditions.

This indicated the existence of uninformed potential users. Marketing could be used to potentially capture this audience and enhance the awareness of Iowa 511. Providing more camera images with higher quality and integration with other applications, such as WAZE, were the most desired features by current Iowa 511 users from the online survey.

**What Improvements to Iowa 511 are Needed?**

Table 3 lists the comments from respondents for improving Iowa 511.

Iowa 511 should be designed to encourage usage by travelers of all driving ages. To induce additional users, Iowa 511 should improve ease of use, be easily accessible, and have good graphic design. To continue attracting current users, it is critical to provide reliable and real-time information, improve information coverage and details for a variety of public needs, integrate with other information services, and disseminate information through the media that can reach a wide range of the target audience. Also, as a publicly funded traveler information system, Iowa 511 should be sure to provide benefits across different geographic areas, incomes, ages, etc.

***Insights***

- Providing more images with higher quality and integration with other applications, such as WAZE, were the most desired features by current Iowa 511 users from the online survey.
- It is critical to provide reliable and real-time information, improve information coverage and details for a variety of public needs, integrate with other information services, disseminate information through the media that can reach a wide range of the target audience, and ensure Iowa 511 distribution benefits users across significantly different geographic areas, incomes, ages, etc.

## Table 3. Respondent suggestions to improve Iowa 511

| MVD Survey | | | Online Survey | | |
|---|---|---|---|---|---|
| **Comments** | **Frequency** | **Percentage** | **Comments** | **Frequency** | **Percentage** |
| Advertising | 27 | 3.18% | None | 24 | 6.65% |
| Not sure | 15 | 1.76% | Construction Updates** | 9 | 2.49% |
| None | 11 | 1.29% | More Frequent Updates | 8 | 2.22% |
| Simplify it | 3 | 0.35% | Not sure | 5 | 1.39% |
| Phone App** | 2 | 0.24% | Advertising | 3 | 0.83% |
| Text Alerts** | 2 | 0.24% | Integrate with other services | 3 | 0.83% |
| App not work sometime | 1 | 0.12% | Better quality cameras | 2 | 0.55% |
| Apps/Maps/ Phone Alerts** | 1 | 0.12% | Increase Bandwidth | 2 | 0.55% |
| Ease access for all phones | 1 | 0.12% | Ridesharing/Public Transportation | 2 | 0.55% |
| Call Back | 1 | 0.12% | Real Time Information | 2 | 0.55% |
| Different Languages | 1 | 0.12% | Rideshare and Public Transport Information | 2 | 0.55% |
| Make it convenient | 1 | 0.12% | Simplify it | 2 | 0.55% |
| Multi state maps | 1 | 0.12% | Weather Updates** | 2 | 0.55% |
| Problem with dynamin messages-being offensive | 1 | 0.12% | DMS information** | 1 | 0.28% |
| Remove it | 1 | 0.12% | More Details | 1 | 0.28% |
| Weather/traffic/ road condition updates** | 1 | 0.12% | Phone Option** | 1 | 0.28% |
| | | | Reduce Clutter | 1 | 0.28% |
| | | | Remove It | 1 | 0.28% |
| | | | Other | 1 | 0.28% |
| | | | Large and fast camera views | 1 | 0.28% |
| | | | Improve website formatting | 1 | 0.28% |

**Existing feature

## CONCLUSIONS AND RECOMMENDATIONS

- Usage of the Iowa 511 system was highest during winter months and extreme weather events and Iowa 511 helps travelers plan their trips. After receiving information from Iowa 511, 66% of the 283 Iowa 511 users from the online survey respondents had changed their routes, 63% had changed their departure times, and 49% responded that Iowa 511 had helped them to be better prepared.

  *Continue to focus on providing high quality traveler information during peak usage periods.*

- Increased awareness about Iowa 511 could lead to increased usage. The Motor Vehicles Division (MVD) survey found that 4% of respondents (37 of 850) were not aware that Iowa 511 existed and only 24% of respondents had used Iowa 511.

  *Marketing the Iowa 511 brand to help increase public awareness could potentially lead to increased usage.*

- Those who commute within short distances close to home are likely to be more familiar and confident with their driving environments and possibly also have more flexible arrangements, which reduce the need to seek traveler information for Iowa DOT-maintained roadways. However, Iowa 511 currently does not cover county and local roads so it is probably less attractive to the commuters on local roadways.

  *Increasing Iowa 511 information coverage and details could increase the market share.*

- Traveler expectations are changing along with technology innovations. More than 50% of Iowa 511 web visits were made from mobile devices in the past two years. However, Iowa 511 was the only one providing phone service among all the traveler information providers used by MVD survey respondents. While the trend is to acquire traveler information through internet, 22% of those surveyed Iowa 511 users accessed Iowa 511 information by phone only.

  *Regular user feedback and data-driven decision-making are quintessential for keeping up with changing needs and expectations.*

- The MVD survey showed that primary competitors for overall usage were Google Maps and in-car navigation systems. Use of Google Maps was highest among the youngest driving ages (18 to 30), who were 38% more likely to use Google Maps than those over 60. In-car navigation systems tended to attract middle-aged users (31 to 40) and users with daily workday commute distances greater than two miles.

  *It is important to understand the market share of the competing traveler information providers to better align the Iowa 511 system for optimal return on investment.*

- Providing more camera images with higher quality and integration with other applications, such as WAZE, were the most desired features by current Iowa 511 users from the online survey. Both MDV and online survey respondents indicated that ease of use and accessibility as well as graphic design of the website and apps are important.

  *Given the desired features/services by the MVD and online survey respondents, it is critical to provide reliable and real-time information, improve information coverage and details for a variety of public needs, integrate with other information services, disseminate information through the media that can reach a wide range of the target audience, and help ensure Iowa 511 distribution benefits users across significantly different geographic areas, incomes, ages, etc.*

- The currently used Google Analytics provided several summaries of Iowa 511 web usage data, but limited flexibility in terms of the default queries, which restricted potential insights that could be gained from the data. The raw web logs could be used to develop improved analytical constructs. Other logs, such as the usage of roadway cameras and other specific tools, will be very helpful in future evaluations of the Iowa 511 Traveler Information System.

  *This study demonstrated a need for better data gathering using improved web logging.*

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## APPENDIX A: ANALYSIS OF ONLINE SURVEY

An online survey was conducted from May 20 through June 15, 2015. The survey was delivered to current Iowa 511 users and Iowa DOT employees by email, and it was also posted on Iowa 511 social media webpages. The survey focused on usage of the Iowa 511 system by current users.

### Users Statistics

Of the 362 respondents, about 78% (283/362) had used 511 services. Most of the respondents were Iowa DOT employees (82% or 296/362). As shown in Table A.1, more than 36% of the respondents were 51-60 years old and more than 25% were 41-50.

**Table A.1 Online survey respondent age groups**

| Age Group | Frequency | Percent |
|---|---|---|
| 18-25 | 13 | 3.59% |
| 26-30 | 20 | 5.52% |
| 31-40 | 56 | 15.47% |
| 41-50 | 92 | 25.41% |
| 51-60 | 131 | 36.19% |
| over 60 | 44 | 12.15% |
| No response | 6 | 1.66% |

Among the 61 non-Iowa DOT respondents, about 83% (51/61) had used an Iowa 511 service, and 44 had used more than one type of Iowa 511 service. The Iowa 511 websites and apps were the most used services, followed by Iowa 511 Twitter and Facebook. About 64% (32/51) of the non-Iowa DOT 511 users commuted between two cities on a typical weekday, and 51 % (26/51) reported commuting more than one hour per day.

The home address and commute destination address were in the same zip code area for all 10 non-Iowa DOT respondents not using 511 services, and eight of them (80%) reporting driving less than one hour on a typical weekday. Shorter commute distances and small traveling areas reduced the likelihood of using Iowa 511 services.

### Traveler Information Sources

Most respondents for the online survey used Iowa 511 websites and apps as their primary traffic information sources. The websites and apps used by the respondents are shown in Tables A.2 and A.3.

**Table A.2. Websites used by online survey respondents**

| Website | DOT | Non-DOT | Total | |
|---|---|---|---|---|
| | Frequency | Frequency | Frequency | Percent |
| None | 60 | 5 | 65 | 17.96 |
| Iowa 511 website | 111 | 26 | 137 | 37.85 |
| Google Maps | 55 | 17 | 72 | 19.89 |
| Mapquest | 21 | 3 | 24 | 6.63 |
| Waze | 1 | 2 | 3 | 0.83 |
| Local TV/ Radio websites | 43 | 5 | 48 | 13.26 |
| Facebook/ Twitter | 3 | 3 | 6 | 1.66 |
| Other | 4 | 0 | 4 | 1.10 |
| No response | 3 | 0 | 3 | 0.83 |

**Table A.3. Mobile apps used by online survey respondents**

| App | DOT | Non-DOT | Total | |
|---|---|---|---|---|
| | Frequency | Frequency | Frequency | Percent |
| None | 133 | 14 | 133 | 36.74 |
| Iowa 511 app | 90 | 24 | 90 | 24.86 |
| Google Maps app | 80 | 12 | 80 | 22.10 |
| Mapquest app | 11 | 1 | 11 | 3.04 |
| Waze app | 11 | 3 | 11 | 3.04 |
| Beat the traffic | 3 | 0 | 3 | 0.83 |
| Facebook/Twitter | 9 | 2 | 9 | 2.49 |
| Other | 12 | 3 | 12 | 3.31 |
| No response | 13 | 2 | 13 | 3.59 |

For 38% of the respondents the Iowa 511 website (LB or HB) was the primary website for traffic information, and Google Maps was the second-most frequently used website. Local TV/radio websites were used by 13% of the respondents for traffic information.

Most of the respondents searched for traffic information occasionally, usually before a trip. More than 60% (218/362) of the respondents used weather-related information before their trips, about

44% (158/362) used congestion/road construction and traffic incidents information before their trips, and about 29% used travel time information before a trip.

About 37% of the respondents did not use any mobile apps for traffic information. Iowa 511 apps and Google Maps were the most frequently used by the mobile app users.

## APPENDIX B: STATISTICAL MODELING FOR IOWA 511 USERS

Statistical analyses using the web logs and NWS COOP weather data were conducted to investigate factors that affect usage of Iowa 511. The statistical analyses included binomial probit modeling for user choice on travel information sources, and negative binomial modeling for estimating Iowa 511 website and phone usages.

### Binomial Probit Models

Binomial probit models were developed to examine differences among those who use the Iowa 511 service versus alternatives (i.e., Google Maps, in-car navigation system, etc.). Several factors, such as age, commute distance, and MVD location, were examined to ascertain differences in use among various segments of the driving population.

*Iowa 511*

Table A.4 present the final best fit model for Iowa 511 with the MVD survey data.

**Table A.4. Binomial probit model for predicting the probability of using Iowa 511 system**

**Dependent variable IOWA511**
**Log likelihood function -341.29311**
**Restricted log likelihood -351.26189**
**Chi squared [3 d.f.] 19.93755**
**Significance level .00017**
**McFadden Pseudo R-squared .0283799**
**Estimation based on N = 788, K = 4**
**Inf.Cr.AIC = 690.6 AIC/N = .876**
**Hosmer-Lemeshow chi-squared = 18.51222**
**P-value= .01770 with deg.fr. = 8**

| **Variables** | | Coefficient | Prob. \|z\|>Z* | Marginal Effects |
|---|---|---|---|---|
| **Constant** | | 1.3657 | 0 | - |
| **AGE3160** | Indicator of ages 31 to 60 | 0.39894*** | 0.0003 | 0.09475*** |
| **COMM1TO2** | Indicator of commute distance within 2 miles | 0.21969* | 0.0961 | 0.05508 |
| **COMM2UP** | Indicator of commute distance more than 2 miles | 0.3069** | 0.0181 | 0.07838** |

***, **, * = at 99%, 95%, 90% levels of confidence, respectively

The analysis showed age and commute distance to be significant determinants of use (at a 95% confidence level). Survey respondents aged 31 to 60 and those with daily commute distances more than two miles were more likely to use Iowa 511 as the most used services for traveler information. The marginal effects for age and commute distance indicated that those aged 31 to 60 were 9.5% more likely to use the 511 service while those with daily commute distances more than two miles were 7.8% more likely to use 511.

Notably, no consistent trends were exhibited with respect to the cities where the surveys were conducted. This implies that the sample users from all the MVD sites were equally likely to use the 511 portal when controlling for age and commute distance.

*In-Car Navigation Systems*

A binomial probit model was developed to better understand the travel information seekers using in-car navigation systems as their major information source. The model results are shown in Table A.5.

**Table A.5. Binomial probit model for predicting the probability of using in-car navigation system**

**Dependent variable CARNAV**
**Log likelihood function -417.01560**
**Restricted log likelihood -422.24516**
**Chi squared [3 d.f.] 10.45912**
**Significance level .01504**
**McFadden Pseudo R-squared .0123851**
**Estimation based on N = 770, K = 4**
**Inf.Cr.AIC = 842.0 AIC/N = 1.094**
**Hosmer-Lemeshow chi-squared = 2.38036**
**P-value = .96708 with deg.fr. = 8**

| **Variables** | | Coefficient | Prob. \|z\|>Z* | Marginal Effects |
|---|---|---|---|---|
| **Constant** | | 0.90882*** | 0 | - |
| **AGE3140** | Indicator of ages 31 to 40 | 0.30354** | 0.0212 | 0.09845** |
| **AGE4160** | Indicator of ages 41 to 60 | 0.19454* | 0.0862 | 0.06066* |
| **COMM2UP** | Indicator of commute distance more than 2 miles | 0.21901** | 0.0434 | 0.06919** |

***, **, * = at 99%, 95%, and 90% levels of confidence, respectively

The probability of using an in-car navigation system was shown to be related to age group and commute distance. People between the ages of 31 and 40 were found to be 9% more likely to use in-car navigation systems, while those with daily commute distances greater than two miles were 7% more likely to use in-car navigation systems.

*Google Maps*

The binomial probit model results are shown in Table A.6.

**Table A.6. Binomial probit model for predicting the probability of using Google Maps**

| | | | | |
|---|---|---|---|---|
| **Dependent variable** | | **GOOGLE** | | |
| **Log likelihood function** | | **-503.86925** | | |
| **Restricted log likelihood** | | **-536.28660** | | |
| **Chi squared [ 5 d.f.]** | | **64.83470** | | |
| **Significance level** | | **.00000** | | |
| **McFadden Pseudo R-squared** | | **.0604478** | | |
| **Estimation based on N = 774, K = 6** | | | | |
| **Inf.Cr.AIC = 1019.7 AIC/N = 1.317** | | | | |
| **Hosmer-Lemeshow chi-squared = 5.26187** | | | | |
| **P-value= .72926 with deg.fr. = 8** | | | | |
| **Variables** | | Coefficient | Prob. \|z\|>Z* | Marginal Effects |
| **Constant** | | -0.7183*** | <0.0001 | - |
| **AGE1830** | Indicator of ages 18 to 30 | 1.07047*** | <0.0001 | 0.38254*** |
| **AGE3140** | Indicator of ages 31 to 40 | 0.73661*** | <0.0001 | 0.25461*** |
| **AGE4150** | Indicator of ages 41 to 50 | 0.58554*** | 0.0005 | 0.20477*** |
| **AGE5160** | Indicator of ages 51 to 60 | 0.40591** | 0.0203 | 0.1445** |
| **COMM1TO4** | Indicator of commute distance from 1 to 4 miles | 0.17876* | 0.0557 | 0.06685* |

***, **, * = at 99%, 95%, and 90% levels of confidence, respectively

Google Maps captures a larger market share for users 18 to 30 years of age. Respondents 18 to 30 were 38% more likely to use Google Maps. The marginal effects for the other age groups showed the use of Google Maps was 25% higher among ages 31 to 40, 20% higher among those 41 to 50, and 14% higher among those 51 to 60 with all rates compared to those for above age 60.

**User Count Models**

Negative binomial (NB) modeling was used to estimate the 511 website and phone usages. The dependent variables used in the models are listed in Table A.7.

**Table A.7. Model variables for the negative binomial models**

| Variables | | Variables | |
|---|---|---|---|
| **PRECIPTO** | Total precipitation | **MAY14** | Dummy variable for May 2014 |
| **SNOWTO** | Total snow depth | **JUN14** | Dummy variable for June 2014 |
| **PRIORPRE** | Precipitation of previous day | **JUL14** | Dummy variable for July 2014 |
| **PRIORSNO** | Snow depth of previous day | **AUG14** | Dummy variable for Aug 2014 |
| **JUL13** | Dummy variable for July 2013 | **SEP14** | Dummy variable for Sep 2014 |
| **AUG13** | Dummy variable for Aug 2013 | **OCT14** | Dummy variable for Oct 2014 |
| **SEP 13** | Dummy variable for Sep 2013 | **NOV14** | Dummy variable for Nov 2014 |
| **OCT13** | Dummy variable for Oct 2013 | **DEC14** | Dummy variable for Dec 2014 |
| **NOV13** | Dummy variable for Nov 2013 | **JAN15** | Dummy variable for Jan 2015 |
| **DEC13** | Dummy variable for Dec 2013 | **FEB15** | Dummy variable for Feb 2015 |
| **JAN14** | Dummy variable for Jan 2014 | **MAR15** | Dummy variable for Mar 2015 |
| **FEB14** | Dummy variable for Feb 2014 | **APR15** | Dummy variable for Apr 2015 |
| **MAR14** | Dummy variable for Mar 2014 | **MAY15** | Dummy variable for May 2015 |
| **APR14** | Dummy variable for Apr 2014 | - | - |

*LB Web Users*

The NB model estimates for LB site users are listed in Table A.8. The variables listed in this table are statistically significant at the 95% confidence level. The Dispersion parameter for the NB model is significantly different from zero, which indicates the NB model is appropriate for the data. LB users are positively related to the total and to prior snow depths and precipitations. The months of September and October 2013, August and October 2014, and April and May 2015 are negatively correlated to the LB users.

**Table A.8. NB model estimates for LB users**

| | | |
|---|---|---|
| Dependent variable: LBUSERS | | |
| Log likelihood function: -5989.69476 | | |
| Restricted log likelihood: -789522.27785 | | |
| Chi squared [ 1 d.f.]: 1567065.16618 | | |
| Significance level : .00000 | | |
| McFadden Pseudo R-squared .9924135 | | |
| Estimation based on N = 730, K = 29 | | |
| Inf.Cr.AIC = 12037.4 AIC/N = 16.490 | | |
| **Variables** | **Coefficient** | **Prob. \|z\|>Z*** |
| Constant | 6.78731 | 0 |
| PRECIPTO | 0.00705 | 0 |
| SNOWTO | 0.00827 | 0 |
| PRIORPRE | 0.00306 | 0.0114 |
| SEP 13 | -0.77453 | 0.0225 |
| OCT13 | -0.69134 | 0.0006 |
| NOV13 | 0.5181 | 0.0027 |
| DEC13 | 2.08625 | 0 |
| JAN14 | 2.4515 | 0 |
| FEB14 | 1.96226 | 0 |
| MAR14 | 1.19892 | 0 |
| AUG14 | -0.65643 | 0.0261 |
| OCT14 | -0.74987 | 0.023 |
| NOV14 | 1.31806 | 0 |
| DEC14 | 1.08351 | 0 |
| JAN15 | 1.83995 | 0 |
| FEB15 | 1.35696 | 0 |
| MAR15 | 0.88618 | 0 |
| APR15 | -0.52314 | 0.0465 |
| MAY15 | -0.57264 | 0.0147 |
| *Dispersion parameter* | 0.44606 | 0 |

*HB Web Users*

The NB model estimates for HB site users are listed in Table A.9. The variables listed in this table are statistically significant at the 95% confidence level. The Dispersion parameter for the NB model is significantly different from zero, which indicates the NB model is appropriate for the data. The HB users are positively related to the total snow depths and precipitations. The HB site users decreased in the months of September and October 2013, October 2014, and April and May 2015.

**Table A.9. NB model estimate for HB users**

| | | |
|---|---|---|
| Dependent variable: HBUSERS<br>Log likelihood function; -6014.91612<br>Restricted log likelihood: -934787.40993<br>Chi squared [ 1 d.f.]: 1857544.98761<br>Significance level : .00000<br>McFadden Pseudo R-squared; .9935655<br>Estimation based on N = 730, K = 29<br>Inf.Cr.AIC = 12087.8 AIC/N = 16.559 | | |
| Variables | Coefficient | Prob. \|z\|>Z* |
| Constant | 6.90752 | 0 |
| PRECIPTO | 0.00742 | 0.0001 |
| SNOWTO | 0.00978 | 0 |
| SEP 13 | -0.66533 | 0.0149 |
| OCT13 | -0.69982 | 0.0098 |
| NOV13 | 0.43409 | 0.0444 |
| DEC13 | 1.79932 | 0 |
| JAN14 | 2.22997 | 0 |
| FEB14 | 1.77794 | 0 |
| MAR14 | 0.67934 | 0.0053 |
| OCT14 | -0.80522 | 0.0333 |
| NOV14 | 1.12191 | 0 |
| DEC14 | 0.67147 | 0.0065 |
| JAN15 | 1.56237 | 0 |
| FEB15 | 0.9259 | 0 |
| MAR15 | 0.48529 | 0.0264 |
| APR15 | -0.7773 | 0.0162 |
| MAY15 | -0.61305 | 0.0306 |
| *Dispersion parameter* | 0.53360 | 0 |

*Mobile Web Users*

The NB model estimates for mobile site users are listed in Table A.10. The variables listed in this table are statistically significant at the 95% confidence level. The Dispersion parameter for the NB model is significantly different from zero, which indicates the NB model is appropriate for the data. The mobile site users are positively related to the total snow depths and precipitations, and negatively related with all the month indicators listed in Table A.10, even for the winter months. The months of August and October 2014 have the greatest marginal effects on the mobile uses, which can reduce the mobile site user by about two users per day.

**Table A.10. NB model estimate for mobile web users**

| | | |
|---|---|---|
| Dependent variable | MOBILE | |
| Log likelihood function | -4370.12056 | |
| Restricted log likelihood | -57760.82598 | |
| Chi squared [ 1 d.f.] | 106781.41083 | |
| Significance level | .00000 | |
| McFadden Pseudo R-squared | .9243411 | |
| Estimation based on N = | 730, K = 29 | |
| Inf.Cr.AIC = | 8798.2 AIC/N = 12.052 | |
| Variables | Coefficient | Prob. \|z\|>Z* |
| Constant | 6.01747 | 0 |
| PRECIPTO | 0.00535 | 0.0012 |
| SNOWTO | 0.00758 | 0 |
| JUL13 | -0.53094 | 0.0169 |
| AUG13 | -0.62492 | 0.0021 |
| SEP 13 | -0.99024 | 0 |
| OCT13 | -0.98583 | 0 |
| MAR14 | -1.12048 | 0 |
| APR14 | -1.46234 | 0 |
| MAY14 | -1.87842 | 0 |
| JUN14 | -1.40854 | 0 |
| JUL14 | -1.42863 | 0 |
| AUG14 | -2.03401 | 0 |
| SEP14 | -1.8201 | 0 |
| OCT14 | -2.00274 | 0 |
| NOV14 | -0.84707 | 0 |
| DEC14 | -1.3693 | 0 |
| JAN15 | -0.57877 | 0.0001 |
| FEB15 | -1.04537 | 0 |
| MAR15 | -1.18053 | 0 |
| APR15 | -1.86069 | 0 |
| MAY15 | -1.45194 | 0 |
| *Dispersion parameter* | 0.43101 | 0 |

*App Users*

The NB model estimates for the highway version of Iowa 511 App users are listed in Table A.11. The variables listed in this table are statistically significant at the 95% confidence level. The Dispersion parameter for the NB model is significantly different from zero, which indicates the NB model is appropriate for the data. The App users are positively related to the total and prior snow depths, as well as the total precipitations. The winter months from November 2014 to March 2015 can increase the App users by more than one user per day.

**Table A.11. NB model estimate for App users**

| | | |
|---|---|---|
| Dependent variable APP<br>Log likelihood function -2798.47713<br>Restricted log likelihood -165140.76185<br>Chi squared [1 d.f.] 324684.56945<br>Significance level .00000<br>McFadden Pseudo R-squared .9830540<br>Estimation based on N = 365, K = 17<br>Inf.Cr.AIC = 5631.0 AIC/N = 15.427 | | |
| Variables | Coefficient | Prob. \|z\|>Z* |
| Constant | 6.17711 | 0 |
| PRECIPTO | 0.00455 | 0.0242 |
| SNOWTO | 0.00596 | 0 |
| PRIORSNO | 0.00168 | 0.014 |
| NOV14 | 1.41756 | 0 |
| DEC14 | 1.36993 | 0 |
| JAN15 | 1.95676 | 0 |
| FEB15 | 1.58104 | 0 |
| MAR15 | 1.27729 | 0 |
| *Dispersion parameter* | 0.31328 | 0 |

*Phone Users*

The NB model estimates for Iowa 511 phone users are listed in Table A.12. The variables listed in this table are statistically significant at the 95% confidence level. The Dispersion parameter for the NB model is significantly different from zero, which indicates the NB model is appropriate for the data. The phone users are positively related to the total snow depths and precipitations. The winter months from December 2013 to January 2014 are positively related to the phone users. The month of January 2014 can increase the phone users by more than one person per day.

**Table A.12. NB model estimate for phone users**

| | | |
|---|---|---|
| Dependent variable | TOTCALLS | |
| Log likelihood function | -4691.25914 | |
| Restricted log likelihood | -61197.79611 | |
| Chi squared [1 d.f.] | 113013.07394 | |
| Significance level | .00000 | |
| McFadden Pseudo R-squared | .9233427 | |
| Estimation based on N = | 730, K = 29 | |
| Inf.Cr.AIC = | 9440.5 AIC/N = 12.932 | |
| Variables | Coefficient | Prob. \|z\|>Z* |
| Constant | 5.82001 | 0 |
| PRECIPTO | 0.00754 | 0 |
| SNOWTO | 0.00659 | 0 |
| SEP 13 | -0.5418 | 0.0161 |
| OCT13 | -0.48 | 0.0153 |
| NOV13 | -0.2827 | 0.037 |
| DEC13 | 0.65563 | 0 |
| JAN14 | 1.03578 | 0 |
| FEB14 | 0.56021 | 0.0001 |
| APR14 | -0.45334 | 0.0063 |
| MAY14 | -0.61795 | 0.0279 |
| SEP14 | -0.44484 | 0.0184 |
| OCT14 | -0.72815 | 0.0017 |
| MAR15 | -0.42435 | 0.0017 |
| APR15 | -0.75311 | 0.0035 |
| MAY15 | -0.57378 | 0.002 |
| *Dispersion parameter* | .25351 | 0 |

## APPENDIX C: MVD SURVEY RESPONSE FREQUENCY TABLES

| City | | | | |
|---|---|---|---|---|
| **City** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **Ankeny** | 252 | 29.65 | 252 | 29.65 |
| **Carroll** | 41 | 4.82 | 293 | 34.47 |
| **Cedar Rapids** | 185 | 21.76 | 478 | 56.24 |
| **Council Bluffs** | 99 | 11.65 | 577 | 67.88 |
| **Dubuque** | 44 | 5.18 | 621 | 73.06 |
| **Fort Dodge** | 85 | 10.00 | 706 | 83.06 |
| **Mason City** | 68 | 8.00 | 774 | 91.06 |
| **Ottumwa** | 55 | 6.47 | 829 | 97.53 |
| **Spencer** | 21 | 2.47 | 850 | 100.00 |

| Q1. Service used most often for Congestion/Road Construction & Closure information. | | | | |
|---|---|---|---|---|
| **Q1** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **None 0** | 434 | 51.06 | 434 | 51.06 |
| **In-car navigation 1** | 102 | 12.00 | 536 | 63.06 |
| **Google Maps 2** | 182 | 21.41 | 718 | 84.47 |
| **Iowa 511 phone 3** | 22 | 2.59 | 740 | 87.06 |
| **Iowa 511 online/app 4** | 36 | 4.24 | 776 | 91.30 |
| **Other 5** | 48 | 5.65 | 824 | 96.95 |
| **Missing 9** | 26 | 3.18 | 850 | 100.00 |

| Q1 Oth. Other service used. | | | | |
|---|---|---|---|---|
| Q1Oth | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
| None, Not Applicable 0 | 802 | 94.35 | 802 | 94.35 |
| Radio/Weather Radio 1 | 16 | 1.88 | 818 | 96.24 |
| Phone app (other than 511) 2 | 7 | 0.82 | 825 | 97.06 |
| TV/News (incl Weather Channel) 3 | 17 | 2.00 | 842 | 99.06 |
| Family/friends 5 | 1 | 0.12 | 843 | 99.18 |
| Other websites (Waze, Weather Bug, NOAA, Facebook, etc.) 6 | 4 | 0.47 | 847 | 99.65 |
| Missing 9 | 3 | 0.35 | 850 | 100.00 |

| Q2. When did you mostly use this service? | | | | |
|---|---|---|---|---|
| Q2 | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
| Not Applicable 0 | 434 | 51.06 | 434 | 51.06 |
| Before a trip 1 | 152 | 17.88 | 586 | 68.94 |
| During a trip 2 | 179 | 21.06 | 765 | 90.00 |
| During traffic congestion 3 | 51 | 6.00 | 816 | 96.00 |
| Other 4 | 29 | 3.41 | 845 | 99.41 |
| Missing 9 | 5 | 0.59 | 850 | 100.00 |

| Q2 Oth. Other times service was used. | | | | |
|---|---|---|---|---|
| Q2Oth | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
| No Other, Not Applicable 0 | 821 | 96.59 | 821 | 96.59 |
| Seasonal/Bad weather/Winter 1 | 8 | 0.94 | 829 | 97.53 |
| At work/Specific times of day (mornings) 2 | 6 | 0.71 | 835 | 98.24 |
| Any time, all of the above 3 | 3 | 0.35 | 838 | 98.59 |
| Every day 4 | 3 | 0.35 | 841 | 98.94 |
| Missing 9 | 9 | 1.06 | 850 | 100.00 |

| Q3. How often did you use this service in the past 6 months? | | | | |
|---|---|---|---|---|
| **Q3** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **Not Applicable 0** | 434 | 51.06 | 434 | 51.06 |
| **Almost every day 1** | 56 | 6.59 | 490 | 57.65 |
| **Once per week 2** | 61 | 7.18 | 551 | 64.82 |
| **Occasionally 3** | 285 | 33.53 | 836 | 98.35 |
| **Other 4** | 9 | 1.06 | 845 | 99.41 |
| **Missing 9** | 5 | 0.59 | 850 | 100.00 |

| Q3 Oth. Other "how often" response. | | | | |
|---|---|---|---|---|
| **Q3Oth** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No Other, Not Applicable 0** | 841 | 98.94 | 841 | 98.94 |
| **Missing 9** | 9 | 1.06 | 850 | 100.00 |

| Q4. Why do you use this service rather than other alternatives? | | | | |
|---|---|---|---|---|
| **Q4** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **Not Applicable 0** | 434 | 51.06 | 434 | 51.06 |
| **Easiest to use 1** | 299 | 35.18 | 733 | 86.24 |
| **It's accurate 2** | 76 | 8.94 | 809 | 95.18 |
| **Its unique features 3** | 17 | 2.00 | 826 | 97.18 |
| **Other 4** | 17 | 2.00 | 843 | 99.18 |
| **Missing 9** | 7 | 0.82 | 850 | 100.00 |

| Q4 Oth. Other reasons for using this service. | | | | |
|---|---|---|---|---|
| **Q4Oth** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No Other, Not Applicable 0** | 833 | 98.00 | 833 | 98.00 |
| **Familiarity (I know how to use it) 1** | 3 | 0.35 | 836 | 98.35 |
| **Not aware of others 2** | 4 | 0.47 | 840 | 98.82 |
| **Missing 9** | 10 | 1.18 | 850 | 100.00 |

| Q5. Service used most often for Weather-Related Travel information. | | | | |
|---|---|---|---|---|
| **Q5** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **None 0** | 341 | 40.12 | 341 | 40.12 |
| **In-car navigation 1** | 62 | 7.29 | 403 | 47.41 |
| **Google Maps 2** | 118 | 13.88 | 521 | 61.29 |
| **Iowa 511 phone 3** | 31 | 3.65 | 552 | 64.94 |
| **Iowa 511 online/app 4** | 88 | 10.35 | 640 | 75.29 |
| **Other 5** | 187 | 22.00 | 827 | 97.29 |
| **Missing 9** | 23 | 2.71 | 850 | 100.00 |

| Q5 Oth. Other service used. | | | | |
|---|---|---|---|---|
| **Q5Oth** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No Other, Not Applicable 0** | 663 | 78.00 | 663 | 78.00 |
| **Radio/Weather Radio 1** | 22 | 2.59 | 685 | 80.59 |
| **Phone app (other than 511) 2** | 36 | 4.24 | 721 | 84.82 |
| **TV/News (incl Weather Channel) 3** | 95 | 11.18 | 816 | 96.00 |
| **Family/friends 5** | 1 | 0.12 | 817 | 96.12 |
| **Other websites (Waze, Weather Bug, NOAA, Facebook, etc.) 6** | 20 | 2.35 | 837 | 98.47 |
| **Newspaper and paper maps 7** | 1 | 0.12 | 838 | 98.59 |
| **Missing 9** | 12 | 1.41 | 850 | 100.00 |

| Q6. When did you mostly use this service? | | | | |
|---|---|---|---|---|
| **Q6** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **Not Applicable 0** | 341 | 40.12 | 341 | 40.12 |
| **Before a trip 1** | 286 | 33.65 | 627 | 73.76 |
| **During a trip 2** | 126 | 14.82 | 753 | 88.59 |
| **During traffic congestion 3** | 36 | 4.24 | 789 | 92.82 |
| **Other 4** | 54 | 6.35 | 843 | 99.18 |
| **Missing 9** | 7 | 0.82 | 850 | 100.00 |

| Q6 Oth. Other times service was used. | | | | |
|---|---|---|---|---|
| **Q6Oth** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No Other, Not Applicable 0** | 796 | 93.65 | 796 | 93.65 |
| **Seasonal/Bad weather/Winter 1** | 9 | 1.06 | 805 | 94.71 |
| **At work/Specific times of day (mornings) 2** | 9 | 1.06 | 814 | 95.76 |
| **Any time, all of the above 3** | 5 | 0.59 | 819 | 96.35 |
| **Every day 4** | 11 | 1.29 | 830 | 97.65 |
| **Missing 9** | 20 | 2.35 | 850 | 100.00 |

| Q7. How often did you use this service in the past 6 months? | | | | |
|---|---|---|---|---|
| **Q7** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **Not Applicable 0** | 341 | 40.12 | 341 | 40.12 |
| **Almost every day 1** | 107 | 12.59 | 448 | 52.71 |
| **Most days in winter 2** | 113 | 13.29 | 561 | 66.00 |
| **During severe weather 3** | 248 | 29.18 | 809 | 95.18 |
| **Other 4** | 32 | 3.76 | 841 | 98.94 |
| **Missing 9** | 9 | 1.06 | 850 | 100.00 |

| Q7 Oth. Other "how often" response. | | | | |
|---|---|---|---|---|
| **Q7Oth** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No Other, Not Applicable 0** | 818 | 96.24 | 818 | 96.24 |
| **Occasionally 1** | 7 | 0.82 | 825 | 97.06 |
| **Rarely, once a year 2** | 4 | 0.47 | 829 | 97.53 |
| **Missing 9** | 21 | 2.47 | 850 | 100.00 |

| Q8. Why do you use this service rather than other alternatives? | | | | |
|---|---|---|---|---|
| **Q8** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **Not Applicable 0** | 341 | 40.12 | 341 | 40.12 |
| **Easiest to use 1** | 353 | 41.53 | 694 | 81.65 |
| **It's accurate 2** | 105 | 12.35 | 799 | 94.00 |
| **Its unique features 3** | 20 | 2.35 | 819 | 96.35 |
| **Other 4** | 24 | 2.82 | 843 | 99.18 |
| **Missing 9** | 7 | 0.82 | 850 | 100.00 |

| Q8 Oth. Other reasons for using this service. | | | | |
|---|---|---|---|---|
| **Q8Oth** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No Other, Not Applicable 0** | 826 | 97.18 | 826 | 97.18 |
| **Familiarity (I know how to use it) 1** | 2 | 0.24 | 828 | 97.41 |
| **Not aware of others 2** | 5 | 0.59 | 833 | 98.00 |
| **Missing 9** | 17 | 2.00 | 850 | 100.00 |

| Q9. Service used most often for Travel Time/Route information. | | | | |
|---|---|---|---|---|
| **Q9** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **None 0** | 262 | 30.82 | 262 | 30.82 |
| **In-car navigation 1** | 164 | 19.29 | 426 | 50.12 |
| **Google Maps 2** | 369 | 43.41 | 795 | 93.53 |
| **Iowa 511 phone 3** | 13 | 1.53 | 808 | 95.06 |
| **Iowa 511 online/app 4** | 10 | 1.18 | 818 | 96.24 |
| **Other 5** | 24 | 2.82 | 842 | 99.06 |
| **Missing 9** | 8 | 0.94 | 850 | 100.00 |

| Q9 Oth. Other service used. | | | | |
|---|---|---|---|---|
| **Q9Oth** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No Other, Not Applicable 0** | 826 | 97.18 | 826 | 97.18 |
| **Radio/Weather Radio 1** | 1 | 0.12 | 827 | 97.29 |
| **Phone app (other than 511) 2** | 9 | 1.06 | 836 | 98.35 |
| **TV/News (incl Weather Channel) 3** | 5 | 0.59 | 841 | 98.94 |
| **Mapquest 4** | 4 | 0.47 | 845 | 99.41 |
| **Other websites (Waze, Weather Bug, NOAA, Facebook, etc.) 6** | 1 | 0.12 | 846 | 99.53 |
| **Newspaper and paper maps 7** | 2 | 0.24 | 848 | 99.76 |
| **Missing 9** | 2 | 0.24 | 850 | 100.00 |

| Q10. When did you mostly use this service? | | | | |
|---|---|---|---|---|
| **Q10** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **Not Applicable 0** | 262 | 30.82 | 262 | 30.82 |
| **Before a trip 1** | 282 | 33.18 | 544 | 64.00 |
| **During a trip 2** | 258 | 30.35 | 802 | 94.35 |
| **During traffic congestion 3** | 26 | 3.06 | 828 | 97.41 |
| **Other 4** | 17 | 2.00 | 845 | 99.41 |
| **Missing 9** | 5 | 0.59 | 850 | 100.00 |

| Q10 Oth. Other times service was used. | | | | |
|---|---|---|---|---|
| **Q10Oth** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No Other, Not Applicable 0** | 833 | 98.00 | 833 | 98.00 |
| **Seasonal/Bad weather/Winter 1** | 2 | 0.24 | 835 | 98.24 |
| **At work/Specific times of day (mornings) 2** | 1 | 0.12 | 836 | 98.35 |
| **Any time, all of the above 3** | 3 | 0.35 | 839 | 98.71 |
| **Every day 4** | 6 | 0.71 | 845 | 99.41 |
| **Missing 9** | 5 | 0.59 | 850 | 100.00 |

| Q11. How often did you use this service in the past 6 months? | | | | |
|---|---|---|---|---|
| **Q11** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **Not Applicable 0** | 262 | 30.82 | 262 | 30.82 |
| **Almost every day 1** | 86 | 10.12 | 348 | 40.94 |
| **Once per week 2** | 129 | 15.18 | 477 | 56.12 |
| **Occasionally 3** | 353 | 41.53 | 830 | 97.65 |
| **Other 4** | 13 | 1.53 | 843 | 99.18 |
| **Missing 9** | 7 | 0.82 | 850 | 100.00 |

| Q11 Oth. Other "how often" response. | | | | |
|---|---|---|---|---|
| **Q11Oth** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No Other, Not Applicable 0** | 837 | 98.47 | 837 | 98.47 |
| **Missing 9** | 13 | 1.53 | 850 | 100.00 |

| Q12. Why do you use this service rather than other alternatives? | | | | |
|---|---|---|---|---|
| **Q12** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **Not Applicable 0** | 262 | 30.82 | 262 | 30.82 |
| **Easiest to use 1** | 451 | 53.06 | 713 | 83.88 |
| **It's accurate 2** | 87 | 10.24 | 800 | 94.12 |
| **Its unique features 3** | 27 | 3.18 | 827 | 97.29 |
| **Other 4** | 15 | 1.76 | 842 | 99.06 |
| **Missing 9** | 8 | 0.94 | 850 | 100.00 |

| Q12 Oth. Other reasons for using this service. | | | | |
|---|---|---|---|---|
| **Q12Oth** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No Other, Not Applicable 0** | 835 | 98.24 | 835 | 98.24 |
| **Familiarity (I know how to use it) 1** | 4 | 0.47 | 839 | 98.71 |
| **Not aware of others 2** | 3 | 0.35 | 842 | 99.06 |
| **It's what's available in my work vehicle 3** | 1 | 0.12 | 843 | 99.18 |
| **Missing 9** | 7 | 0.82 | 850 | 100.00 |

| Q13. During the past 6 months, how many hours did you drive on a typical work day (or week day)? | | | | |
|---|---|---|---|---|
| **Q13** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **Less than 1 hour 1** | 357 | 42.00 | 357 | 42.00 |
| **One to two hours 2** | 223 | 26.24 | 580 | 68.24 |
| **Two to four hours 3** | 123 | 14.47 | 703 | 82.71 |
| **Four hours/day or more 4** | 102 | 12.00 | 805 | 94.71 |
| **Missing 9** | 45 | 5.29 | 850 | 100.00 |

| Q14. Zip Code of your home address | | | | |
|---|---|---|---|---|
| **Q14** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **3841** | 1 | 0.12 | 1 | 0.12 |
| **19082** | 1 | 0.12 | 2 | 0.24 |
| **30083** | 1 | 0.12 | 3 | 0.35 |
| **35051** | 1 | 0.12 | 4 | 0.47 |
| **46385** | 1 | 0.12 | 5 | 0.59 |
| **50009** | 11 | 1.29 | 16 | 1.88 |
| **50010** | 1 | 0.12 | 17 | 2.00 |
| **50021** | 15 | 1.76 | 32 | 3.76 |
| **50023** | 18 | 2.12 | 50 | 5.88 |
| **50026** | 1 | 0.12 | 51 | 6.00 |
| **50035** | 3 | 0.35 | 54 | 6.35 |
| **50061** | 1 | 0.12 | 55 | 6.47 |
| **50076** | 2 | 0.24 | 57 | 6.71 |
| **50111** | 6 | 0.71 | 63 | 7.41 |
| **50112** | 1 | 0.12 | 64 | 7.53 |
| **50126** | 1 | 0.12 | 65 | 7.65 |
| **50129** | 1 | 0.12 | 66 | 7.76 |
| **50131** | 8 | 0.94 | 74 | 8.71 |
| **50135** | 1 | 0.12 | 75 | 8.82 |

| Q14. Zip Code of your home address | | | | |
|---|---|---|---|---|
| **Q14** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **50161** | 1 | 0.12 | 76 | 8.94 |
| **50169** | 4 | 0.47 | 80 | 9.41 |
| **50201** | 1 | 0.12 | 81 | 9.53 |
| **50211** | 1 | 0.12 | 82 | 9.65 |
| **50219** | 1 | 0.12 | 83 | 9.76 |
| **50223** | 1 | 0.12 | 84 | 9.88 |
| **50226** | 5 | 0.59 | 89 | 10.47 |
| **50247** | 1 | 0.12 | 90 | 10.59 |
| **50249** | 1 | 0.12 | 91 | 10.71 |
| **50261** | 1 | 0.12 | 92 | 10.82 |
| **50263** | 3 | 0.35 | 95 | 11.18 |
| **50265** | 9 | 1.06 | 104 | 12.24 |
| **50266** | 15 | 1.76 | 119 | 14.00 |
| **50276** | 1 | 0.12 | 120 | 14.12 |
| **50305** | 1 | 0.12 | 121 | 14.24 |
| **50309** | 8 | 0.94 | 129 | 15.18 |
| **50310** | 14 | 1.65 | 143 | 16.82 |
| **50311** | 2 | 0.24 | 145 | 17.06 |
| **50312** | 1 | 0.12 | 146 | 17.18 |
| **50313** | 8 | 0.94 | 154 | 18.12 |
| **50314** | 5 | 0.59 | 159 | 18.71 |
| **50315** | 14 | 1.65 | 173 | 20.35 |
| **50316** | 11 | 1.29 | 184 | 21.65 |
| **50317** | 19 | 2.24 | 203 | 23.88 |
| **50319** | 1 | 0.12 | 204 | 24.00 |
| **50320** | 9 | 1.06 | 213 | 25.06 |
| **50321** | 4 | 0.47 | 217 | 25.53 |
| **50322** | 20 | 2.35 | 237 | 27.88 |
| **50324** | 2 | 0.24 | 239 | 28.12 |

| Q14. Zip Code of your home address | | | | |
|---|---|---|---|---|
| **Q14** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **50325** | 1 | 0.12 | 240 | 28.24 |
| **50327** | 4 | 0.47 | 244 | 28.71 |
| **50401** | 41 | 4.82 | 285 | 33.53 |
| **50420** | 1 | 0.12 | 286 | 33.65 |
| **50428** | 8 | 0.94 | 294 | 34.59 |
| **50436** | 1 | 0.12 | 295 | 34.71 |
| **50441** | 1 | 0.12 | 296 | 34.82 |
| **50452** | 1 | 0.12 | 297 | 34.94 |
| **50456** | 2 | 0.24 | 299 | 35.18 |
| **50468** | 1 | 0.12 | 300 | 35.29 |
| **50469** | 3 | 0.35 | 303 | 35.65 |
| **50475** | 1 | 0.12 | 304 | 35.76 |
| **50479** | 1 | 0.12 | 305 | 35.88 |
| **50501** | 47 | 5.53 | 352 | 41.41 |
| **50518** | 2 | 0.24 | 354 | 41.65 |
| **50523** | 3 | 0.35 | 357 | 42.00 |
| **50524** | 1 | 0.12 | 358 | 42.12 |
| **50525** | 2 | 0.24 | 360 | 42.35 |
| **50532** | 2 | 0.24 | 362 | 42.59 |
| **50536** | 1 | 0.12 | 363 | 42.71 |
| **50543** | 4 | 0.47 | 367 | 43.18 |
| **50544** | 2 | 0.24 | 369 | 43.41 |
| **50548** | 1 | 0.12 | 370 | 43.53 |
| **50551** | 1 | 0.12 | 371 | 43.65 |
| **50557** | 1 | 0.12 | 372 | 43.76 |
| **50558** | 1 | 0.12 | 373 | 43.88 |
| **50563** | 1 | 0.12 | 374 | 44.00 |
| **50569** | 2 | 0.24 | 376 | 44.24 |
| **50579** | 2 | 0.24 | 378 | 44.47 |

| Q14. Zip Code of your home address | | | | |
|---|---|---|---|---|
| **Q14** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **50585** | 1 | 0.12 | 379 | 44.59 |
| **50595** | 3 | 0.35 | 382 | 44.94 |
| **50599** | 1 | 0.12 | 383 | 45.06 |
| **50601** | 2 | 0.24 | 385 | 45.29 |
| **50648** | 1 | 0.12 | 386 | 45.41 |
| **50658** | 2 | 0.24 | 388 | 45.65 |
| **50702** | 1 | 0.12 | 389 | 45.76 |
| **50801** | 1 | 0.12 | 390 | 45.88 |
| **51023** | 1 | 0.12 | 391 | 46.00 |
| **51031** | 1 | 0.12 | 392 | 46.12 |
| **51033** | 1 | 0.12 | 393 | 46.24 |
| **51201** | 1 | 0.12 | 394 | 46.35 |
| **51232** | 1 | 0.12 | 395 | 46.47 |
| **51301** | 13 | 1.53 | 408 | 48.00 |
| **51334** | 2 | 0.24 | 410 | 48.24 |
| **51338** | 1 | 0.12 | 411 | 48.35 |
| **51366** | 1 | 0.12 | 412 | 48.47 |
| **51401** | 18 | 2.12 | 430 | 50.59 |
| **51433** | 1 | 0.12 | 431 | 50.71 |
| **51443** | 4 | 0.47 | 435 | 51.18 |
| **51445** | 1 | 0.12 | 436 | 51.29 |
| **51449** | 2 | 0.24 | 438 | 51.53 |
| **51454** | 2 | 0.24 | 440 | 51.76 |
| **51455** | 3 | 0.35 | 443 | 52.12 |
| **51458** | 1 | 0.12 | 444 | 52.24 |
| **51465** | 2 | 0.24 | 446 | 52.47 |
| **51501** | 33 | 3.88 | 479 | 56.35 |
| **51503** | 34 | 4.00 | 513 | 60.35 |
| **51521** | 2 | 0.24 | 515 | 60.59 |

| Q14. Zip Code of your home address | | | | |
|---|---|---|---|---|
| **Q14** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **51525** | 2 | 0.24 | 517 | 60.82 |
| **51526** | 3 | 0.35 | 520 | 61.18 |
| **51540** | 1 | 0.12 | 521 | 61.29 |
| **51542** | 1 | 0.12 | 522 | 61.41 |
| **51549** | 1 | 0.12 | 523 | 61.53 |
| **51555** | 1 | 0.12 | 524 | 61.65 |
| **51560** | 3 | 0.35 | 527 | 62.00 |
| **51565** | 1 | 0.12 | 528 | 62.12 |
| **51571** | 1 | 0.12 | 529 | 62.24 |
| **51575** | 1 | 0.12 | 530 | 62.35 |
| **51576** | 4 | 0.47 | 534 | 62.82 |
| **51577** | 1 | 0.12 | 535 | 62.94 |
| **52001** | 11 | 1.29 | 546 | 64.24 |
| **52002** | 1 | 0.12 | 547 | 64.35 |
| **52003** | 4 | 0.47 | 551 | 64.82 |
| **52008** | 1 | 0.12 | 552 | 64.94 |
| **52040** | 4 | 0.47 | 556 | 65.41 |
| **52045** | 2 | 0.24 | 558 | 65.65 |
| **52046** | 1 | 0.12 | 559 | 65.76 |
| **52101** | 1 | 0.12 | 560 | 65.88 |
| **52172** | 1 | 0.12 | 561 | 66.00 |
| **52202** | 1 | 0.12 | 562 | 66.12 |
| **52203** | 2 | 0.24 | 564 | 66.35 |
| **52205** | 1 | 0.12 | 565 | 66.47 |
| **52213** | 1 | 0.12 | 566 | 66.59 |
| **52214** | 1 | 0.12 | 567 | 66.71 |
| **52233** | 5 | 0.59 | 572 | 67.29 |
| **52234** | 1 | 0.12 | 573 | 67.41 |
| **52240** | 1 | 0.12 | 574 | 67.53 |

| Q14. Zip Code of your home address | | | | |
|---|---|---|---|---|
| **Q14** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **52241** | 1 | 0.12 | 575 | 67.65 |
| **52242** | 1 | 0.12 | 576 | 67.76 |
| **52253** | 2 | 0.24 | 578 | 68.00 |
| **52302** | 17 | 2.00 | 595 | 70.00 |
| **52306** | 1 | 0.12 | 596 | 70.12 |
| **52314** | 1 | 0.12 | 597 | 70.24 |
| **52317** | 2 | 0.24 | 599 | 70.47 |
| **52318** | 1 | 0.12 | 600 | 70.59 |
| **52323** | 1 | 0.12 | 601 | 70.71 |
| **52324** | 1 | 0.12 | 602 | 70.82 |
| **52328** | 1 | 0.12 | 603 | 70.94 |
| **52332** | 1 | 0.12 | 604 | 71.06 |
| **52336** | 2 | 0.24 | 606 | 71.29 |
| **52338** | 1 | 0.12 | 607 | 71.41 |
| **52351** | 1 | 0.12 | 608 | 71.53 |
| **52353** | 1 | 0.12 | 609 | 71.65 |
| **52362** | 1 | 0.12 | 610 | 71.76 |
| **52401** | 1 | 0.12 | 611 | 71.88 |
| **52402** | 37 | 4.35 | 648 | 76.24 |
| **52403** | 25 | 2.94 | 673 | 79.18 |
| **52404** | 37 | 4.35 | 710 | 83.53 |
| **52405** | 25 | 2.94 | 735 | 86.47 |
| **52406** | 1 | 0.12 | 736 | 86.59 |
| **52411** | 1 | 0.12 | 737 | 86.71 |
| **52501** | 32 | 3.76 | 769 | 90.47 |
| **52531** | 1 | 0.12 | 770 | 90.59 |
| **52537** | 2 | 0.24 | 772 | 90.82 |
| **52544** | 2 | 0.24 | 774 | 91.06 |
| **52552** | 1 | 0.12 | 775 | 91.18 |

| Q14. Zip Code of your home address | | | | |
|---|---|---|---|---|
| **Q14** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **52554** | 1 | 0.12 | 776 | 91.29 |
| **52556** | 1 | 0.12 | 777 | 91.41 |
| **52560** | 2 | 0.24 | 779 | 91.65 |
| **52567** | 1 | 0.12 | 780 | 91.76 |
| **52576** | 1 | 0.12 | 781 | 91.88 |
| **52577** | 2 | 0.24 | 783 | 92.12 |
| **52585** | 1 | 0.12 | 784 | 92.24 |
| **52588** | 1 | 0.12 | 785 | 92.35 |
| **52591** | 1 | 0.12 | 786 | 92.47 |
| **52601** | 1 | 0.12 | 787 | 92.59 |
| **52641** | 1 | 0.12 | 788 | 92.71 |
| **52730** | 1 | 0.12 | 789 | 92.82 |
| **52804** | 1 | 0.12 | 790 | 92.94 |
| **53001** | 1 | 0.12 | 791 | 93.06 |
| **63440** | 1 | 0.12 | 792 | 93.18 |
| **63561** | 1 | 0.12 | 793 | 93.29 |
| **68111** | 1 | 0.12 | 794 | 93.41 |
| **68114** | 1 | 0.12 | 795 | 93.53 |
| **68123** | 1 | 0.12 | 796 | 93.65 |
| **68134** | 1 | 0.12 | 797 | 93.76 |
| **68137** | 1 | 0.12 | 798 | 93.88 |
| **68850** | 1 | 0.12 | 799 | 94.00 |
| **90814** | 1 | 0.12 | 800 | 94.12 |
| **99999** | 50 | 5.88 | 850 | 100.00 |

| Q15. Zip Code of the place you travel to most often on weekdays. | | | | |
|---|---|---|---|---|
| **Q15** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **3865** | 1 | 0.12 | 1 | 0.12 |
| **11111** | 12 | 1.41 | 13 | 1.53 |
| **19151** | 1 | 0.12 | 14 | 1.65 |
| **22222** | 6 | 0.71 | 20 | 2.35 |
| **35051** | 1 | 0.12 | 21 | 2.47 |
| **50002** | 1 | 0.12 | 22 | 2.59 |
| **50007** | 1 | 0.12 | 23 | 2.71 |
| **50009** | 8 | 0.94 | 31 | 3.65 |
| **50010** | 1 | 0.12 | 32 | 3.76 |
| **50011** | 1 | 0.12 | 33 | 3.88 |
| **50014** | 1 | 0.12 | 34 | 4.00 |
| **50021** | 8 | 0.94 | 42 | 4.94 |
| **50023** | 10 | 1.18 | 52 | 6.12 |
| **50031** | 1 | 0.12 | 53 | 6.24 |
| **50036** | 1 | 0.12 | 54 | 6.35 |
| **50111** | 6 | 0.71 | 60 | 7.06 |
| **50112** | 1 | 0.12 | 61 | 7.18 |
| **50125** | 1 | 0.12 | 62 | 7.29 |
| **50129** | 1 | 0.12 | 63 | 7.41 |
| **50131** | 3 | 0.35 | 66 | 7.76 |
| **50161** | 1 | 0.12 | 67 | 7.88 |
| **50169** | 1 | 0.12 | 68 | 8.00 |
| **50201** | 1 | 0.12 | 69 | 8.12 |
| **50219** | 2 | 0.24 | 71 | 8.35 |
| **50226** | 3 | 0.35 | 74 | 8.71 |
| **50233** | 1 | 0.12 | 75 | 8.82 |
| **50237** | 1 | 0.12 | 76 | 8.94 |
| **50263** | 1 | 0.12 | 77 | 9.06 |
| **50265** | 9 | 1.06 | 86 | 10.12 |

| Q15. Zip Code of the place you travel to most often on weekdays. | | | | |
|---|---|---|---|---|
| **Q15** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **50266** | 12 | 1.41 | 98 | 11.53 |
| **50305** | 1 | 0.12 | 99 | 11.65 |
| **50309** | 19 | 2.24 | 118 | 13.88 |
| **50310** | 12 | 1.41 | 130 | 15.29 |
| **50311** | 3 | 0.35 | 133 | 15.65 |
| **50312** | 3 | 0.35 | 136 | 16.00 |
| **50313** | 4 | 0.47 | 140 | 16.47 |
| **50314** | 4 | 0.47 | 144 | 16.94 |
| **50315** | 9 | 1.06 | 153 | 18.00 |
| **50316** | 8 | 0.94 | 161 | 18.94 |
| **50317** | 13 | 1.53 | 174 | 20.47 |
| **50318** | 1 | 0.12 | 175 | 20.59 |
| **50319** | 3 | 0.35 | 178 | 20.94 |
| **50320** | 8 | 0.94 | 186 | 21.88 |
| **50321** | 1 | 0.12 | 187 | 22.00 |
| **50322** | 15 | 1.76 | 202 | 23.76 |
| **50324** | 2 | 0.24 | 204 | 24.00 |
| **50325** | 2 | 0.24 | 206 | 24.24 |
| **50326** | 1 | 0.12 | 207 | 24.35 |
| **50327** | 1 | 0.12 | 208 | 24.47 |
| **50329** | 1 | 0.12 | 209 | 24.59 |
| **50392** | 1 | 0.12 | 210 | 24.71 |
| **50401** | 46 | 5.41 | 256 | 30.12 |
| **50420** | 1 | 0.12 | 257 | 30.24 |
| **50428** | 5 | 0.59 | 262 | 30.82 |
| **50456** | 1 | 0.12 | 263 | 30.94 |
| **50458** | 1 | 0.12 | 264 | 31.06 |
| **50469** | 1 | 0.12 | 265 | 31.18 |
| **50475** | 1 | 0.12 | 266 | 31.29 |

| Q15. Zip Code of the place you travel to most often on weekdays. | | | | |
|---|---|---|---|---|
| **Q15** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **50482** | 1 | 0.12 | 267 | 31.41 |
| **50501** | 56 | 6.59 | 323 | 38.00 |
| **50511** | 1 | 0.12 | 324 | 38.12 |
| **50518** | 2 | 0.24 | 326 | 38.35 |
| **50525** | 2 | 0.24 | 328 | 38.59 |
| **50530** | 2 | 0.24 | 330 | 38.82 |
| **50533** | 1 | 0.12 | 331 | 38.94 |
| **50536** | 1 | 0.12 | 332 | 39.06 |
| **50543** | 1 | 0.12 | 333 | 39.18 |
| **50548** | 1 | 0.12 | 334 | 39.29 |
| **50551** | 1 | 0.12 | 335 | 39.41 |
| **50568** | 1 | 0.12 | 336 | 39.53 |
| **50595** | 5 | 0.59 | 341 | 40.12 |
| **50601** | 1 | 0.12 | 342 | 40.24 |
| **50613** | 1 | 0.12 | 343 | 40.35 |
| **50625** | 1 | 0.12 | 344 | 40.47 |
| **50701** | 2 | 0.24 | 346 | 40.71 |
| **50702** | 2 | 0.24 | 348 | 40.94 |
| **50801** | 1 | 0.12 | 349 | 41.06 |
| **51031** | 1 | 0.12 | 350 | 41.18 |
| **51033** | 1 | 0.12 | 351 | 41.29 |
| **51201** | 1 | 0.12 | 352 | 41.41 |
| **51301** | 14 | 1.65 | 366 | 43.06 |
| **51351** | 2 | 0.24 | 368 | 43.29 |
| **51401** | 16 | 1.88 | 384 | 45.18 |
| **51442** | 2 | 0.24 | 386 | 45.41 |
| **51443** | 2 | 0.24 | 388 | 45.65 |
| **51449** | 1 | 0.12 | 389 | 45.76 |
| **51450** | 1 | 0.12 | 390 | 45.88 |

| Q15. Zip Code of the place you travel to most often on weekdays. | | | | |
|---|---|---|---|---|
| **Q15** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **51454** | 1 | 0.12 | 391 | 46.00 |
| **51455** | 2 | 0.24 | 393 | 46.24 |
| **51465** | 1 | 0.12 | 394 | 46.35 |
| **51501** | 32 | 3.76 | 426 | 50.12 |
| **51503** | 16 | 1.88 | 442 | 52.00 |
| **51537** | 1 | 0.12 | 443 | 52.12 |
| **51542** | 1 | 0.12 | 444 | 52.24 |
| **51549** | 1 | 0.12 | 445 | 52.35 |
| **51555** | 1 | 0.12 | 446 | 52.47 |
| **51560** | 2 | 0.24 | 448 | 52.71 |
| **51577** | 1 | 0.12 | 449 | 52.82 |
| **52001** | 9 | 1.06 | 458 | 53.88 |
| **52003** | 6 | 0.71 | 464 | 54.59 |
| **52004** | 1 | 0.12 | 465 | 54.71 |
| **52008** | 1 | 0.12 | 466 | 54.82 |
| **52040** | 1 | 0.12 | 467 | 54.94 |
| **52042** | 1 | 0.12 | 468 | 55.06 |
| **52045** | 2 | 0.24 | 470 | 55.29 |
| **52046** | 2 | 0.24 | 472 | 55.53 |
| **52101** | 1 | 0.12 | 473 | 55.65 |
| **52172** | 1 | 0.12 | 474 | 55.76 |
| **52203** | 2 | 0.24 | 476 | 56.00 |
| **52206** | 1 | 0.12 | 477 | 56.12 |
| **52213** | 1 | 0.12 | 478 | 56.24 |
| **52233** | 1 | 0.12 | 479 | 56.35 |
| **52240** | 1 | 0.12 | 480 | 56.47 |
| **52241** | 3 | 0.35 | 483 | 56.82 |
| **52242** | 4 | 0.47 | 487 | 57.29 |
| **52302** | 9 | 1.06 | 496 | 58.35 |

| Q15. Zip Code of the place you travel to most often on weekdays. | | | | |
|---|---|---|---|---|
| **Q15** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **52305** | 1 | 0.12 | 497 | 58.47 |
| **52314** | 5 | 0.59 | 502 | 59.06 |
| **52317** | 1 | 0.12 | 503 | 59.18 |
| **52328** | 1 | 0.12 | 504 | 59.29 |
| **52333** | 2 | 0.24 | 506 | 59.53 |
| **52339** | 1 | 0.12 | 507 | 59.65 |
| **52349** | 1 | 0.12 | 508 | 59.76 |
| **52353** | 1 | 0.12 | 509 | 59.88 |
| **52401** | 9 | 1.06 | 518 | 60.94 |
| **52402** | 28 | 3.29 | 546 | 64.24 |
| **52403** | 14 | 1.65 | 560 | 65.88 |
| **52404** | 42 | 4.94 | 602 | 70.82 |
| **52405** | 9 | 1.06 | 611 | 71.88 |
| **52407** | 1 | 0.12 | 612 | 72.00 |
| **52411** | 3 | 0.35 | 615 | 72.35 |
| **52498** | 2 | 0.24 | 617 | 72.59 |
| **52501** | 36 | 4.24 | 653 | 76.82 |
| **52537** | 1 | 0.12 | 654 | 76.94 |
| **52544** | 3 | 0.35 | 657 | 77.29 |
| **52554** | 1 | 0.12 | 658 | 77.41 |
| **52556** | 1 | 0.12 | 659 | 77.53 |
| **52576** | 1 | 0.12 | 660 | 77.65 |
| **52577** | 1 | 0.12 | 661 | 77.76 |
| **52588** | 1 | 0.12 | 662 | 77.88 |
| **52591** | 1 | 0.12 | 663 | 78.00 |
| **52641** | 1 | 0.12 | 664 | 78.12 |
| **52732** | 1 | 0.12 | 665 | 78.24 |
| **52772** | 1 | 0.12 | 666 | 78.35 |
| **52806** | 1 | 0.12 | 667 | 78.47 |

| Q15. Zip Code of the place you travel to most often on weekdays. | | | | |
|---|---|---|---|---|
| **Q15** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **57104** | 1 | 0.12 | 668 | 78.59 |
| **60619** | 1 | 0.12 | 669 | 78.71 |
| **62450** | 1 | 0.12 | 670 | 78.82 |
| **63440** | 1 | 0.12 | 671 | 78.94 |
| **66102** | 1 | 0.12 | 672 | 79.06 |
| **68102** | 2 | 0.24 | 674 | 79.29 |
| **68108** | 1 | 0.12 | 675 | 79.41 |
| **68110** | 2 | 0.24 | 677 | 79.65 |
| **68111** | 1 | 0.12 | 678 | 79.76 |
| **68112** | 1 | 0.12 | 679 | 79.88 |
| **68114** | 1 | 0.12 | 680 | 80.00 |
| **68127** | 3 | 0.35 | 683 | 80.35 |
| **68128** | 1 | 0.12 | 684 | 80.47 |
| **68131** | 5 | 0.59 | 689 | 81.06 |
| **68134** | 1 | 0.12 | 690 | 81.18 |
| **68136** | 1 | 0.12 | 691 | 81.29 |
| **68137** | 1 | 0.12 | 692 | 81.41 |
| **68144** | 1 | 0.12 | 693 | 81.53 |
| **68154** | 3 | 0.35 | 696 | 81.88 |
| **68847** | 1 | 0.12 | 697 | 82.00 |
| **77662** | 1 | 0.12 | 698 | 82.12 |
| **78629** | 1 | 0.12 | 699 | 82.24 |
| **90245** | 1 | 0.12 | 700 | 82.35 |
| **90814** | 1 | 0.12 | 701 | 82.47 |
| **99999** | 149 | 17.53 | 850 | 100.00 |

| Q16. Your age category | | | | |
|---|---|---|---|---|
| Q16 | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
| 18-25 years 1 | 184 | 21.65 | 184 | 21.65 |
| 26-30 years 2 | 87 | 10.24 | 271 | 31.88 |
| 31-40 years 3 | 154 | 18.12 | 425 | 50.00 |
| 41-50 years 4 | 153 | 18.00 | 578 | 68.00 |
| 51-60 years 5 | 127 | 14.94 | 705 | 82.94 |
| Over 60 years 6 | 125 | 14.71 | 830 | 97.65 |
| Missing 9 | 20 | 2.35 | 850 | 100.00 |

| Q17. Are you an employee of the Iowa Department of Transportation? | | | | |
|---|---|---|---|---|
| Q17 | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
| No 0 | 796 | 93.65 | 796 | 93.65 |
| Yes 1 | 32 | 3.76 | 828 | 97.41 |
| Missing 9 | 22 | 2.59 | 850 | 100.00 |

| Q18. Have you ever used Iowa 511 services? | | | | |
|---|---|---|---|---|
| Q18 | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
| No 0 | 598 | 70.35 | 598 | 70.35 |
| Yes 1 | 204 | 24.00 | 802 | 94.35 |
| Missing 9 | 48 | 5.65 | 850 | 100.00 |

| Q19_1. Have you used 511 phone? | | | | |
|---|---|---|---|---|
| Q19_1 | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
| No 0 | 718 | 84.47 | 718 | 84.47 |
| Yes 1 | 76 | 8.94 | 794 | 93.41 |
| Missing 9 | 56 | 6.59 | 850 | 100.00 |

| Q19_2. Have you used 511 website? | | | | |
|---|---|---|---|---|
| **Q19_2** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No 0** | 689 | 81.06 | 689 | 81.06 |
| **Yes 1** | 105 | 12.35 | 794 | 93.41 |
| **Missing 9** | 56 | 6.59 | 850 | 100.00 |

| Q19_3. Have you used 511 mobile app? | | | | |
|---|---|---|---|---|
| **Q19_3** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No 0** | 735 | 86.47 | 735 | 86.47 |
| **Yes 1** | 59 | 6.94 | 794 | 93.41 |
| **Missing 9** | 56 | 6.59 | 850 | 100.00 |

| Q19_4. Have you used 511 Twitter/Facebook? | | | | |
|---|---|---|---|---|
| **Q19_4** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No 0** | 774 | 91.06 | 774 | 91.06 |
| **Yes 1** | 20 | 2.35 | 794 | 93.41 |
| **Missing 9** | 56 | 6.59 | 850 | 100.00 |

| Q20_1. Do you use Traffic speeds on highways (real time)? | | | | |
|---|---|---|---|---|
| **Q20_1** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No 0** | 761 | 89.53 | 761 | 89.53 |
| **Yes 1** | 35 | 4.12 | 796 | 93.65 |
| **Missing 9** | 54 | 6.35 | 850 | 100.00 |

| Q20_2. Do you use Road reports (road conditions, closures, or warnings due to weather or construction)? | | | | |
|---|---|---|---|---|
| **Q20_2** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No 0** | 632 | 74.35 | 632 | 74.35 |
| **Yes 1** | 164 | 19.29 | 796 | 93.65 |
| **Missing 9** | 54 | 6.35 | 850 | 100.00 |

| Q20_3. Do you use Travel times / Routes? | | | | |
|---|---|---|---|---|
| **Q20_3** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No 0** | 765 | 90.00 | 765 | 90.00 |
| **Yes 1** | 31 | 3.65 | 796 | 93.65 |
| **Missing 9** | 54 | 6.35 | 850 | 100.00 |

| Q20_4. Do you use Camera images of roads (real time)? | | | | |
|---|---|---|---|---|
| **Q20_4** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No 0** | 764 | 89.88 | 764 | 89.88 |
| **Yes 1** | 32 | 3.76 | 796 | 93.65 |
| **Missing 9** | 54 | 6.35 | 850 | 100.00 |

| Q20_5. Do you use Electronic sign locations and messages? | | | | |
|---|---|---|---|---|
| **Q20_5** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No 0** | 782 | 92.00 | 782 | 92.00 |
| **Yes 1** | 14 | 1.65 | 796 | 93.65 |
| **Missing 9** | 54 | 6.35 | 850 | 100.00 |

| Q20_6. Do you use Other information from Iowa 511? | | | | |
|---|---|---|---|---|
| **Q20_6** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No 0** | 794 | 93.41 | 794 | 93.41 |
| **Yes 1** | 2 | 0.24 | 796 | 93.65 |
| **Missing 9** | 54 | 6.35 | 850 | 100.00 |

| Q20Oth. Other information used? | | | | |
|---|---|---|---|---|
| **Q20Oth** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| **No Other, Not Applicable 0** | 848 | 99.76 | 848 | 99.76 |
| **Snowplow locations 1** | 1 | 0.12 | 849 | 99.88 |
| **Missing 9** | 1 | 0.12 | 850 | 100.00 |

## APPENDIX D: FEEDBACK FROM MVD SURVEY RESPONDENTS

### Q21. What new features or services would you like the Iowa DOT to add to its 511 Traveler Information System?
### Q22. Do you have any ideas or comments on how we can improve the Iowa 511Traveler Information System?

| Case ID | Q21 Features/Services | Q22 Ideas/Comments |
|---|---|---|
| 1005 | I'm not sure what services are already being provided | |
| 1006 | | Get the word out about it to public. I didn't even know about it until this survey. |
| 1014 | Recent construction action going on which indicates what roads are closed | |
| 1019 | None. We waste too many tax dollars on things that require nothing more than common sense. | Yes! Get rid of it, and stop wasting tax money on crap that benefits the lazy! |
| 1023 | I never heard of Iowa 511 | Tell people about it. |
| 1034 | Something simple for people who don't use computers. | Make it so the system can be used by anyone who has no computer skills. |
| 1039 | I'm not sure what it even is. | |
| 1043 | Phone application to check all road related issues whether is weather or construction. | Do a phone application. |
| 1047 | I didn't know there was a DOT 511 system. | |
| 1048 | I did not know about this service. | |
| 2001 | Honestly don't know much about it. Usually just fly by the seat of my pants most days. | Advertise on social media to spread the word more. Young people don't watch the news so that would be the best way to reach out to them. |
| 2021 | | The digital road signs frequently have offensive "safety" notices. For example "Don't text and drive bobble head." This represents Iowa to people out of state. Should we be a state who calls people names for the sake of safety? Someone needs to be held responsible for those statements. |
| 2031 | It's not a service I use, because I don't travel often, but it sounds like a good service. | None that I can think of. |
| 2032 | Indicate whether interstate exits are on right or left of roadway - so you can prepare for proper lane upon exiting. | |
| 2046 | Apps for phone. | |
| 2048 | Call back option. | Call back option. |

| Case ID | Q21 Features/Services | Q22 Ideas/Comments |
|---|---|---|
| 2058 | Make it more known | Maybe easier to use. |
| 2066 | I have never heard of this service. | More information to make drivers aware of the service. |
| 2070 | | I'd never heard of it, more awareness. |
| 2071 | Detours; other than that it looks good. | |
| 2075 | Outreach, more ads so I even know how to access it. | |
| 2086 | Weather radar. Quicker updating. Aerial maps of cities. | Make the app less congestive, use GPS locate to identify your current position. |
| 2090 | I really didn't know about the service. I will try it and see if it works for me. | |
| 2097 | Advise me when there's an accident | Different languages. |
| 2102 | Maybe more advertising. Never heard of it? | |
| 2105 | User friendly app for directions. | |
| 2113 | Not sure of current services. | |
| 2115 | | Believe we use it on second hand basis through TV8. Would like more info on this service. |
| 2125 | Not sure, I like the system as is. | Not at this time. |
| 2129 | Unsure since I've never used the service before. I will start to check out the 511 system. | |
| 2135 | I don't know because I have never used the program. | |
| 2136 | Is there an app? If not, that be nice. A Facebook feed. | I've never used it or knew it existed. |
| 2141 | Rest stops. | |
| 2145 | I'm sorry I have never used 511. I have seen the signs on the road. Make an app for it - connect it to google maps. Everyone is always on their phones, maybe others would try it if there was an app for it. | |
| 2146 | | More awareness. |
| 2149 | Never used it, so I can't say. | |
| 2150 | I was not aware of this service until today. I will try it out. | |
| 2152 | Not sure. I have never used before. I do not know if I would use in the future. | |
| 2157 | Alternative routes | |

| Case ID | Q21 Features/Services | Q22 Ideas/Comments |
|---|---|---|
| 2162 | Well in regards to me since I have never used the system myself I believe we should use an in phone free app. That is for the app and play store make it user friendly and advertise more. | |
| 2169 | A phone app. | |
| 2178 | I think it's fine. | |
| 2186 | Not sure. I plan on using the service though in the future. | |
| 2189 | | I have not known about these services. I do intend on using them now. |
| 2190 | | Iowa 511 doing a great job. |
| 2230 | | Make it more widely advertised |
| 3003 | Never used it. | Never used it. |
| 3005 | I did not really this was available. Now that I am aware, will certainly access this. Thanks. | |
| 3009 | Quick reference guide how to link | More awareness of usage. |
| 3010 | Unknown - never heard of 511 till today. | |
| 3011 | I'm not sure never heard 511 before | No, sorry. |
| 3020 | | Think it is confusing. Used during winter/bad driving conditions. |
| 3023 | | Road conditions. Weather. Roads w/construction. Time for planned routes. |
| 3035 | I wasn't aware of this service and I'm unaware of its uses. | Show it (advertise) on the highway alert system . . . The one that has the amber alerts and road closure ahead info. |
| 3050 | Haven't used it so can't say what to add. | |
| 3051 | On road signs giving information. | |
| 3053 | | Advertise - never even heard of it! |
| 3057 | | Don't have any input. Never heard of or used 511. |
| 3070 | Just never tried. | |
| 3074 | | Not sure what 511 is never used. |
| 3077 | Predict delay time for certain streets based on amount of cars already stopped or slowed down and based on car amount (traffic) averages. | |
| 3078 | Unsure, I've never seen or used it. | Make it more known. I didn't know about it before today. |
| 3083 | Not familiar enough to comment. | Not familiar enough to comment. |

| Case ID | Q21 Features/Services | Q22 Ideas/Comments |
|---|---|---|
| 3084 | Safety alerts at peak time of drunk driving. | Let more people know about it, because I have never heard of it. |
| 3097 | I don't have anything in particular to ad. I haven't a clue what services are offered with 511. | |
| 3098 | Not sure never used. I will have to look into the services. | |
| 3101 | Not sure what you have to offer if I've never used it. Would need to use to give my opinion. | |
| 3103 | I'm new to Iowa. I don't know what the 511 system is. | |
| 3107 | Better advertisement for it. I had never heard of it. | |
| 3116 | Not sure. | Don't know it. |
| 3126 | | Never heard of service |
| 3127 | Never used - Didn't know it existed | Maybe let people know more about the service and its availability. |
| 3128 | I don't know what it is. | Get more publicity. |
| 3134 | More awareness. | None. |
| 3147 | Not sure, as I have never had an experience using "511". I will definitely be checking it out though for future use. | |
| 3148 | Don't know what it has. | |
| 3154 | | I don't even know what it is. Make more people aware. |
| 3161 | Never heard of it. | |
| 3162 | | Make knowledge of its existence more available. |
| 3166 | Not sure. | Apps, personalization of routes, maps online, and phone alerts. |
| 3170 | Better communication about the services as I have never heard of it. | |
| 3173 | Advertise, didn't know about it. | Advertise. |
| 3177 | | More exposure not familiar with service. Not a big fan of social media! |
| 3180 | I didn't even know 511 existed. I keep my head in the sand more than I should. | |
| 3182 | Tie your system into common map application i.e., google waze garin etc. | Text alerts |

| Case ID | Q21 Features/Services | Q22 Ideas/Comments |
|---|---|---|
| 3183 | | I didn't know it was there, always used phone apps, they were already on phone and easy to access. |
| 6005 | Haven't looked at it. | Haven't looked at it. |
| 6023 | More interactive app with easier usage. More stability. | |
| 6030 | | Get more information to the public. |
| 7015 | Was not aware of apps. I will investigate these since I have blue tooth in car and will try 511 apps for car/phone. | I use 511. Because it is reliable/dependable. |
| 7030 | An app. Easier to use. | |
| 7039 | I have not used 511 because I did not know this service was available. Thank you for informing me of this service. | |
| 7042 | | Letting people know it is there and what it is. I have never heard of the service. |
| 7048 | Advanced notice for weather/road conditions. More brief description of how the roads truly are and a percentage chance of making it through the roads. | |
| 7057 | | Don't use much, but impressed with what's used. |
| 8005 | | Access on all phones. Not so many construction zones! |
| 8006 | Am glad the way it is. | |
| 8007 | Not sure. As long as it has construction, travel time, and weather that would be good. | |
| 8012 | Other states that have road conditions to the 511 | Multi state maps |
| 5004 | | I was in awe the 511 had all those resources listed in the questions. So maybe market your available service to the public more. |
| 5005 | | Put in the roads we travel in winter - you text us alerts when icy or closed. |
| 5008 | I didn't even know about it. Is there an app? | |
| 5011 | Emergency services | No. Throughout the state of Iowa our services are better than most. (More emergency situations resolutions; lone female traveler) |
| 5013 | I do not know what services they provide. I have never used 511 system before. | Not at this time. |
| 5014 | Haven't studied enough to know. | Didn't know about 511. |
| 5034 | Never heard of Iowa 511 before. | |

| Case ID | Q21 Features/Services | Q22 Ideas/Comments |
|---|---|---|
| 5036 | | I was not aware of Iowa 511. |
| 5056 | | Televise it. |
| 5061 | | I wasn't even aware of it. Advertise! |
| 5076 | | I did not know about it. |
| 5087 | I really don't know. I need to start using the Iowa 511 service since I just moved here. | I'll use the service. I haven't used it since I just moved here. |
| 5088 | | Make it convenient |
| 5097 | Can't think of any . . . It is pretty useful as it is. | |
| 9002 | | Think it is good even though I have never had to use it. |
| 9004 | Maps. Color graphs on conditions. | |
| 9013 | | Make an app to use on a phone |
| 9016 | Possibly maybe to be known more, cause I've never heard of it. | |
| 9033 | | Find a way to spread this information to people so they know about this service. |
| 9041 | Tell when, or how often and far away rest stops are. | |
| 9049 | | Have problems with phone app on Android - when it works it's a great service. |
| 9054 | Not sure I've never looked at it. | Advertise that you can go online to use it. Is there an app? |
| 9062 | | Get more information out about service. An app for phone would help (like Google Maps) |
| 9067 | Where the cops are! That would be helpful with speed traps. | |
| 9068 | Never heard of it. | Maybe get the word out to younger people that don't know about 511. |
| 9082 | I don't really know what it is. | More advertisements so people like me know what it is. |

## APPENDIX E: ONLINE SURVEY RESPONSE FREQUENCY TABLES

| **Q1. In the past 6 months, how often did you use the following services to get CONGESTION, ROAD CONSTRUCTION & CLOSURE or other traffic incident information?** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Information Source** | More than 3 times per week | | 2-3 times per week | | Once per week | | Occasionally | | Never | | No Response | |
| | *Frequency* | *Percent* | *Frequency* | *Percent* | *Frequency* | *Percent* | *Frequency* | *Percent* | *Frequency* | *Percent* | *Frequency* | *Percent* |
| 511 phone service | 5 | 1.38 | 4 | 1.10 | 3 | 0.83 | 55 | 15.19 | 228 | 62.98 | 67 | 18.51 |
| 511 web/app | 25 | 6.91 | 27 | 7.46 | 35 | 9.67 | 140 | 38.67 | 73 | 20.17 | 62 | 17.13 |
| Websites other than 511 | 14 | 3.87 | 12 | 3.31 | 16 | 4.42 | 76 | 20.99 | 169 | 46.69 | 75 | 20.72 |
| Mobile apps other than 511 | 9 | 2.49 | 9 | 2.49 | 13 | 3.59 | 68 | 18.78 | 187 | 51.66 | 76 | 20.99 |
| In-vehicle navigation | 13 | 3.59 | 12 | 3.31 | 19 | 5.25 | 65 | 17.96 | 183 | 50.55 | 70 | 19.34 |
| Radio | 42 | 11.60 | 26 | 7.18 | 23 | 6.35 | 103 | 28.45 | 100 | 27.62 | 68 | 18.78 |
| TV | 40 | 11.05 | 24 | 6.63 | 16 | 4.42 | 95 | 26.24 | 121 | 33.43 | 66 | 18.23 |
| Electronic signs on highways | 32 | 8.84 | 24 | 6.63 | 52 | 14.36 | 146 | 40.33 | 49 | 13.54 | 59 | 16.30 |
| Something else | 6 | 1.66 | 4 | 1.10 | 15 | 4.14 | 51 | 14.09 | 181 | 50.00 | 105 | 29.01 |

| Q2, 5, 8. When did you most often use the service(s)? | | | | | | |
|---|---|---|---|---|---|---|
| | Congestion, Road Construction, Traffic Incidents Information | | Weather Related Travel Information | | Travel Time Information | |
| **Time of Use** | *Frequency* | *Percent* | *Frequency* | *Percent* | *Frequency* | *Percent* |
| Before a trip | 158 | 43.65 | 218 | 60.22 | 105 | 29.01 |
| During a trip | 73 | 20.17 | 45 | 12.43 | 83 | 22.93 |
| During traffic congestion | 28 | 7.73 | 7 | 1.93 | 16 | 4.42 |
| All of the above | 9 | 2.49 | 10 | 2.76 | 3 | 0.83 |
| Other | 23 | 6.35 | 38 | 10.50 | 12 | 3.31 |
| No Response | 71 | 19.61 | 44 | 12.15 | 143 | 39.50 |

| Q3, 6, 9. Why did you use the service(s)? | | | | | | |
|---|---|---|---|---|---|---|
| | Congestion, Road Construction, Traffic Incidents Information | | Weather Related Travel Information | | Travel Time Information | |
| **Reason for Use** | *Frequency* | *Percent* | *Frequency* | *Percent* | *Frequency* | *Percent* |
| Easiest to use | 161 | 44.48 | 181 | 50.00 | 138 | 38.12 |
| Accuracy | 49 | 13.54 | 68 | 18.78 | 44 | 12.15 |
| Unique features | 15 | 4.14 | 17 | 4.70 | 5 | 1.38 |
| My friends use it | 3 | 0.83 | 3 | 0.83 | 2 | 0.55 |
| Not aware of other services | 33 | 9.12 | 29 | 8.01 | 19 | 5.25 |
| Other | 27 | 7.46 | 17 | 4.70 | 10 | 2.76 |
| No Response | 74 | 20.44 | 47 | 12.98 | 144 | 39.78 |

| Q4. In the past 6 months, how often did you use the following services to get WEATHER-RELATED TRAVEL information? | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Information Source** | Almost Every Day | | Most Days in Winter | | Occasionally | | Never | | Other | | No Response | |
| | *Frequency* | *Percent* | *Frequency* | *Percent* | *Frequency* | *Percent* | *Frequency* | *Percent* | *Frequency* | *Percent* | *Frequency* | *Percent* |
| 511 phone service | 7 | 1.93 | 11 | 3.04 | 39 | 10.77 | 212 | 58.56 | 22 | 6.08 | 71 | 19.61 |
| 511 web/app | 23 | 6.35 | 76 | 20.99 | 109 | 30.11 | 83 | 22.93 | 14 | 3.87 | 57 | 15.75 |
| Websites other than 511 | 27 | 7.46 | 61 | 16.85 | 88 | 24.31 | 104 | 28.73 | 20 | 5.52 | 62 | 17.13 |
| Mobile apps other than 511 | 33 | 9.12 | 39 | 10.77 | 60 | 16.57 | 135 | 37.29 | 29 | 8.01 | 66 | 18.23 |
| In-vehicle navigation | 4 | 1.10 | 13 | 3.59 | 45 | 12.43 | 188 | 51.93 | 38 | 10.50 | 74 | 20.44 |
| Radio | 69 | 19.06 | 71 | 19.61 | 101 | 27.90 | 54 | 14.92 | 9 | 2.49 | 58 | 16.02 |
| TV | 90 | 24.86 | 75 | 20.72 | 93 | 25.69 | 44 | 12.15 | 12 | 3.31 | 48 | 13.26 |
| Electronic signs on highways | 23 | 6.35 | 36 | 9.94 | 143 | 39.50 | 81 | 22.38 | 14 | 3.87 | 65 | 17.96 |
| Something else | 10 | 2.76 | 12 | 3.31 | 35 | 9.67 | 157 | 43.37 | 46 | 12.71 | 102 | 28.18 |

| Q7. In the past 6 months, how often did you use the following services to get TRAVEL TIME information? | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Information Source** | More than 3 times per week | | 2-3 times per week | | Once per week | | Occasionally | | Never | | Other | | No Response | |
| | *Frequency* | *%* | *Frequency* | *%* | *Frequency* | *%* | *Frequency* | *%* | *Frequency* | *%* | *Frequency* | *%* | *Frequency* | *%* |
| 511 phone service | 1 | 0.28 | 1 | 0.28 | 1 | 0.28 | 9 | 2.49 | 229 | 63.26 | 14 | 3.87 | 107 | 29.56 |
| 511 web/app | 6 | 1.66 | 5 | 1.38 | 5 | 1.38 | 29 | 8.01 | 195 | 53.87 | 12 | 3.31 | 110 | 30.39 |
| Websites other than 511 | 4 | 1.10 | 10 | 2.76 | 20 | 5.52 | 63 | 17.40 | 145 | 40.06 | 11 | 3.04 | 109 | 30.11 |
| Mobile apps other than 511 | 5 | 1.38 | 10 | 2.76 | 17 | 4.70 | 50 | 13.81 | 159 | 43.92 | 13 | 3.59 | 108 | 29.83 |
| In-vehicle navigation | 6 | 1.66 | 10 | 2.76 | 14 | 3.87 | 46 | 12.71 | 159 | 43.92 | 15 | 4.14 | 112 | 30.94 |
| Radio | 16 | 4.42 | 10 | 2.76 | 3 | 0.83 | 56 | 15.47 | 153 | 42.27 | 12 | 3.31 | 112 | 30.94 |
| TV | 13 | 3.59 | 7 | 1.93 | 4 | 1.10 | 44 | 12.15 | 166 | 45.86 | 15 | 4.14 | 113 | 31.22 |
| Electronic signs on highways | 10 | 2.76 | 15 | 4.14 | 12 | 3.31 | 92 | 25.41 | 120 | 33.15 | 10 | 2.76 | 103 | 28.45 |
| Something else | 5 | 1.38 | 1 | 0.28 | 5 | 1.38 | 27 | 7.46 | 173 | 47.79 | 19 | 5.25 | 132 | 36.46 |

| Q10. What is the main WEBSITE you use to get traffic information? | | |
|---|---|---|
| **Websites** | ***Frequency*** | ***Percent*** |
| None | 65 | 17.96 |
| Iowa 511 website | 137 | 37.85 |
| Google Maps | 72 | 19.89 |
| Mapquest | 24 | 6.63 |
| Waze | 3 | 0.83 |
| Local TV/Radio websites | 48 | 13.26 |
| Social media (Facebook, Twitter, etc) | 6 | 1.66 |
| Other | 4 | 1.10 |
| No Response | 3 | 0.83 |

| Q11. What is the main MOBILE APP you use for traffic information? | | |
|---|---|---|
| **Mobile Apps** | ***Frequency*** | ***Percent*** |
| None | 133 | 36.74 |
| Iowa 511 app | 90 | 24.86 |
| Google Maps app | 80 | 22.10 |
| Mapquest app | 11 | 3.04 |
| Waze app | 11 | 3.04 |
| Beat the traffic | 3 | 0.83 |
| Social media (Facebook, Twitter, etc) app | 9 | 2.49 |
| Other | 12 | 3.31 |
| No Response | 13 | 3.59 |

| Q12. What types of Iowa 511 services that you have EVER used? | | |
|---|---|---|
| **Services Used** | ***Frequency*** | ***Percent*** |
| 511 phone service | 6 | 1.66 |
| 511 website | 76 | 20.99 |
| 511 mobile app | 10 | 2.76 |
| 511 Twitter/Facebook | 2 | 0.55 |
| 511 Personalized email/text alert | 3 | 0.83 |
| More than 1 service | 186 | 51.38 |
| No Response | 79 | 21.82 |

| Q13. What information do you use from Iowa 511 websites and mobile apps? | | |
|---|---|---|
| **Information/Features** | ***Frequency*** | ***Percent*** |
| Travel-At-A-Glance/Road report | 1 | 0.28 |
| Construction | 7 | 1.93 |
| Incidents | 1 | 0.28 |
| Winter driving conditions | 19 | 5.25 |
| Traffic speeds | 0 | 0.00 |
| Camera images/video of road | 1 | 0.28 |
| Electronic sign locations and messages | 0 | 0.00 |
| Trucker's page | 0 | 0.00 |
| More than 1 service | 254 | 70.17 |
| Other | 0 | 0.00 |
| No Response | 79 | 21.82 |

| Q14. How have you used the information you received from Iowa's 511 services? | | |
|---|---|---|
| **Trip Change Due to 511 Information** | ***Frequency*** | ***Percent*** |
| Changed route | 38 | 10.50 |
| Changed departure time | 22 | 6.08 |
| Changed mode of travel | 1 | 0.28 |
| Changed stress level/feel more control on the trip | 24 | 6.63 |
| All that apply | 177 | 48.90 |
| Other | 10 | 2.76 |
| No Response | 90 | 24.86 |

| Q15. During the past 6 months, how many hours did you drive on a typical work day (or weekday)? | | |
|---|---|---|
| **Hours of Driving** | ***Frequency*** | ***Percent*** |
| Less than 1 hour | 152 | 41.99 |
| 1-2 hours | 111 | 30.66 |
| 2-4 hours | 58 | 16.02 |
| 4 hours or more | 37 | 10.22 |
| No Response | 4 | 1.10 |

| Q17. What type of vehicle did you typically drive on a work day (or weekday)? | | |
|---|---|---|
| **Type of Vehicle** | ***Frequency*** | ***Percent*** |
| Passenger car | 156 | 43.09 |
| SUV | 83 | 22.93 |
| Pickup truck | 83 | 22.93 |
| Van | 21 | 5.80 |
| Two axle single unit truck | 6 | 1.66 |
| Truck with 3 or more axles | 4 | 1.10 |
| Other | 5 | 1.38 |
| No Response | 4 | 1.10 |

| Q19. What is your age category? | | |
|---|---|---|
| **Age Group** | ***Frequency*** | ***Percent*** |
| 18-25 | 13 | 3.59 |
| 26-30 | 20 | 5.52 |
| 31-40 | 56 | 15.47 |
| 41-50 | 92 | 25.41 |
| 51-60 | 131 | 36.19 |
| over 60 | 44 | 12.15 |
| No Response | 6 | 1.66 |

| Q20. Are you an employee of the Iowa Department of Transportation? | | |
|---|---|---|
| **DOT Employee** | ***Frequency*** | ***Percent*** |
| Yes | 296 | 81.77 |
| No | 61 | 16.85 |
| No Response | 5 | 1.38 |

| Q 17. What is the ZIP code of your home address? | | | | |
|---|---|---|---|---|
| **Zip Code** | **City** | **State** | **Frequency** | **Percentage** |
| 50010 | Ames | IA | 40 | 11.05% |
| 50014 | Ames | IA | 22 | 6.08% |
| 50036 | Boone | IA | 21 | 5.80% |
| 50023 | Ankeny | IA | 9 | 2.49% |
| 50401 | Mason City | IA | 9 | 2.49% |
| 50021 | Ankeny | IA | 8 | 2.21% |
| 50201 | Nevada | IA | 8 | 2.21% |
| 50248 | Story City | IA | 6 | 1.66% |
| 52641 | Mount Pleasant | IA | 6 | 1.66% |
| 50009 | Altoona | IA | 5 | 1.38% |
| 50124 | Huxley | IA | 5 | 1.38% |
| 50138 | Knoxville | IA | 4 | 1.10% |
| 50263 | Waukee | IA | 4 | 1.10% |
| 50317 | Des Moines | IA | 4 | 1.10% |
| 50703 | Waterloo | IA | 4 | 1.10% |
| 52501 | Ottumwa | IA | 4 | 1.10% |
| 50035 | Bondurant | IA | 3 | 0.83% |
| 50129 | Jefferson | IA | 3 | 0.83% |
| 50158 | Marshalltown | IA | 3 | 0.83% |
| 50208 | Newton | IA | 3 | 0.83% |
| 50226 | Polk City | IA | 3 | 0.83% |
| 50613 | Cedar Falls | IA | 3 | 0.83% |
| 50801 | Creston | IA | 3 | 0.83% |
| 51012 | Cherokee | IA | 3 | 0.83% |
| 52001 | Dubuque | IA | 3 | 0.83% |
| 52057 | Manchester | IA | 3 | 0.83% |
| 52402 | Cedar Rapids | IA | 3 | 0.83% |
| 52772 | Tipton | IA | 3 | 0.83% |
| 52806 | Davenport | IA | 3 | 0.83% |
| 50046 | Cambridge | IA | 2 | 0.55% |
| 50054 | Colfax | IA | 2 | 0.55% |
| 50056 | Colo | IA | 2 | 0.55% |
| 50073 | Elkhart | IA | 2 | 0.55% |
| 50105 | Gilbert | IA | 2 | 0.55% |
| 50130 | Jewell | IA | 2 | 0.55% |
| 50131 | Johnston | IA | 2 | 0.55% |
| 50236 | Roland | IA | 2 | 0.55% |
| 50273 | Winterset | IA | 2 | 0.55% |
| 50311 | Des Moines | IA | 2 | 0.55% |
| 50313 | Des Moines | IA | 2 | 0.55% |
| 50428 | Clear Lake | IA | 2 | 0.55% |

| Q 17. What is the ZIP code of your home address? | | | | |
|---|---|---|---|---|
| **Zip Code** | **City** | **State** | **Frequency** | **Percentage** |
| 50595 | Webster City | IA | 2 | 0.55% |
| 51030 | Lawton | IA | 2 | 0.55% |
| 51040 | Onawa | IA | 2 | 0.55% |
| 51106 | Sioux City | IA | 2 | 0.55% |
| 51108 | Sioux City | IA | 2 | 0.55% |
| 51347 | Lake Park | IA | 2 | 0.55% |
| 51503 | Council Bluffs | IA | 2 | 0.55% |
| 51559 | Neola | IA | 2 | 0.55% |
| 52046 | Farley | IA | 2 | 0.55% |
| 52302 | Marion | IA | 2 | 0.55% |
| 52403 | Cedar Rapids | IA | 2 | 0.55% |
| 52544 | Centerville | IA | 2 | 0.55% |
| 52748 | Eldridge | IA | 2 | 0.55% |
| 52807 | Davenport | IA | 2 | 0.55% |
| 50002 | Adair | IA | 1 | 0.28% |
| 50022 | Atlantic | IA | 1 | 0.28% |
| 50025 | Audubon | IA | 1 | 0.28% |
| 50028 | Baxter | IA | 1 | 0.28% |
| 50031 | Beaver | IA | 1 | 0.28% |
| 50034 | Blairsburg | IA | 1 | 0.28% |
| 50039 | Bouton | IA | 1 | 0.28% |
| 50042 | Brayton | IA | 1 | 0.28% |
| 50048 | Casey | IA | 1 | 0.28% |
| 50051 | Clemons | IA | 1 | 0.28% |
| 50055 | Collins | IA | 1 | 0.28% |
| 50072 | Earlham | IA | 1 | 0.28% |
| 50112 | Grinnell | IA | 1 | 0.28% |
| 50125 | Indianola | IA | 1 | 0.28% |
| 50134 | Kelley | IA | 1 | 0.28% |
| 50144 | Leon | IA | 1 | 0.28% |
| 50148 | Liscomb | IA | 1 | 0.28% |
| 50156 | Madrid | IA | 1 | 0.28% |
| 50166 | Milo | IA | 1 | 0.28% |
| 50169 | Mitchellville | IA | 1 | 0.28% |
| 50212 | Ogden | IA | 1 | 0.28% |
| 50225 | Pleasantville | IA | 1 | 0.28% |
| 50228 | Prairie City | IA | 1 | 0.28% |
| 50244 | Slater | IA | 1 | 0.28% |
| 50247 | State Center | IA | 1 | 0.28% |

| Q 17. What is the ZIP code of your home address? | | | | |
|---|---|---|---|---|
| **Zip Code** | **City** | **State** | **Frequency** | **Percentage** |
| 50250 | Stuart | IA | 1 | 0.28% |
| 50266 | West Des Moines | IA | 1 | 0.28% |
| 50276 | Woodward | IA | 1 | 0.28% |
| 50309 | Des Moines | IA | 1 | 0.28% |
| 50312 | Des Moines | IA | 1 | 0.28% |
| 50314 | Des Moines | IA | 1 | 0.28% |
| 50315 | Des Moines | IA | 1 | 0.28% |
| 50316 | Des Moines | IA | 1 | 0.28% |
| 50320 | Des Moines | IA | 1 | 0.28% |
| 50323 | Urbandale | IA | 1 | 0.28% |
| 50324 | Windsor Heights | IA | 1 | 0.28% |
| 50327 | Des Moines | IA | 1 | 0.28% |
| 50423 | Britt | IA | 1 | 0.28% |
| 50436 | Forest City | IA | 1 | 0.28% |
| 50451 | Lakota | IA | 1 | 0.28% |
| 50468 | Rockford | IA | 1 | 0.28% |
| 50471 | Rudd | IA | 1 | 0.28% |
| 50501 | Fort Dodge | IA | 1 | 0.28% |
| 50516 | Badger | IA | 1 | 0.28% |
| 50529 | Dakota City | IA | 1 | 0.28% |
| 50621 | Conrad | IA | 1 | 0.28% |
| 50647 | Janesville | IA | 1 | 0.28% |
| 50652 | Lincoln | IA | 1 | 0.28% |
| 50658 | Nashua | IA | 1 | 0.28% |
| 50660 | New Hartford | IA | 1 | 0.28% |
| 50662 | Oelwein | IA | 1 | 0.28% |
| 50677 | Bremer | IA | 1 | 0.28% |
| 50845 | Diagonal | IA | 1 | 0.28% |
| 50851 | Lenox | IA | 1 | 0.28% |
| 50854 | Mount Ayr | IA | 1 | 0.28% |
| 51016 | Correctionville | IA | 1 | 0.28% |
| 51026 | Hornick | IA | 1 | 0.28% |
| 51039 | Moville | IA | 1 | 0.28% |
| 51063 | Whiting | IA | 1 | 0.28% |
| 51104 | Sioux City | IA | 1 | 0.28% |
| 51235 | Doon | IA | 1 | 0.28% |
| 51248 | Sanborn | IA | 1 | 0.28% |
| 51301 | Spencer | IA | 1 | 0.28% |
| 51442 | Denison | IA | 1 | 0.28% |
| 51443 | Glidden | IA | 1 | 0.28% |

| Q 17. What is the ZIP code of your home address? | | | | |
|---|---|---|---|---|
| **Zip Code** | **City** | **State** | **Frequency** | **Percentage** |
| 51501 | Council Bluffs | IA | 1 | 0.28% |
| 51510 | Carter Lake | IA | 1 | 0.28% |
| 51526 | Crescent | IA | 1 | 0.28% |
| 51550 | Magnolia | IA | 1 | 0.28% |
| 52052 | Guttenberg | IA | 1 | 0.28% |
| 52054 | La Motte | IA | 1 | 0.28% |
| 52060 | Maquoketa | IA | 1 | 0.28% |
| 52101 | Decorah | IA | 1 | 0.28% |
| 52147 | Hawkeye | IA | 1 | 0.28% |
| 52162 | Postville | IA | 1 | 0.28% |
| 52165 | Ridgeway | IA | 1 | 0.28% |
| 52172 | Waukon | IA | 1 | 0.28% |
| 52236 | Homestead | IA | 1 | 0.28% |
| 52247 | Kalona | IA | 1 | 0.28% |
| 52248 | Keota | IA | 1 | 0.28% |
| 52301 | Marengo | IA | 1 | 0.28% |
| 52327 | Riverside | IA | 1 | 0.28% |
| 52349 | Vinton | IA | 1 | 0.28% |
| 52358 | West Branch | IA | 1 | 0.28% |
| 52405 | Cedar Rapids | IA | 1 | 0.28% |
| 52531 | Hiteman | IA | 1 | 0.28% |
| 52556 | Fairfield | IA | 1 | 0.28% |
| 52563 | Hedrick | IA | 1 | 0.28% |
| 52577 | Oskaloosa | IA | 1 | 0.28% |
| 52601 | Burlington | IA | 1 | 0.28% |
| 52627 | Fort Madison | IA | 1 | 0.28% |
| 52638 | Middletown | IA | 1 | 0.28% |
| 52645 | New London | IA | 1 | 0.28% |
| 52646 | Oakville | IA | 1 | 0.28% |
| 52730 | Camanche | IA | 1 | 0.28% |
| 52751 | Grand Mound | IA | 1 | 0.28% |
| 52761 | Muscatine | IA | 1 | 0.28% |
| 52766 | Nichols | IA | 1 | 0.28% |
| 55904 | Rochester | MN | 1 | 0.28% |
| 57038 | Jefferson | SD | 1 | 0.28% |
| 57049 | Dakota Dunes | SD | 1 | 0.28% |
| 63556 | Milan | MO | 1 | 0.28% |
| No Response | No Response | No Response | 10 | 2.76% |

| Q18. What is the ZIP code of the place you travel to most often on weekdays? | | | | |
|---|---|---|---|---|
| **Zip Code** | **City** | **State** | **Frequency** | **Percentage** |
| 50010 | Ames | IA | 144 | 39.78% |
| 50021 | Ankeny | IA | 20 | 5.52% |
| 50401 | Mason City | IA | 11 | 3.04% |
| 52556 | Fairfield | IA | 9 | 2.49% |
| 50014 | Ames | IA | 8 | 2.21% |
| 50801 | Creston | IA | 7 | 1.93% |
| 52404 | Cedar Rapids | IA | 7 | 1.93% |
| 50022 | Atlantic | IA | 5 | 1.38% |
| 51102 | Sioux City | IA | 5 | 1.38% |
| 51501 | Council Bluffs | IA | 4 | 1.10% |
| 52501 | Ottumwa | IA | 4 | 1.10% |
| 50158 | Marshalltown | IA | 3 | 0.83% |
| 50208 | Newton | IA | 3 | 0.83% |
| 52003 | Dubuque | IA | 3 | 0.83% |
| 52544 | Centerville | IA | 3 | 0.83% |
| 52641 | Mount Pleasant | IA | 3 | 0.83% |
| 52761 | Muscatine | IA | 3 | 0.83% |
| 52806 | Davenport | IA | 3 | 0.83% |
| 50036 | Boone | IA | 2 | 0.55% |
| 50201 | Nevada | IA | 2 | 0.55% |
| 50309 | Des Moines | IA | 2 | 0.55% |
| 50321 | Des Moines | IA | 2 | 0.55% |
| 50423 | Britt | IA | 2 | 0.55% |
| 50501 | Fort Dodge | IA | 2 | 0.55% |
| 50588 | Storm Lake | IA | 2 | 0.55% |
| 50613 | Cedar Falls | IA | 2 | 0.55% |
| 51040 | Onawa | IA | 2 | 0.55% |
| 51104 | Sioux City | IA | 2 | 0.55% |
| 51106 | Sioux City | IA | 2 | 0.55% |
| 51360 | Spirit Lake | IA | 2 | 0.55% |
| 52001 | Dubuque | IA | 2 | 0.55% |
| 52057 | Manchester | IA | 2 | 0.55% |
| 52101 | Decorah | IA | 2 | 0.55% |
| 52172 | Waukon | IA | 2 | 0.55% |
| 52240 | Iowa City | IA | 2 | 0.55% |
| 52345 | Urbana | IA | 2 | 0.55% |
| 52772 | Tipton | IA | 2 | 0.55% |
| 20010 | Washington | DC | 1 | 0.28% |
| 50009 | Altoona | IA | 1 | 0.28% |

| Q18. What is the ZIP code of the place you travel to most often on weekdays? | | | | |
|---|---|---|---|---|
| **Zip Code** | **City** | **State** | **Frequency** | **Percentage** |
| 50023 | Ankeny | IA | 1 | 0.28% |
| 50047 | Carlisle | IA | 1 | 0.28% |
| 50126 | Iowa Falls | IA | 1 | 0.28% |
| 50129 | Jefferson | IA | 1 | 0.28% |
| 50131 | Johnston | IA | 1 | 0.28% |
| 50138 | Knoxville | IA | 1 | 0.28% |
| 50144 | Leon | IA | 1 | 0.28% |
| 50228 | Prairie City | IA | 1 | 0.28% |
| 50265 | West Des Moines | IA | 1 | 0.28% |
| 50271 | Williams | IA | 1 | 0.28% |
| 50306 | Des Moines | IA | 1 | 0.28% |
| 50313 | Des Moines | IA | 1 | 0.28% |
| 50314 | Des Moines | IA | 1 | 0.28% |
| 50317 | Des Moines | IA | 1 | 0.28% |
| 50320 | Des Moines | IA | 1 | 0.28% |
| 50322 | Urbandale | IA | 1 | 0.28% |
| 50438 | Garner | IA | 1 | 0.28% |
| 50511 | Algona | IA | 1 | 0.28% |
| 50525 | Clarion | IA | 1 | 0.28% |
| 50614 | Cedar Falls | IA | 1 | 0.28% |
| 50630 | Fredericksburg | IA | 1 | 0.28% |
| 50658 | Nashua | IA | 1 | 0.28% |
| 50677 | Bremer | IA | 1 | 0.28% |
| 50703 | Waterloo | IA | 1 | 0.28% |
| 50854 | Mount Ayr | IA | 1 | 0.28% |
| 51101 | Sioux City | IA | 1 | 0.28% |
| 51108 | Sioux City | IA | 1 | 0.28% |
| 51247 | Rock Valley | IA | 1 | 0.28% |
| 51248 | Sanborn | IA | 1 | 0.28% |
| 51301 | Spencer | IA | 1 | 0.28% |
| 51442 | Denison | IA | 1 | 0.28% |
| 51503 | Council Bluffs | IA | 1 | 0.28% |
| 51546 | Logan | IA | 1 | 0.28% |
| 51555 | Mo Valley | IA | 1 | 0.28% |
| 52002 | Dubuque | IA | 1 | 0.28% |
| 52040 | Dyersville | IA | 1 | 0.28% |
| 52242 | Iowa City | IA | 1 | 0.28% |
| 52302 | Marion | IA | 1 | 0.28% |

| Q18. What is the ZIP code of the place you travel to most often on weekdays? | | | | |
|---|---|---|---|---|
| **Zip Code** | **City** | **State** | **Frequency** | **Percentage** |
| 52353 | Washington | IA | 1 | 0.28% |
| 52401 | Cedar Rapids | IA | 1 | 0.28% |
| 52402 | Cedar Rapids | IA | 1 | 0.28% |
| 52403 | Cedar Rapids | IA | 1 | 0.28% |
| 52411 | Cedar Rapids | IA | 1 | 0.28% |
| 52601 | Burlington | IA | 1 | 0.28% |
| 52652 | Swedesburg | IA | 1 | 0.28% |
| 52655 | West Burlington | IA | 1 | 0.28% |
| 52722 | Bettenford | IA | 1 | 0.28% |
| 52732 | Clinton | IA | 1 | 0.28% |
| 52742 | De Witt | IA | 1 | 0.28% |
| 52809 | Davenport | IA | 1 | 0.28% |
| 68102 | Omaha | NE | 1 | 0.28% |
| No Response | No Response | No Response | 26 | 7.18% |

## APPENDIX F: FEEDBACK FROM ONLINE SURVEY RESPONDENTS

| ID | Q 22. What new features or services would you like the Iowa DOT to add to its 511 Traveler Information System? |
|---|---|
| 8 | On the state borders, It would be nice to show a little bit of the next state's road conditions for continuity (example: I often travel from Iowa to Illinois through the Quad Cities) |
| 14 | Don't know |
| 19 | None. |
| 21 | I'm a big fan of Google Traffic. If you have some great idea to improve that.... |
| 33 | Unknown |
| 35 | tie in local events so you don't end up in a parade |
| 47 | More cameras for each location, a variety of view choices. |
| 51 | don't use often enough to say |
| 60 | Add the plow cam images from the Track-a-Plow site to 511. |
| 81 | Improve the telephone option of 511. Make the mobile apps more real-time in nature. |
| 84 | Appreciate the system, especially like the timeframe for construction- ie roadwork from this date to that date. |
| 85 | It would be nice to be able to put in a route and get alternate choices for other routes that would avoid construction/traffic delays. |
| 87 | Texting alerts |
| 89 | Be able to enter my normal route and get an alert if there's a traffic accident or closure that would alter my route. |
| 96 | Like amber alerts if there is road closures or extreme conditions / blockages / accidents |
| 97 | Portable CMS board messages. |
| 98 | Put construction project info on 511. |
| 100 | N.A. Due to never seeing Iowa 511 before |
| 102 | N/A |
| 106 | County Road construction projects and road conditions. |
| 109 | The use of more stationary or plow cameras would be beneficial in winter operation situations. Rural primary routes seem to be spottier in regards to these types of features, so more attention to these areas would be good. |
| 110 | I would like to see more RWIS sights in Northwest Iowa. |
| 111 | None - it is sufficient as is. Spend money on road repair. |
| 112 | I'm happy with what is provided. |
| 120 | Delay times for projects with pilot cars or one lane traffic would be helpful.<br>Length of detours would also be helpful. |
| 124 | A way for people who do not have smartphones or any phone to get the information. |
| 132 | I don't know. |
| 141 | Having current and future events not land on top of each other such as lane closures during day(one event), then detoured to ramps on selected nights(second event) Each event on same location. |
| 143 | Surface Forecast |
| 150 | Combine the 511 site with the construction projects website information. 511 is too vague. Or have a link to the project website from 511 if a user wants additional information. |

| ID | Q 22. What new features or services would you like the Iowa DOT to add to its 511 Traveler Information System? |
|---|---|
| 151 | It would be really nice if we could incorporate Local Public Agencies (counties and cities) into the 511 apps, etc. |
| 156 | Multiple family members have asked if there is a way to see the time that the weather-related road conditions were last updated on the 511 website. I think that is a feature that should be added (to each road segment perhaps or however it is recorded?) so that travelers know whether roads are clear/partially covered with snow and ice/or completely covered with snow and ice at that moment or if that information might be outdated. |
| 159 | 511 county road data, this is sometime my first choice of route or alt. route |
| 160 | I don't really use it much. However I think I will check in on it. The little use I have experienced It seemed very good. |
| 163 | county road information<br>real time information - advance notifications<br>mile posts<br>better clarification/description of the route (which part of the route) that is closed and the detour |
| 164 | I wish it was more current. I have seen electronic signs indicating an accident ahead and call 511 and it will say the route is clear with no traffic.--wish the information given was real time. hard to use the phone service--would be cool if the phone service could sync somehow to my location on my cell |
| 166 | None |
| 172 | On days of weather issues it would be nice to have radar or weather warnings notice. |
| 173 | The detour information is not too clear. |
| 174 | na |
| 177 | allow people to sign up for specific alerts when there is a road closure or issue on a road(s) we specify |
| 186 | Show/list low clearance (<15 ft.) or other travel restrictions for trailers, 5th wheels and/or motor homes. Any other information/restrictions that would apply to RV type vehicles. |
| 187 | More access to road cameras. Some not on website |
| 188 | Travel times map like Google maps.<br>easier to access road reports |
| 193 | Pot holes! We have a motorcycle!<br>Did not notice the weather guide! Will be looking that up soon! |
| 202 | road construction |
| 205 | Maybe have access or a link to a weather radar. |
| 211 | Don't use |
| 220 | Link to other states with a similar 511 app (I've searched and downloaded from iTunes on my own, but should be nicer to see list if possible from the Iowa app) |
| 227 | PUBLIC TRANSPORTATION AVAILABILITY. |
| 228 | Possibly links to other state 511 service |
| 233 | It is to slow. Especially when panning and regenerating the screen. |
| 238 | Rideshare (Carpool, Vanpool), and public transit trip planner |
| 245 | Timely updates on traffic incidents, especially when there are delays! |
| 248 | Allow me to have a personal setting "home" page - i.e., East Central Iowa. I most often want this local area information and the map defaults to Central Iowa. |

| ID | Q 22. What new features or services would you like the Iowa DOT to add to its 511 Traveler Information System? |
|---|---|
| 252 | The continued improvements have been great and easy to follow. Have had occasional comments that our traveler page was so easy to use compared to other states. |
| 298 | None - great the way it is. |
| 302 | None. The system is flawed. |
| 306 | Push lanes closure messages using geo-fencing |
| 320 | County highway closures/detours |
| 322 | More road cameras |
| 323 | Integration with google maps for traffic cameras and message signs. It would also be nice to set up specific notifications on the phone app (such as I235 WB between 4-5 M-F). |
| 327 | Integrate with track-a-plow so it's all on the same map. |
| 328 | One aspect of my route decision process is vehicle density. But that factor comes from my previous experience based on time of day on certain roads. A graphical representation similar to speeds would be beneficial. Density is not always a factor in arrival times, rather is correlated to frequency and intensity of accidents. |
| 329 | It should be more integrated with other DOT applications. Why do we have a separate app for snow plow location and another for construction project information? |
| 330 | Make it easier to type in an address and see around that area. |
| 337 | More information on the status of non-interstate roads. |
| 340 | More road cameras, bridge cameras. |
| 346 | Deleted the app a while ago because I found it was not easy to use, it appears different so I will re-install later. How about an app tied to phone's GPS with text alerts of incidents in your area if the app is activated, but an app that will run in the background so it doesn't use too much battery or data. (ex. program "Ames to Omaha", it uses Google maps or something similar, uses your phone's GPS and runs in background. If it gets a maintenance or police report of an accident, weather, flood, construction it will text you what delay is, expected time of delay if known, and possible routes. Not the best idea if driving alone but great for a family traveling so a non-driving person can play co-pilot. |
| 353 | It would be nice to see higher quality video streams from traffic cams, especially at night. Also more traffic cams in outlying areas like Knoxville, Pleasantville, Pella (Always needs fixed or cleaned, so it's useless), etc. Especially for winter road conditions and traffic. |
| 357 | It's a great system |
| 359 | none as of now |
| 360 | add more cameras to routes would help |

| ID | 23. Do you have any ideas or comments on how we can improve the Iowa 511 Traveler Information System? |
|---|---|
| 1 | |
| 8 | The site is great, i find it very useful in the winter because i live on a gravel road and often can't tell if i should leave the house or stay put. I don't really use it for traffic congestion purposes. I'm sorry but i think the highway overhead digital signs are a waste of money. I can understand having them around large cities like Des Moines but no other parts of Iowa. |
| 14 | No |
| 18 | Reduce the clutter on the website. |
| 19 | Just get the word out more. I had no idea about 511. |
| 21 | Love the snow plow cams.<br><br>I do not like your tweets regarding road construction/accidents. I like the idea but I think it is a bad format. Leading with the Highway # is not useful to me. US 30 could be Missouri Valley or Cedar Rapids. Lead with the near city name.<br><br>Here is now: US 63: Intermittent lane closure from County Road G17 (near Montezuma) to I-80 (near Malcom).<br><br>What I would like. Near Malcom, and Near Montezuma. US 63: Intermittent lane closure from County Road G17 to I-80<br><br>Same stuff, but I know where I am going, the city name is what catches the eye when scrolling thru all my tweets. |
| 45 | More details of winter road conditions updated more often |
| 47 | A larger view of the traffic cameras. The new smaller format is hard to use. You can't see smaller details. |
| 51 | don't use often enough to say |
| 56 | I did not know that it existed. Make it more easily seen or available. |
| 60 | Include warnings on the presence of paint crews since they move very slowly. This might be a good thing to include on the DMS' as well so that drivers know there is a slow moving paint train X# miles ahead on whatever side of the road. |
| 81 | Improve the telephone option so it's not so clunky. |
| 84 | I was not aware that travel times are listed on the 511 site. |
| 85 | It would be nice to incorporate closures that are directly off of a major interstate. For example, C57 is closed in both directions off of Hwy 218. There is no indication of that on the map. It would help to know there is a detour. |
| 96 | I am unaware if there is a voice message system that I could listen to on the way to work because I will NOT access my smart phone apps while I am driving |
| 98 | Put construction project info on 511. |
| 100 | I had never heard of this system before so making everyone more aware of it would help this system in my opinion |
| 101 | None. |
| 102 | N/A |
| 108 | To made up to the minute road closer more on time. I was traveling to Omaha and I looked at 511 and is didn't show road work be the valley and when I got down there was a bridge paint job going on that had traffic back up for about 30 min. |

| ID | 23. Do you have any ideas or comments on how we can improve the Iowa 511 Traveler Information System? |
|---|---|
| 109 | The efforts for more real time information are the best improvement we can provide the travelling public. Winter road condition updates have become much more "real time" in recent winters and this is very important for travelers who are on the road in the early morning hours. Previously updates seemed to often end with ISP at about 11 pm and not update again until 6 or 7 am the next morning, when many of the commuters already have left for work uncertain what the condition actually was. Much better now. |
| 111 | It is good just the way that it is. |
| 112 | Maybe update things more frequently. It seems some mornings that the app is behind real-time traffic. |
| 114 | Increase the bandwidth during winter months. There's good information there, but when there are snow events the site's inaccessible, which defeats the entire purpose. |
| 124 | Winter weather information could be better. |
| 134 | Additional, more descriptive categories of snow/ice cover on roadways similar to 511's earlier categories. The current few categories do not give enough road condition information. |
| 141 | Leave traffic impact descriptions more value so that they are more accurate. (Alternating lane closures) as it is difficult to keep up with exactly where the contractor is and which side they choose to work. Especially at night or with no inspectors. |
| 150 | Have a link to the construction project website on 511 so a user can access additional information. |
| 152 | I am thankful for the Iowa 511 Traveler Information, it helps with trip planning both professionally and personally. |
| 159 | County construction work more so. |
| 160 | Not at this time. |
| 163 | better clarification/description of the route (which part of the route) that is closed and the detour<br>county road information<br>real time information - advance notifications<br>mile posts |
| 168 | Make sure upcoming closures are on both the traveler's page and the trucker's page. Make sure the site works with as many different versions of browsers as possible. |
| 174 | N/A |
| 192 | Be more clear and accurate with the exact locations of closures and work zones. A point or line on a map does not always accurately convey which interchanges, ramps, intersections or cross-streets are open and which are closed. |
| 193 | pot holes reporting...they are scary when on the bike |
| 204 | Speed/loading improvements to the site during heavy site traffic. It can be frustrating to not get the site to work when it cannot handle the capacity, therefore I go elsewhere to get my information. |
| 205 | Just keep it reliable and up to date. |
| 222 | More use of electronic signs in high traffic areas |
| 227 | PUBLIC TRANSPORTATION FROM AMES TO DES MOINES. |
| 238 | Include information for more transportation modes - Rideshare resources and public transit trip planner, bicycle trails, airports, passenger rail lines and stations. |
| 245 | Timely information would be nice. |
| 248 | Picking cameras to view by route is clumsy. Any way to speed that up? |

| ID | 23. Do you have any ideas or comments on how we can improve the Iowa 511 Traveler Information System? |
|---|---|
| 249 | More signs or advertising materials at rest stops to make more people aware of this service. |
| 250 | Keep it simple and easy to use and understand. |
| 253 | The part of the system that frustrates me the most is that the winter driving conditions are so terribly outdated most of the time. Last reports are sometimes MANY HOURS behind actual time. Wish there were a way to make them more up-to-the-minute. This is the part of the system I find the most undependable to rely on. |
| 274 | Make more user friendly. |
| 289 | More consistent construction information between office's, and wording for the construction. |
| 298 | Not at this time. |
| 302 | Junk the 511, and get a more user friendly program. |
| 306 | Love it.. |
| 311 | Fix 'your session has expired' when clicking on links that are posted to Facebook |
| 318 | Advertise more about 511. I personally thought it was only a thing to call in to which I don't do but now that i know there is an app i can put on my phone I will definitely use it! |
| 319 | Need better location descriptions of projects. For example: the description for work on US 67 in Bettendorf is poor. "Between Business US 61 and US 30 (near Bettendorf)" is a 33 mile stretch! Actually it is in Bettendorf between 10th St and 18th St; a half mile stretch.<br><br>Project entries need to be updated whenever there is a change in lane availability; not just once at the beginning of a project. For example on interstate patching projects the location of nightly lane closures should be given; not just the entire project area for the entire contract period. |
| 320 | Better wintertime crash reporting like MnDOT |
| 322 | None |
| 323 | The travel time message signs are great. It would be nice to see the stay on all the time not just during rush. It would also be nice to see them in more areas.<br><br>IOS app is great but crashes often. |
| 324 | Keep the winter road map AS IS please. You could ask other states to make theirs' as good. This question is why I wanted to take this survey. In winter the Iowa 511 road color map is a great tool. Thank you. |
| 327 | Push all of the information to Google Maps. With Android Auto coming out now, pretty soon we won't even be able to easily use 511 in our cars - it'll just be Maps and maybe Waze. Obviously some people will still need the old 511 service, but the future seems to be pushing the data to the major providers like Google and Apple. |
| 328 | This camera http://hb.511ia.org/#cameras/albumView/214417 is misnamed and located incorrectly on the map. I tried to tell @iadot about it. The response said I was incorrect. If you just look at the picture, you can see that the camera is on the other side of Black Hawk Creek. And if you drive under highway 218 on Duryea Street, you can look up at the camera. Even with Google Maps, when one submits a correction, there is eventual follow through. |
| 329 | Integrate it with other DOT applications. Find a way to be more precise with the condition information. Partially covered doesn't really tell you if the road is slippery. There should be one interface for DOT field staff to enter information into all systems. |

| ID | 23. Do you have any ideas or comments on how we can improve the Iowa 511 Traveler Information System? |
|---|---|
| 346 | I would pay $5 or so for an app that doesn't bombard me with ads and can give me real-time traffic data, but not too much. I would like the data on MY trip from Ames to Omaha, but don't need real-time data for stuff an hour behind or don't need data on someone else's trip from Waterloo to Dubuque. Maybe tying a text message to the DMS boards would be easier instead of my app idea? I don't know how necessary it is to have hundreds of cameras up around roads and on trucks. You either gets pics of cars sitting still or snow packed cameras. Spend more money and effort with a real-time map/GPs based driving app to supplement on-board or aftermarket Garmin-type devices. ALSO: |
| 353 | Higher quality video streams from traffic cams, ie. Higher res video. Maybe make the res selectable like on YouTube so if you have a slow connection you can pick a lower quality stream. |
| 356 | As per construction projects, removed when not impacted travel lanes. |
| 360 | Everything looks good, speed and accuracy would is always beneficial. |

## APPENDIX G: MVD SURVEY QUESTIONNAIRE

This survey is being conducted by the Institute of Transportation at Iowa State University to help the Iowa DOT improve its 511 Traveler Information System and meet the needs of the driving public. Please circle one answer for each of the following questions. Your answers are voluntary and anonymous. Thank you!

### Congestion/Road Construction & Closure

1. In the past 6 months, which service did you use most often to get **CONGESTION/ROAD CONSTRUCTION & CLOSURE** and **other traffic incident** information?

   0 = None [Go to Q5] 3 = Iowa 511 phone
   1 = In-car navigation 4 = Iowa 511 online/app
   2 = Google Maps 5 = Other:_____

2. When did you mostly use this service?

   1 = Before a trip 3 = During traffic congestion
   2 = During a trip 4 = Other:_____

3. How often did you use this service in the past 6 months?

   1 = Almost every day 3 = Occasionally
   2 = Once per week 4 = Other:_____

4. Why do you use this service rather than other alternatives?

   1 = Easiest to use 3 = Its unique features
   2 = It's accurate 4 = Other:_____

### Weather-Related Travel Information

***(winter road conditions, travel advisories, etc…)***

5. In the past 6 months, which service did you use most often to get **WEATHER-RELATED TRAVEL** information?

   0 = None [Go to Q9] 3 = Iowa 511 phone
   1 = In-car navigation 4 = Iowa 511 online/app
   2 = Google Maps 5 = Other:_____

6. When did you mostly use this service?

   1 = Before a trip 3 = During traffic congestion
   2 = During a trip 4 = Other:_____

7. How often did you use this service in the past 6 months?

   1 = Almost every day 3 = During severe weather
   2 = Most days in winter 4 = Other:_____

8. Why do you use this service rather than other alternatives?

   1 = Easiest to use 3 = Its unique features
   2 = It's accurate 4 = Other:_____

### Travel Time and Route Information

***(which roads to use & how long it will take…)***

9. In the past 6 months, which service did you use most often to get **TRAVEL TIME/ROUTE** information?

   0 = None [Go to Q13] 3 = Iowa 511 phone
   1 = In-car navigation 4 = Iowa 511 online/app
   2 = Google Maps 5 = Other:_____

10. When did you mostly use this service?

    1 = Before a trip 3 = During traffic congestion
    2 = During a trip 4 = Other:_____

11. How often did you use this service in the past 6 months?

    1 = Almost every day 3 = Occasionally
    2 = Once per week 4 = Other:_____

12. Why do you use this service rather than other alternatives?

    1 = Easiest to use 3 = Its unique features
    2 = It's accurate 4 = Other:_____

### Your Driving Patterns

13. During the past 6 months, how many hours did you drive on a typical work day (or week day)?

    1 = Less than one hour 2 = One to two hours
    3 = Two to four hours 4 = Four hours/day or more

14. What is the Zip Code of your home address?

    Zip Code:_____

15. What is the zip code of the place you travel to most often on weekdays (work, errands, school)?

    Zip Code:_____

***Please continue to the back***

16. What is your age category?

1 = 18-25 2 = 26-30 3 = 31-40
4 = 41-50 5 = 51-60 6 = Over 60

17. Are you an employee of the Iowa Department of Transportation?

1 = Yes 2 = N

18. Have you ever used **Iowa 511** services?

1 = No [Go to Q21]
2 = Yes

19. Please circle all the types of **Iowa 511** services that you have used.

1 = 511 phone
2 = 511 website
3 = 511 mobile app
4 = 511 Twitter /Facebook

20. What information do you use from **Iowa 511**? Please circle all that apply.

1 = Traffic speeds on highways (real time)
2 = Road reports (road conditions, closures, or warnings due to weather or construction)
3 = Travel times / Routes
4 = Camera images of roads (real time)
5 = Electronic sign locations and messages
6 = Other:_____

21. What new features or services would you like the Iowa DOT to add to its **511** system?

22. Do you have any ideas or comments on how we can improve the **Iowa 511** Traveler Information System?

*Thank you for your participation! We are very grateful for your help with this important project.*

## APPENDIX H: ONLINE SURVEY QUESTIONNAIRE


# Iowa 511 Online Survey

This short survey will help Iowa Department of Transportation improve its 511 Traveler Information System (www.511ia.org) and meet the needs of the driving public. Your answers are voluntary and anonymous.

**1. In the past 6 months, how often did you use the following services to get CONGESTION, ROAD CONSTRUCTION & CLOSURE or other traffic incident information? Please go to Question 4 if you didn't use any service.**

| | More than 3 times per week | 2-3 times per week | Once per week | Occasionally | Never |
|---|---|---|---|---|---|
| 511 phone service | ○ | ○ | ○ | ○ | ○ |
| 511 web/app | ○ | ○ | ○ | ○ | ○ |
| Websites other than 511 | ○ | ○ | ○ | ○ | ○ |
| Mobile apps other than 511 | ○ | ○ | ○ | ○ | ○ |
| In-vehicle navigation | ○ | ○ | ○ | ○ | ○ |
| Radio | ○ | ○ | ○ | ○ | ○ |
| TV | ○ | ○ | ○ | ○ | ○ |
| Electronic signs on highways | ○ | ○ | ○ | ○ | ○ |
| Something else | ○ | ○ | ○ | ○ | ○ |

**2. When did you most often use the service(s) selected in Question 1 above?**

- ○ Before a trip
- ○ During a trip
- ○ During traffic congestion
- ○ Other:

**3. Why did you use the service(s) selected in Question 1 rather than other alternatives?**

- ○ Easiest to use
- ○ Accuracy
- ○ Unique features
- ○ My friend uses it
- ○ Not aware of other services
- ○ Other:

Continue »

12% completed

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# Iowa 511 Online Survey

**4. In the past 6 months, how often did you use the following services to get WEATHER-RELATED TRAVEL information? Please go to Question 7 if you didn't use any service.**

| | Almost every day | Most days in winter | Occasionally | Never | Other |
|---|---|---|---|---|---|
| 511 phone service | ○ | ○ | ○ | ○ | ○ |
| 511 web/app | ○ | ○ | ○ | ○ | ○ |
| Websites other than 511 | ○ | ○ | ○ | ○ | ○ |
| Mobile apps other than 511 | ○ | ○ | ○ | ○ | ○ |
| In-vehicle navigation | ○ | ○ | ○ | ○ | ○ |
| Radio | ○ | ○ | ○ | ○ | ○ |
| TV | ○ | ○ | ○ | ○ | ○ |
| Electronic signs on highways | ◉ | ○ | ○ | ○ | ○ |
| Something else | ○ | ○ | ○ | ○ | ○ |

**5. When did you most often use the service(s) selected in Question 4?**

- ○ Before a trip
- ○ During a trip
- ○ During traffic congestion
- ○ Other:

**6. Why did you use the service(s) selected in Question 4 rather than other alternatives?**

- ○ Easiest to use
- ○ Accuracy
- ○ Unique features
- ○ My friend uses it
- ○ Not aware of other services
- ○ Other:

« Back  Continue »

25% completed

# Iowa 511 Online Survey

**7. In the past 6 months, how often did you use the following services to get TRAVEL TIME information? Please go to Question 10 if you didn't use any service.**

| | More than 3 times per week | 2-3 times per week | once per week | Occasionally | Never | Other |
|---|---|---|---|---|---|---|
| 511 phone service | ○ | ○ | ○ | ○ | ○ | ○ |
| 511 web/app | ○ | ○ | ○ | ○ | ○ | ○ |
| Websites other than 511 | ○ | ○ | ○ | ○ | ○ | ○ |
| Mobile apps other than 511 | ○ | ○ | ○ | ○ | ○ | ○ |
| In-vehicle navigation | ○ | ○ | ○ | ○ | ○ | ○ |
| Radio | ○ | ○ | ○ | ○ | ○ | ○ |
| TV | ○ | ○ | ○ | ○ | ○ | ○ |
| Electronic signs on highways | ○ | ○ | ○ | ○ | ○ | ○ |
| Something else | ○ | ○ | ○ | ○ | ○ | ○ |

**8. When did you most often use the service(s) selected in Queston 7 above?**

- ○ Before a trip
- ○ During a trip
- ○ During traffic congestion
- ○ Other:

**9. Why did you use the service(s) selected in Question 7 rather than other alternatives?**

- ○ Easiest to use
- ○ Accuracy
- ○ Unique features
- ○ My friend uses it
- ○ Not aware of other services
- ○ Other:

« Back  Continue »

37% completed

# Iowa 511 Online Survey

**10. What is the main WEBSITE you use to get traffic information?**

- None
- Iowa 511 website
- Google Maps
- MapQuest
- Waze
- Local TV/Radio websites
- Social media (Facebook, Twitter, etc.)
- Other:

**11. What is the main MOBILE APP you use for traffic information?**

- None
- Iowa 511 app
- Google Maps app
- MapQuest app
- Waze app
- Beat the traffic
- Social media (Facebook, Twitter, etc.) apps
- Other:

« Back  Continue »

50% completed

# Iowa 511 Online Survey

**12. Please select all of the types of Iowa 511 services that you have EVER used. If you have never used Iowa 511, please go to Question 15.**

- [ ] 511 phone service
- [ ] 511 website
- [ ] 511 mobile app
- [ ] 511 Twitter/ Facebook
- [ ] 511 Personalized email/text alert
- [ ] Other:

**13. What information do you use from Iowa 511 websites and mobile apps? Please check all that apply.**

- [ ] Travel At-A-Glance/ Road report (incidents, construction, weather warning, and other states' info)
- [ ] Construction (roadwork, closure, restrictions, etc.)
- [ ] Incidents (closure due to accident)
- [ ] Winter driving conditions
- [ ] Traffic speeds
- [ ] Camera images/video of road
- [ ] Electronic sign locations and messages
- [ ] Truckers' page
- [ ] Other:

**14. How have you used the information you received from Iowa's 511 services? Please select all that apply.**

- [ ] Changed route
- [ ] Changed departure time
- [ ] Changed mode of travel
- [ ] Changed stress level/ feel more control on the trip
- [ ] Other:

« Back  Continue »

62% completed

# Iowa 511 Online Survey

**15. During the past 6 months, how many hours did you drive on a typical work day (or weekday)?**

- ○ Less than 1 hour
- ○ 1 to 2 hours
- ○ 2 to 4 hours
- ○ 4 hours or more

**16. What type of vehicle did you typically drive on a work day (or weekday)?**

- ○ Passenger car
- ○ SUV
- ○ Pickup truck
- ○ Van
- ○ Two-Axle single unit truck
- ○ Truck with three or more axles
- ○ Other:

**17. What is the ZIP code of your home address?**

**18. What is the ZIP code of the place you travel to most often on weekdays (work, errands, school, etc.) ?**

« Back  Continue »

75% completed

# Iowa 511 Online Survey

**19. What is your age category?**

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

**20. Are you an employee of the Iowa Department of Transportation?**

- No
- Yes

**21. How do you access the Internet? Please select all that apply.**

- I have Internet access on my smartphone / tablet
- I have Internet access at work
- I have Internet access at home
- I don't have internet access
- Other:

« Back  Continue »

87% completed

# Iowa 511 Online Survey

**22. What new features or services would you like the Iowa DOT to add to its 511 Traveler Information System?**

**23. Do you have any ideas or comments on how we can improve the Iowa 511 Traveler Information System?**

**24. If you would like to be contacted to further discuss the above, please provide your name and a phone number or email address.**

« Back Submit

100%: You made it.

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