

Final Research Report
Agreement 4118, Task 63
Congestion Survey

CONGESTION SURVEY

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CONGESTION SURVEY

INTRODUCTION

There are sections of major freeways in the Puget Sound region without traffic data collection devices to provide traveler information to roadway users. To remedy this condition, the Washington State Department of Transportation (WSDOT) placed additional data collection devices on some of those most heavily used roadway sections. This report describes motorists' responses to the new information available as a result of those new devices.

The devices were installed on SR 512 and I-5 in the Olympic Region. The data collected from those devices were then displayed in two places on WSDOT's website, as well as provided by other traveler information resources that WSDOT's data supports.

On WSDOT's website, the information was displayed on the primary congestion page for the Tacoma region within WSDOT's traveler information section (<http://www.wsdot.com/traffic/tacoma/default.aspx>) and on a new travel time Web page (<http://www.wsdot.com/traffic/tacoma/traveltimes/default.aspx>) for the Olympia/Tacoma area. In addition, the information was made available through the state's 511 system and through the mobile phone app that WSDOT supports. The information was also distributed to a number of private sector firms that create and distribute their own travel information via a variety of platforms, ranging from conventional radio broadcasts to innovative smart phone applications.

This project conducted a Web-based survey to determine whether users of WSDOT's traveler information pages

- had noticed that new information was available
- had found the travel time information page
- found the information on those pages useful and accurate.

Taking advantage of our interaction with users of WSDOT's congestion information website, the survey also sought to obtain information that could be used to further improve WSDOT's understanding of what information services are utilized and determined to be valuable, as well as how users of those services reacted to the information they obtained.

The survey was posted as a link on WSDOT's Tacoma area site. The survey link was active for the month of May 2012. Interested individuals clicked on a link and were connected to the anonymous survey. This limited the survey respondents to individuals who actively used the WSDOT website that provides congestion data to the Olympia/Tacoma region. Therefore, many potential users of WSDOT traveler information (e.g., people who listened to the radio or got their information exclusively from private sector sources such as a wirelessly connected navigation device) are not represented in the results discussed below. This limitation was accepted in order to limit the respondents to those who had been exposed specifically to the data collected as a result of the newly placed detectors.

A copy of the survey is attached to this report as an appendix.

PROJECT FINDINGS

This report is intended to provide insight into the attitudes of people who use WSDOT congestion information in the Olympic Region, how they obtain data, and what they do with it once they have obtained it.

Basic Survey Facts

The one-month survey obtained 84 total responses. 60 of those 84 acknowledged that they had seen changes in the travel information. Of those 60 respondents, 84 percent thought the information provided was useful. Only two people responded that the information was not useful. While 84 percent of people reported the website information at least somewhat useful, 34 percent of those people also accessed other websites for traffic congestion information.

In addition to the information's utility, 51 percent of the 60 respondents who had seen the changed travel information considered it "accurate," with an additional 44 percent considering it "sometimes, but not always" accurate.

Perhaps most importantly, 95 percent of all survey respondents said that WSDOT should continue to collect and distribute travel congestion information.

Use of the New Tacoma Congestion Web Pages

Only 38 percent of the survey respondents (31 people) reported noticing the new travel time information on the Tacoma/Olympia congestion web page (as opposed to the basic congestion map, which contained the link to the project survey). Of those who had seen the travel time page, 46 percent (eleven people) said they thought the travel times presented on the page were accurate. Eleven people described the travel times as “sometimes, but not always accurate.” Two people who had seen the new travel time information thought the travel times were not accurate.

The biggest issue with the travel time page seemed to be the lack of users noticing it, or at least the update to it. Six users provided comments on the travel time page, and their feedback was generally positive about the information provided. One specific comment was that “it is better than the map,” while a few others stated that they only glanced at it briefly while taking the survey but believed it was a “good idea.”

Information Delivered During the Trip

An overwhelming 92 percent (74 people) of individuals responding to the survey question reported that they looked for congestion information before they began their trip, whereas 39 percent of the people responding to the question asking when they typically got their traveler information said that they obtained traffic congestion information during their trip. Respondents were allowed to answer more than one time to this question. Only four respondents stated that they typically looked for travel information during the trip and did not list a second time period. Most respondents that look for information during their trip, also look for information prior to making their trip.

If the analysis is restricted to only those individuals who indicated that they looked for information while already on their trip (34 people), 69 percent of them got information through the radio, 25 percent of them used their cell phone to call 511, 41 percent used a smart phone application, and 34 percent used the information from WSDOT’s variable message signs (VMS). Note that respondents were allowed to select all types of information sources, not just their primary source, so percentages add up to more than 100.

For the respondents who reported that they did *not* obtain traffic information during the trip (50 people), only 2 percent reported that they used their cell phone to call

511 to obtain information, 18 percent used a smart phone app, 58 percent listened to the radio for traffic information, 48 percent used their home computer to get information from the Internet, 44 percent used their office computer, and 24 percent got information from WSDOT's variable message signs.

Effects of Traveler Information on Travel Behavior

A key question about traveler information is whether obtaining information actually affects travel behavior. Of the 82 respondents to this survey question, only seven (8 percent) reported not making changes to their trips as a result of information they received about congestion. The other 92 percent said they were willing to make some type of change, although 36 people (44 percent) reported that they rarely made those changes.

Travelers who reported seeking information both before and during their trips had types of travel behavior changes reasonably similar to those who reported seeking information only before making a trip. For users who got information during their trip, 50 percent said they made adjustments to their trip, 41 percent said they rarely made adjustments, and 9 percent said they made no adjustments.

Surprisingly, *when* respondents get the information makes no real difference in the likelihood of whether they will make trip changes. (Note that 70 respondents reported getting information before a trip, more than twice as many as the 29 who reported getting information during a trip, and obviously some respondents reported collecting information at both times.) This similarity is partly explained by the changes respondents indicated they would make. The primary change respondents reported making after receiving information was a route change: 83 percent (58) of those who reported obtaining congestion information before leaving on a trip said they made route changes, and 86 percent (25) of those who reported obtaining congestion information during a trip said they made route changes.

The second most reported response to congestion information was a change in the timing of a trip: 61 percent of the 82 respondents to this question indicated that, to avoid congestion, they would leave at a different time. This result was not significantly affected by whether that person also looked for information mid-trip.

To ensure arrival on time at a destination, 36 percent of respondents to this question indicated that they would shift their departure time. In contrast to the general willingness to shift routes to avoid congestion, those who looked for congestion information during their trip reported being slightly more likely to leave at a different time to ensure on-time arrival (44 percent) than those who looked for information only before they left (34 percent). This indicates that the need for an on-time arrival does encourage more in-vehicle use of traveler information.

Table 1 shows the differences between respondents' willingness to change their travel behavior in relation to when they obtained travel information.

Table 1: Travel Behavior Changes in Relation to Information Obtained Before versus During Trips

| Travel Behavior Change | Respondent Obtained Information Before the Trip | Respondent Obtained Information During the Trip |
|---|---|---|
| Change routes | 83% | 86% |
| Leave at a different time to avoid congestion | 61% | 66% |
| Leave early to arrive on time | 34% | 44% |

Only six survey respondents indicated that they changed mode (five to transit, one to bike) on the basis of receiving traveler information. This low level of mode shift is likely affected by the general lack of good modal alternatives for many trips in the corridor covered by the Tacoma/Olympia travel information page.

In looking specifically at the use of 511, 28 percent of those who said that they made changes in their travel plans as a result of obtaining congestion information (22 people) had used the 511 system. The percentage of 511 use was the same among those who reported rarely making changes to their travel plans.

Table 2: Willingness to Change Travel Behavior in Relation to Use of 511

| | Change Route, Time of Travel or Mode | Rarely Change Route, Time of Travel or Mode | Do Not Change Route, Time of Travel or Mode |
|-------------------|--------------------------------------|---|---|
| Have used 511 | 28% | 28% | 14% |
| Have not used 511 | 15% | 25% | 0% |
| Did not respond | 56% | 47% | 86% |
| Total | 100% | 100% | 100% |

Use of Alternative Information Sources

In addition to the WSDOT website, travelers reported using a variety of other sources of traffic congestion information. Table 3 shows the additional sources from which respondents reported getting their information. Of the 84 survey participants, 80 responded with at least one alternative source of information.

Table 3: Summary of Other Information Sources Used

| Information Source | Number of Responses | Percentage of Responses |
|--|---------------------|-------------------------|
| Variable message signs (VMS) | 23 | 27% |
| Smart phone app | 22 | 26% |
| Cell phone (call 511) | 9 | 11% |
| Conventional land line phone (call 511) | 2 | 2% |
| Alternative website on home computer (Internet browser) | 41 | 48% |
| Alternative website on office computer (Internet browser) | 40 | 47% |
| Portable or installed geographic positioning system (GPS) (e.g., TomTom, Garmin) | 9 | 11% |
| Radio | 51 | 59% |
| TV | 23 | 27% |
| Other | 11 | 13% |

Although the provided list of information sources was extensive, respondents offered even more options through the “Other” response category. One person reported using an “iPad with 3G,” two others reported using Twitter, one got information in the

form of emails from coworkers, and yet another reported “watching the highway.” Radio remains a heavily used resource for traffic information. Of the nine people who reported having a GPS, seven of them still said they used the radio as an alternative source of information. The survey also revealed that 511 users were more likely to tap other services (64 percent) than those who had not used 511 (53 percent).

Between the 39 respondents who reported making travel changes and the 36 who reported “rarely” making those changes, relatively little difference was observed in “other services used.” The most significant differences were that “rare” travel changers were more likely to own a GPS system (19 percent versus 5 percent) and slightly more likely to use a smart cell phone app (31 percent versus 23 percent). However, these findings have low statistical significance because of the relatively low sample size.

With privately collected travel information becoming routinely available through Internet mapping services, travelers access not only turn-by-turn directions but also estimates of current travel times for the exact routes they plan to take. With that in mind, the survey asked which, if any, mapping services respondents used to obtain traffic congestion information. Just under half of the survey respondents (40) indicated that they obtained traffic information from the major Internet map services. Of those 40, 80 percent (32 people) reported using Google Maps, 27.5 percent Mapquest, 15 percent Bing, and 10 percent Yahoo , as shown in Figure 1. (Note that respondents could indicate the use of more than one mapping service.)

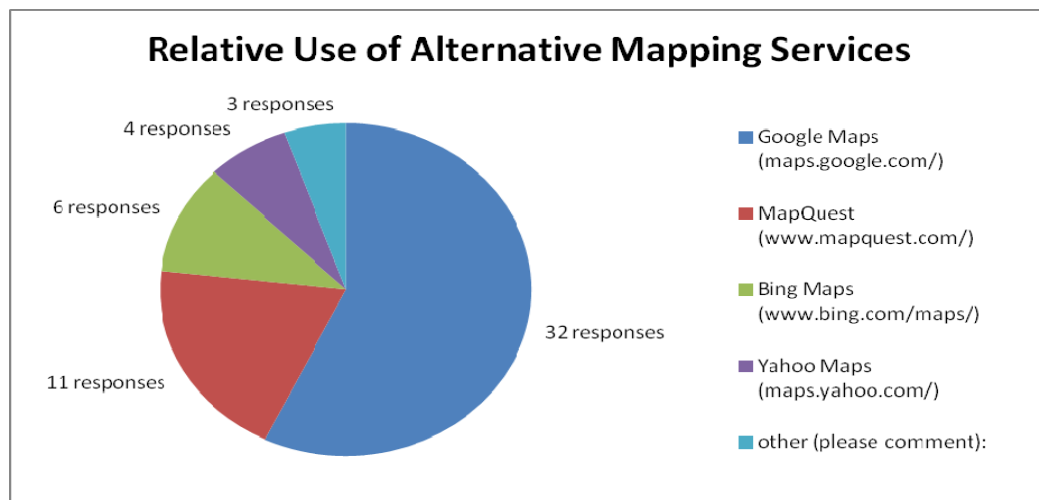


Figure 1: Relative Uses of Alternative Mapping Services

Use of 511

While a large percentage of survey respondents were aware of changes in WSDOT's Tacoma/Olympia area travel information, only 45 percent of respondents (37 people) were aware that information could be received by using 511. Of the 37 respondents who knew about 511, only 22 had actually used the 511 service; that is, only 26 percent of the 84 people taking the on-line survey reported using 511. An even smaller 10 percent of all respondents (nine people) reported using 511 as an alternative to the WSDOT website. This suggests that the 511 system is largely underutilized—at least by those people who actively use the WSDOT website.

Of the 22 participants who reported having used 511, two individuals said they commonly used it as a method to obtain travel information. One potential reason that reported 511 use was so low may have been that—by survey selection—these respondents obtained congestion information on their computers, while 511 may be used more frequently by individuals with phone access but not good Internet access. In addition, there are now laws against the use of cell phones while driving, which potentially limited the use of the 511 telephone service by this group. It is possible that, if this survey had been restricted to individuals with more limited access to the Internet but with access to basic phone service, 511 use may have been higher.

Only 37 percent (32 people) of all survey respondents said that they sought information about traffic congestion *during* their trip, indicating that a majority of participants did not use their cell phones for accessing 511 while traveling. Conversely, 87 percent of all survey participants (75 people), some of whom also got information in the midst of their trip, reported that they looked up information on traffic congestion just before they started their trip. So another issue is that if 511 is not as fast as the Internet or a cell phone app for obtaining information before the trip start, then its use will be more limited than other, more convenient applications. (One specific comment complained about how slow 511 was as part of an explanation for why they did not use 511 to get traffic information.)

While 22 respondents said they had used the 511 system, only eleven selected “511” as one of the traffic information systems they used for obtaining traffic congestion information. Nine of those who said they used 511 also said they called it with a cell

phone (as opposed to a land line), which suggests that they may call 511 at least sometimes while traveling.

Travel Behavior Changes and User Trust in the Congestion Information

This section examines the extent to which users’ expressed confidence in the WSDOT website’s usefulness or accuracy had any relationship to their reported willingness to change their travel behavior.

69 percent (50 people) of the survey respondents said that the WSDOT website is useful, and an additional 26 percent (19 people) said the WSDOT site is useful “sometimes, but not always.” Ten individuals provided comments—usually about parts of the system that were not functioning as they desired—instead of responding to the question. Only three respondents said that the website was not useful.

52 percent of respondents (31 people) who noticed the addition of the new traffic data on the WSDOT website reported that the WSDOT website information is accurate, while an additional 42 percent (25 people) said the information is accurate “sometimes, but not always.” The perception of the accuracy of the WSDOT website data was essentially the same for those who did not notice the addition of the new information. These different levels of confidence were compared with the survey respondents’ reported willingness to change their travel behavior. Table 4 shows whether respondents were willing to change travel plans in relation to whether they found the WSDOT website useful or accurate.

Table 4: Trust in the Data versus Willingness to Change Travel Behavior

| | Change Route, Time of Travel or Mode | Rarely Change Route, Time of Travel or Mode | Do not Change Route, Time of Travel or Mode | Total |
|---|--------------------------------------|---|---|-------|
| WSDOT website useful | 48% | 48% | 4% | 100% |
| WSDOT website sometimes useful | 47% | 37% | 16% | 100% |
| WSDOT website accurate | 48.6% | 48.6% | 3% | 100% |
| WSDOT website sometimes but not always accurate | 44% | 41% | 15% | 100% |

Table 5 presents data on the types of travel changes that respondents were willing to make in relation to their trust in the data. As with Table 4, the respondents' responses to the accuracy and usefulness of data were used as surrogates for trust in the data. One finding shown in the Table 5 is that regardless of the travelers' faith in the congestion information they obtained, they were more likely to change routes than change their time of departure. The other result that stands out is that the less they trusted the information they received, the more likely they were to leave early in order to arrive on time, whereas the more they trusted the data, the more likely they were to change routes or departure times in order to avoid congestion.

Table 5: Types of Travel Behavior Changes versus Trust in Website Data

| Travel Behavior Change | WSDOT Website Useful | WSDOT Website Sometimes Useful | WSDOT Website Accurate | WSDOT Website Sometimes But Not Always Accurate |
|---|----------------------|--------------------------------|------------------------|---|
| Change routes | 82% | 68% | 89% | 59% |
| Leave at a different time to avoid congestion | 60% | 53% | 59% | 53% |
| Leave early to arrive on time | 30% | 47% | 27% | 41% |

It is also possible to explore whether the likelihood that a respondent reported seeking other information sources increases with a lack of trust in WSDOT's website data. Of the 37 respondents who said they think thought website was accurate, 48 percent also reported using other mapping services. Of the 34 respondents who said the website was "sometimes but not always accurate" or provided a comment with a similar meaning, 44 percent (15 people) reported using other map-based congestion information services. Two of the four individuals who stated that the WSDOT site was not accurate used other map-based information systems. The conclusion is that the perception that the WSDOT website is accurate has little effect on whether an individual seeks traffic congestion information on other Internet-based map services.

Other Factors Possibly Affecting Respondents' Attitudes toward Data Accuracy

The assumption can be made that an individual who has access to an independent GPS device has a stronger than average interest in traffic information. Cross-tabulations were performed to determine whether having access to a GPS device had a relationship to respondents' attitudes toward the accuracy of WSDOT website data. The analysis found no significant relationship, with similar percentages of respondents with and without a GPS reporting similar opinions about the website's accuracy. Of the 84 total respondents, only nine reported having an independent GPS device. Of those nine, five (55 percent) said that the WSDOT website is accurate, as did 44 percent of the rest of the survey respondents who answered the accuracy question. 33 percent of those with a GPS and 40 percent of those without reported the website to be "sometimes accurate." One of the nine with GPS and only three of the 72 without a GPS said the website is inaccurate. These results are shown in Figure 2.

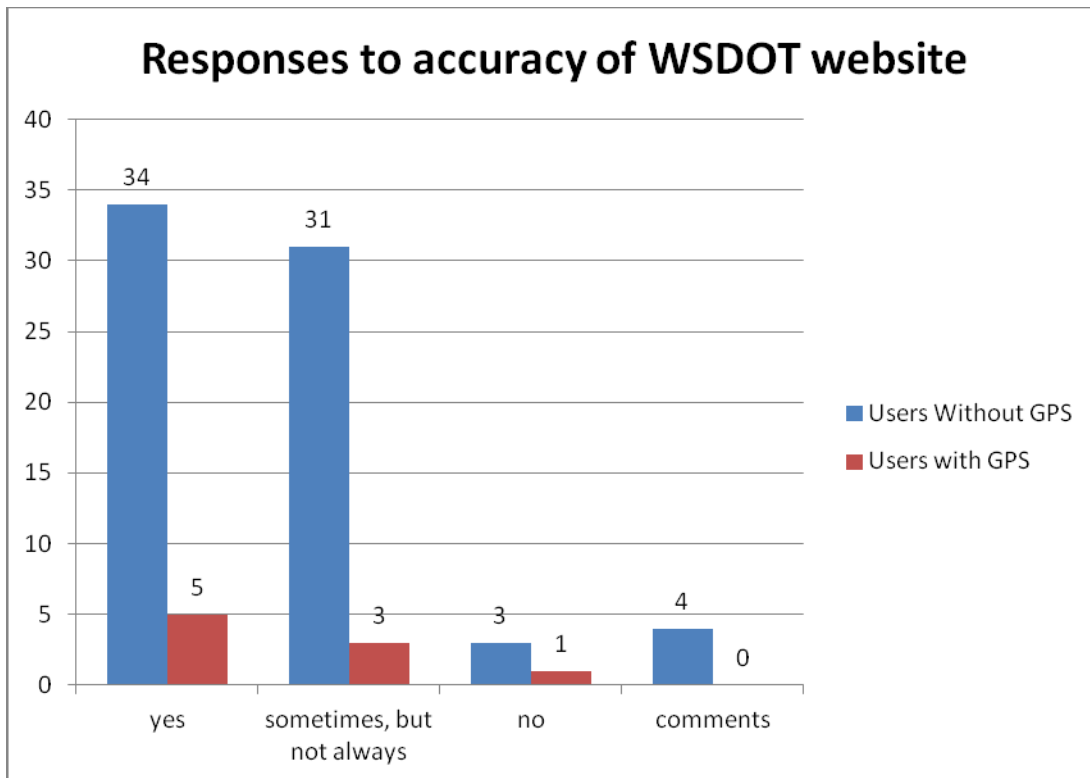


Figure 2: Opinions about the Accuracy of the WSDOT Website Information in Relation to Owning a GPS Device

The authors also decided to investigate whether users’ perceptions of data accuracy changed if they used the travel time page as well as the main WSDOT congestion map display page. (That is, would the provision of a number—a current travel time—affect the perception of accuracy of the user?) Only 31 people reported seeing the Olympia-Tacoma travel time Web page. An analysis was conducted for the users of the travel time page, comparing their perceptions of the accuracy of the main congestion map with their perceptions of the accuracy of the travel time statistics. The results are shown in Table 6. In general, there was a strong correlation between the perceptions of accuracy between the two display mechanisms. For example, everyone who described the travel time information as accurate also described the congestion map information as accurate, and those who reported the travel times as not accurate said the same thing about the map information. A slightly higher percentage of respondents thought the map display was more accurate than the travel time information, in comparison to those who thought the travel times were more accurate than the map, but given the fairly small sample size, it is difficult to draw conclusions about whether the method used to display congestion information actually alters a user’s perception of its accuracy.

Table 6: Travel Time Information Accuracy versus Website Information Accuracy

| | | Travel Time Information | | | |
|---------------------------|-----------------------------------|-------------------------|-----------------------------------|--------------|----------------------|
| | | Accurate | Sometimes but Not Always Accurate | Not Accurate | Other or No Response |
| WSDOT Website Information | Accurate | 9 | 5 | 0 | 3 |
| | Sometimes but not always accurate | 2 | 6 | 0 | 3 |
| | Not accurate | 0 | 0 | 2 | |
| | Other or No Response | 0 | 0 | 0 | 1 |

SUMMARY

The Internet survey of WSDOT congestion information showed considerable support for WSDOT's continued efforts to collect and report traffic congestion information to travelers. 95 percent of survey respondents said they support WSDOT's continued efforts to collect and distribute traveler information. Survey respondents had a generally positive attitude toward the accuracy of the information WSDOT provides, with 95 percent stating that the data were either "accurate" or "sometimes, but not always accurate." This indicates that travelers do notice equipment failures and other causes of inaccurate congestion reports but continue to value the information they receive despite its limitations.

Survey respondents also reported using a wide variety of other traveler information sources. Many use modern smart phone technology, but a large percentage of users continue to use traditional information sources such as radio traffic reports and WSDOT's variable message signs.

Finally, a significant percentage of users indicated that they made travel changes in response to the information they obtained. More than 45 percent indicated they changed route or time of travel as a result of congestion information, and another 40 percent said they made changes but only under extreme conditions. These figures show that, if used correctly, information can affect travel behavior in ways that can result in overall decreases in traffic congestion and improvements in public mobility and satisfaction.

APPENDIX

COPY OF THE WEB SURVEY

Introductory Material Presented to Recruit Subjects

WSDOT is gathering information on the use of traffic congestion information in the Tacoma and Olympia areas. Your survey responses are anonymous. The survey will take only about 2 minutes.

The Survey

1) Did you notice changes in the past 6 months to the roadway congestion and travel information available for highways between Tacoma and Olympia on the WSDOT Web site?

Yes / No / No response

2) Is the information on the WSDOT site useful?

Yes / Sometime, but not always / No / No response (Comments allowed)

3) Is the information on the WSDOT site accurate?

Yes / Sometime, but not always / No / No response (Comments allowed)

4) Did you know that you can receive congestion information by dialing 511 from any phone or by visiting the Web at <http://511.org>?

Yes / No / No response

5) Have you ever used the 511 system? [Only asked if (4) is Yes]

Yes / No / No response

6) Have you noticed the new travel time page for the Tacoma and Olympia areas on WSDOT's web site? (<http://wsdot.wa.com/traffic/traveltimes/default.aspx>)

Yes / No / No response

7) Is the travel time information on the WSDOT site accurate? [Only asked if (6) is Yes]

Yes / Sometime, but not always / No / No response (Comments allowed)

8) Besides the WSDOT web site, how do you obtain travel information? (Check all that apply)

Variable message signs (VMS)

Smart phone app

Cell phone (call 511)

Conventional land line phone (511)

Home computer

Portable or installed geographic positioning system (e.g., Tom Tom, Garmin)
Radio
TV
Other (comment)

9) Besides WSDOT's site, which – if any - of these sites do you use to get traffic congestion information?

GoogleMaps
BINGmaps
Mapquest
Yahoo Maps
Other (comment)

10) When do you typically obtain traffic congestion information?

just before I start my trip
more than a day before starting my trip
during my trip
comments

11) Do you ever change your route, time of travel, or mode of travel (e.g., car, bus, bike) based on the traffic condition information you receive?

Yes
Yes, rarely. For example, only when it is very congested
No
comments

12) What kind of changes do you make? (answer all that are true)

I take different roads to avoid congestion
I leave at a different time than I originally planned to avoid congestion
I leave at a different time than I originally planned to make sure I arrive on time
I take transit
I ride my bike or walk
comments

13) Should WSDOT continue to collect and distribute traffic congestion information?

Yes / No / No response