

COMPARATIVE EVALUATION OF AUTOMATED WIND WARNING SYSTEMS

Showcase Evaluation #15

Technical Memorandum 1: Motorist Survey Results

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GLOSSARY OF ABBREVIATIONS

| | |
|-----------|---|
| AADT | Annual Average Daily Traffic |
| ATIS | Advanced Traveler Information Systems |
| AWWS | Automated Wind Warning Systems |
| Caltrans | California Department of Transportation |
| CMS | Changeable Message Sign |
| COATS | California/Oregon Advanced Transportation Systems |
| FHWA | Federal Highway Administration |
| ITS | Intelligent Transportation Systems |
| MOE | Measures of Effectiveness |
| MP | Mile Post |
| NB | North Bound |
| ODOT | Oregon Department of Transportation |
| RWIS | Road Weather Information Systems |
| SB | South Bound |
| SRRA | Safety Roadside Rest Area |
| TripCheck | ODOT Traveler Information Website |
| VMS | Variable Message Sign |

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1. INTRODUCTION

One challenge facing rural travelers is weather hazards that produce adverse driving conditions at isolated locations. One such hazard is sustained high winds that can cause high-profile vehicles such as recreational or commercial vehicles to overturn, and lower-profile vehicles to leave their lanes, jeopardizing motorist safety. Since wind conditions and patterns are defined significantly by local topography, there is limited ability to mitigate the impacts of wind through improved roadway design. Warning the drivers of impending cross winds well in advance and measures to reduce operational speeds are other options explored by transportation professionals.

To address localized high cross wind challenges, the Oregon and California Departments of Transportation (ODOT and Caltrans, respectively) have used intelligent transportation systems (ITS) installations to alert motorists of dangerously windy conditions automatically. The warning messages are displayed to drivers at locations where they can stop and wait until the winds die down or where they can decide to take a longer alternate route. More details on three such automated wind warning systems (AWWS), all of which are located in the rural California/Oregon Advanced Transportation Systems study area, are provided in the following sections.

1.1. South Coast System

ODOT has installed an AWWS on US Route 101 between mileposts (MP) 300.10 and 327.51. This part of the highway from Port Orford to Gold Beach has been identified as a high wind area. The ODOT ITS Unit designed a system that uses a local wind gauge (anemometer) to monitor wind speeds near Humbug Mountain. Prior to implementation of the system, when high winds were detected, maintenance personnel drove to Gold Beach (MP 330) and Port Orford (MP 300) to flip up folded signs that read “CAUTION HIGH WINDS NEXT 27 MILES WHEN FLASHING” and turn on a flashing beacon to warn traffic about windy conditions. The employee would patrol the highway until the winds subsided, and then manually turn off each sign. This system had a high maintenance cost, required a 60-mile round trip to Gold Beach, and was not timely enough.

This process has now been automated. Currently, this system consists of an anemometer that provides continuous input to the controller connected to a flashing beacon on static warning signs located at either end of the corridor. Communication to the two warning signs is automated and is provided using dial-up telephone links. Motorists are informed when average winds of speeds higher than 35 mph are recorded over a given time interval (e.g. 2 minutes). This enhancement has also enabled an automated creation of an instance of severity 0 (zero) incident (for wind speeds between 35 and 80 mph) or a severity two incident (for wind speeds greater than 80 mph) in Oregon’s Highway Travel Conditions Reporting System (HTCRS). This incident in HTCRS is then verified by the Traffic Operations Center (TOC) staff. When verified by the TOC staff, the HTCRS warning is posted on ODOT’s TripCheck web site.

Project implementation was motivated by the many potential benefits, including equipment cost savings, elimination of unnecessary and possibly unsafe travel by ODOT personnel, and more rapid detection and notification of high-wind conditions, which would improve safety in the corridor.

1.2. Yaquina Bay Bridge System

The second AWWs in Oregon was installed on Yaquina Bay Bridge (US Route 101) between mileposts 141.27 (SB) and 142.08 (NB). ODOT has had a manual process for measuring gusts in the vicinity of the bridge and providing warnings to the public. When gusts or sustained high winds were present, an employee went to the site with a portable anemometer and, if windy conditions were verified, unfolded static warning signs on either end of the bridge. Crossing the bridge to reach the other sign (and then coming back) presented a safety risk for the employee charged with this task.

To avoid the safety risks and to improve operations, ODOT has automated the posting of high-wind warnings. The proposed system originally consisted of a local wind gauge connected to small variable message signs (VMS) located at either end of the corridor with different levels of warning. Due to lack of available funding, the current system uses a static sign that reads “Caution High Winds on Bridge When Flashing” and flashing beacons installed on top of the signs. The signs are located to provide sufficient warning for drivers to be able to turn around on existing roads under either end of the bridge. Although the current signs display a fixed message, the system records two different warning levels. Proposed warnings for each range of sustained wind speeds are shown in Table 1-1. This system also defines the severity of the incident. This severity is automatically recorded in HTCRS, and is then verified by the Traffic Operations Center (TOC) staff. When verified and accepted by TOC staff, a warning message is automatically posted on ODOT’s TripCheck Web site. Faxes are also sent manually to other agencies, and maintenance staff are also notified automatically via pager and / or email. The sign is deactivated when the average wind speed goes below 25 mph. This system will archive data including wind speed, and date and time of warning postings.

Table 1-1: Warning Messages for Yaquina Bay System

| Average Wind Speed Range | Warning Message | HTCRS Severity Level |
|--------------------------|-----------------|----------------------|
| 35 to 80 mph | Pending Closure | 1 |
| Over 80 mph | Closure | 2 |

1.3. Interstate 5 System

Caltrans has installed a set of changeable message signs (CMS) on Interstate 5 in Siskiyou County between postmiles 13.2 (Weed) to 45.3 (Yreka). Currently there are static signs with no flashing beacons at both the locations indicated above. The static signs are not responsive to real-time weather conditions and they make less of an impression on the drivers, because they display a message of caution irrespective of wind speeds.

Caltrans has been providing high wind warning messages through two CMS: one just south of the Yreka interchange (PM 45.3) and the other at the Abrams Lake over-crossing (PM 13.2) for the southbound and northbound traffic, respectively. There is a weather station installed at the northbound Weed Safety Roadside Rest Area at PM 25.7 to make the system responsive to

conditions on a real-time basis. Caltrans is in the process of automating the activation of warning messages through these CMS signs. The CMS also allow greater flexibility in message sets, including the ability to report specific levels of warning, or the actual wind speed.

Table 1-2 summarizes the different characteristics of these three systems. All three systems are currently active. The two systems on US 101 in Oregon are automated, while the system on Interstate 5 in California is operational but not fully automated.

Table 1-2: Summary of Wind Warning System Characteristics.

| Characteristics of the System | AWWS at Yaquina Bay Bridge, OR | AWWS at South Coast, OR | 5, Siskiyou County, CA |
|---|--|-----------------------------------|--|
| Flashing/Non-Flashing | Flashing | Flashing | CMS |
| Static/Dynamic | Static (to be upgraded to CMS) | Static | Dynamic (CMS) |
| Message sent to sign (manual / automated) | Automated | Automated | Manual (To Be Automated in 2005) |
| Message posted on Web (manual / automated) | Semi - Automated | Semi - Automated | N/A |
| Archiving of the Wind Data | Yes | Yes | No |
| TOC notification of sign activation (manual / automated) | Automated | Automated | To be Automated |
| TOC notification of wind data (manual / automated) | Automated | Automated | Automated |
| Location of signage | US Route 101, MP 141.27 (SB) and 142.08 (NB) | US Route 101, MP 300.10 to 327.51 | Interstate 5, PM 13.2 to 45.3, Siskiyou County |

These systems represent innovative applications of ITS in a rural environment; consequently, it is important to know whether these systems are effective in improving user safety and the quality and dissemination of traveler information. It is also important to identify other benefits such as DOT personnel time savings due to automation of some of the processes. The evaluation focused on the two systems in Oregon, because these two systems were fully automated and operational prior to the high wind season of 2003-04 (i.e. November 2003 – March 2004). The AWWS on Interstate 5 in California is not expected to be fully automated before December 2005.

The goals of the automated wind warning systems (AWWS) deployed in Oregon are threefold:

- Improve the safety and security of the region’s rural transportation system
- Provide sustainable advanced traveler information systems that collect and disseminate credible, accurate “real-time” information
- Increase operational efficiency and productivity focusing on system providers

To identify potential benefits, the automated wind warning systems in Oregon are being evaluated against the measures of effectiveness (MOE) shown in Table 1-3. The ones that are focused on the overall evaluation of these systems are as follows.

1. Reduction in wind induced accident frequency and severity

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2. Traveler awareness of these systems
3. Traveler perception of the usefulness of these systems
4. Traveler perception of the reliability of the system
5. System accuracy
6. Other operational cost savings

A motorist survey was conducted to evaluate MOEs 2, 3 and 4 as listed above. The survey responses were analyzed and the results of this analysis will be used to document the effectiveness of these automated wind warning systems (AWWS) in Oregon, to improve the quality and timeliness of high wind warning and to increase traveler awareness of these systems. This technical memorandum provides details on the motorist survey part of the evaluation. Chapter 2 describes the survey instrument design and distribution methods used. Chapters 3 through 8 present the analysis results of various aspects of the motorist survey, namely demographic and travel characteristics, motorist perception of high winds and high wind forecast, system awareness and functionality of AWWS. Chapter 9 summarizes the conclusions from this analysis.

Table 1-3: Goals, Objectives and Measures of Effectiveness

| Goal | Objective | Potential Measures of Effectiveness | Data Source |
|--|---|---|------------------|
| Improve the safety and security of the region's rural transportation system | Improve the safety of high profile vehicles | <ul style="list-style-type: none"> ▪ Crash frequency for high profile vehicles ▪ Crash severity for high profile vehicles | Crash Data |
| | Improve safety of lower profile vehicles | <ul style="list-style-type: none"> ▪ Crash frequency for all vehicles ▪ Crash severity for all vehicles | Crash Data |
| Provide sustainable traveler information systems that collect and disseminate credible, accurate "real-time" information | Improve the motorist information on severe weather conditions | <ul style="list-style-type: none"> ▪ System usage by motorists ▪ Awareness of system among motorists | Motorist Survey |
| | Improve motorist acceptance and perception | <ul style="list-style-type: none"> ▪ Sign clarity ▪ Message credibility and reliability | Motorist Survey |
| Increase operational efficiency and productivity focusing on system providers | Improve staff operations efficiency | <ul style="list-style-type: none"> ▪ Savings in personnel time ▪ Reduction in the time to post a message | Maintenance Logs |
| | System reliability | <ul style="list-style-type: none"> ▪ Number of full system outages ▪ Number of partial system outages | Maintenance Logs |
| | Improving emergency response | <ul style="list-style-type: none"> ▪ Information sharing | Kick Off |

2. SURVEY DESIGN AND DISTRIBUTION

The motorist survey design, its evolution over time, means of distribution, and analytical techniques are described below. Subsequent sections detail the results of these surveys.

2.1. Survey Design

The specific objectives of the motorist surveys were to assess user perception of high cross winds as a safety hazard, user awareness of the warning systems at these locations, user reaction to wind warning messages, and the accuracy and usefulness of the AWWS. The survey solicited the following types of information.

- Traveler characteristics
- Traveler perception of high winds as a hazard
- Traveler awareness of AWWS
- System functionality and
- Demographic information

Three types of response options were used throughout the surveys: multiple-choice, ordinal ratings and open-ended questions. For the rated responses (ordinal ratings), survey respondents were instructed to select values from 1 to 5 that they felt best represented their behavior or opinion regarding a particular topic. The ordinal nature of such a scale allows conclusions to be drawn on a relative basis only. Numerical differences between response values can not be quantified because each respondent's assessment and understanding of the intervals between the response categories will vary. In general, results from specific questions on this survey are qualitative and are intended to measure the performance of the AWWS or make general improvements and modifications to the wind warning systems in the COATS region.

2.2. Survey Methodology

A questionnaire format was developed based on the set of information that the research team desired to collect from survey respondents. This questionnaire was slightly modified for the two locations to include details on the corresponding location. These survey questionnaires are shown in Appendix A. This survey was targeted to travelers who are likely to travel through either of the two wind warning system locations in Oregon. Based on input from ODOT personnel, it was assumed that motorists who drive on Yaquina Bay Bridge are likely to be the residents of Newport and other communities in Lincoln County. The AWWS between Port Orford and Gold Beach (Wedderburn) covers a stretch of 27 miles of US Route 101. The travel pattern on this corridor suggests that most of the travel on this corridor is by the residents of Coos and Curry Counties in Oregon.

The research team determined that the best method of survey distribution for evaluating the systems in Oregon was to send survey questionnaires by mail and receive the responses through a postage paid envelope provided along with the survey questionnaire. More details on the reasons for choosing this method of distribution can be found in the survey plan document ([1](#)).

The survey questionnaires were mailed out in May 2004, because the wind events are most frequent in November to March season. The research team wanted the respondents to be able to easily recollect high wind experience to answer the relevant questions.

To improve the rate of response, incentives were used. Survey respondents were given an opportunity to request a copy of the results and a chance to enter a \$100 drawing. Two winners were selected from respondents to questionnaires for each system.

Drivers of commercial or high-profile vehicles would likely be more concerned about high wind conditions; therefore, these respondents were targeted separately through a list of trucking companies with the help of Oregon Motor Carrier Transportation Division. Identical survey instruments were used for trucking companies and the general public; consequently, their responses were combined in the analysis.

Response rates are shown for each survey in Table 2-1. The desired number of responses shown in Table 2-1 was calculated based on the assumption that the expected response proportion of “yes” and “no” for a question with two answer options would be 50 percent. The desired number of responses was also for a confidence level of 95 percent and a confidence interval of 5 percent (i.e. the results of the survey have an accuracy of ± 5 percent). These assumptions resulted in a more conservative estimate of the desired number of responses. It can be seen that the number of responses was only 343 for the South Coast survey, which was less than the desired number.

Table 2-1: Survey Distribution Locations and Response Percentages

| System Location | Counties | Surveys Distributed | | | Survey Responses | Responses Desired | Pct. |
|-----------------|-----------------|---------------------|----------|-------|------------------|-------------------|------|
| | | Motorists | Truckers | Total | | | |
| Yaquina Bay | Lincoln | 2,200 | 200 | 2,400 | 407 | 384 | 17 |
| South Coast | Coos Bay, Curry | 2,200 | 200 | 2,400 | 343 | 384 | 14.3 |

Table 2-2 shows minimum sample sizes for different confidence intervals and various expected response proportions. The minimum required number of responses is estimated to be 267 for a 95 percent confidence level and a 6 percent confidence interval. The actual number of responses obtained for the South Coast system (i.e. 343) is higher than both the 323 responses required when the proportion of “yes” responses is 0.7 and the confidence interval is 5 percent, and the 267 responses required when the proportion of “yes” responses is 0.5 and the confidence interval of 6 percent. The analysis results presented below are all statistically valid because of the fact that the number of answer options for most of the questions in the survey was more than the assumed number of response options of two (“yes” or “no”), and the actual number of responses is higher than the minimum required number of responses for a “yes” response proportion of 0.7 and a confidence interval of 6 percent.

Table 2-2: Number of Desired Responses for 95 Percent Confidence Level

| Confidence Level | | Expected Response Proportion of "Yes" | Expected Response Proportion of "No" | Confidence Interval | Number of Desired Responses |
|------------------|-------------|---------------------------------------|--------------------------------------|---------------------|-----------------------------|
| | t | p | q | d | N |
| 95% | 1.96 | 0.5 | 0.5 | 0.03 | 1,067 |
| | 1.96 | 0.5 | 0.5 | 0.04 | 600 |
| | 1.96 | 0.5 | 0.5 | 0.05 | 384 |
| | 1.96 | 0.6 | 0.4 | 0.05 | 369 |
| | 1.96 | 0.5 | 0.5 | 0.06 | 267 |
| | 1.96 | 0.5 | 0.5 | 0.07 | 196 |
| | 1.96 | 0.5 | 0.5 | 0.08 | 150 |
| | 1.96 | 0.7 | 0.3 | 0.05 | 323 |
| | 1.96 | 0.8 | 0.2 | 0.05 | 246 |

2.3. Analysis

The responses were analyzed using various summary statistics, including percentages, frequencies, and means. Tabular results are detailed in Appendix B. To provide insight into differences between survey responses, t-statistic and chi-square analyses were used.

Respondents had the option of responding to the survey by answering only a partial set of questions from the questionnaire. Percentages are based on the total number of survey respondents, so there was a need for an “unknown” or “no response” category for each question. In addition, if more than one option was selected for questions requiring only a single response; all responses from that individual to that particular question were omitted from the statistical analysis. This was done to avoid biasing the results by arbitrarily choosing which option among several selected by the respondent was to be included. Failure to comply with written instructions on the survey form also resulted in omission of that respondent’s particular response from the data analysis (e.g. adding a response option of their own).

2.4. Comparative Analysis

Differences in responses for each demographic group were investigated between respondents in selected demographic categories using the chi-square analysis. The analysis was performed on all responses with respect to specific demographic characteristics.

Typically, the hypothesis tested with chi-square analysis is *whether or not two different samples are different enough in some characteristic or aspect of their behavior* that we can generalize that the populations from which our samples are drawn are also different in the behavior or characteristic.

The results of chi-square analyses are summarized in Appendix C. It should be noted that an “association” observed as the result of a chi-square test does not equal “causation”; an observed relationship between two variables is not necessarily causal.

3. DEMOGRAPHIC CHARACTERISTICS

Demographic questions were asked to investigate whether there were any significant differences in the responses for different demographic groups.

The chi-square analysis compared responses to particular questions with respect to each demographic category. Tables in the later sections of this document show the questions that were analyzed using the chi-square analysis. These tables show where the chi-square analysis passed, where it was invalid due to lack of spread and where differences in responses were found.

3.1. Residence (Zip Code)

Respondents were asked for the zip code of their primary residence. Figure 3-1 and Figure 3-2 show the distribution of the respondents among different zip codes in the region for South Coast System and Yaquina Bay System, respectively. The “Others” category includes all the zip codes which had eight or fewer respondents.

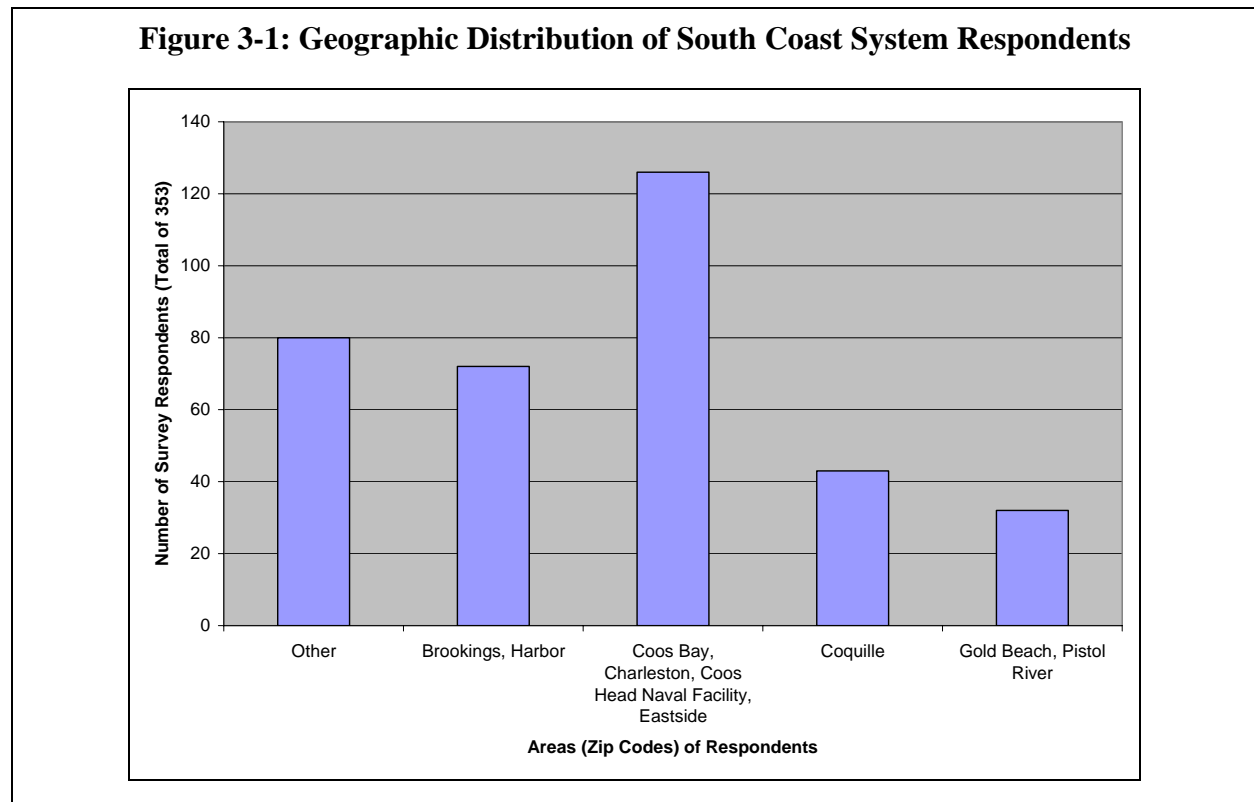
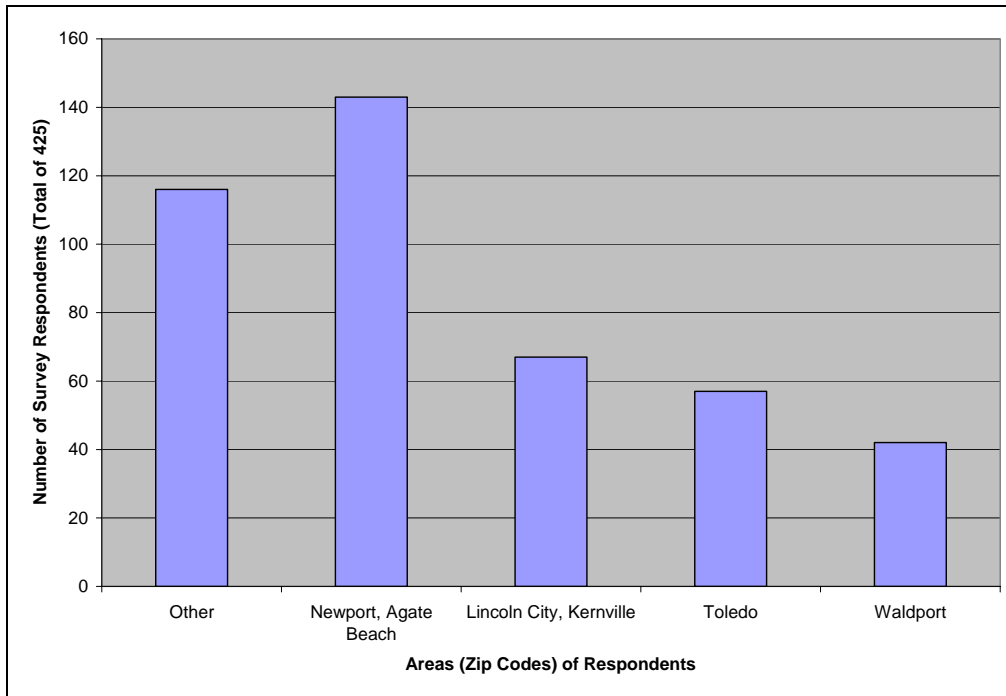
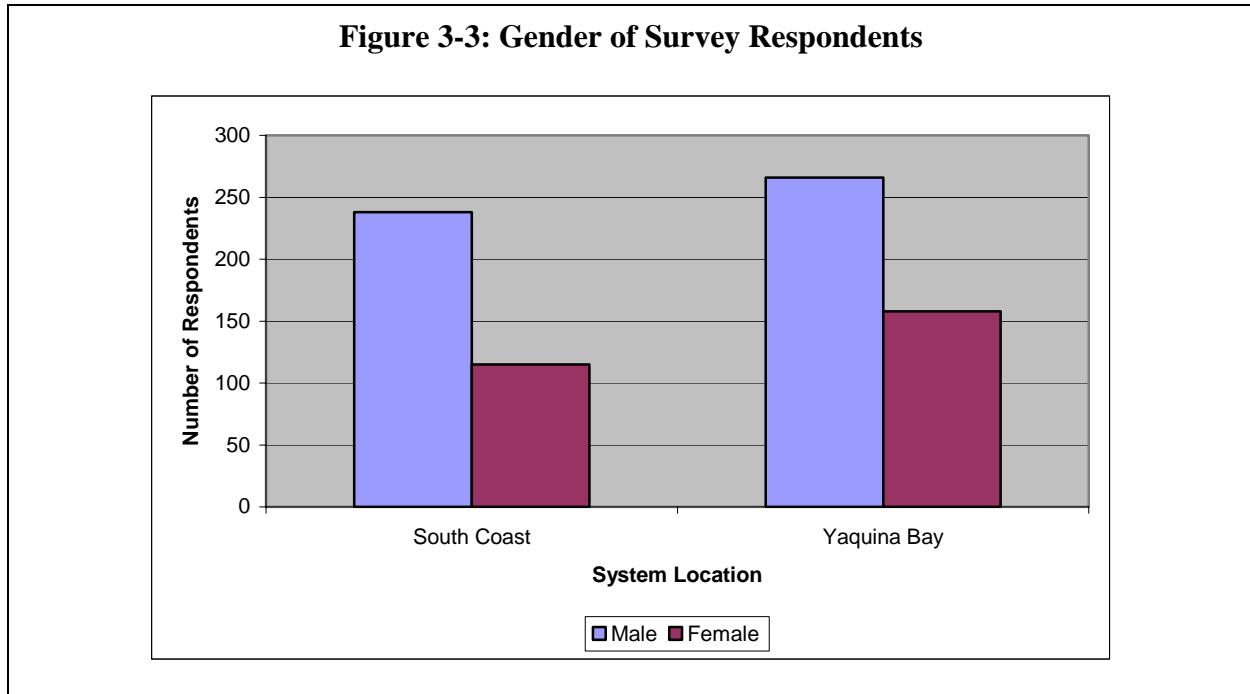


Figure 3-2: Geographic Distribution of Yaquina Bay Bridge System Respondents



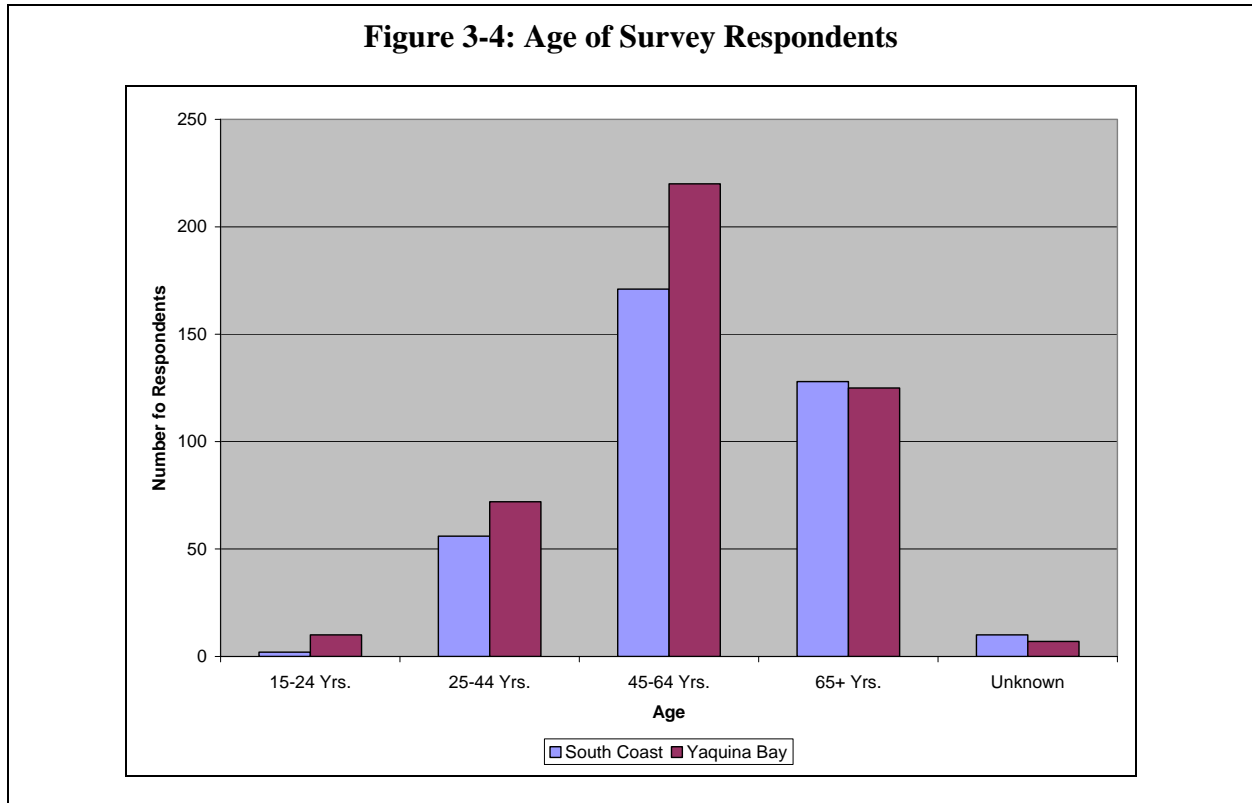
3.2. Gender

The majority of respondents to both surveys were males – 67.4 percent of respondents to the South Coast system and 62.7 percent of respondents for the Yaquina Bay system. Figure 3-3 shows the distribution of gender among survey participants.



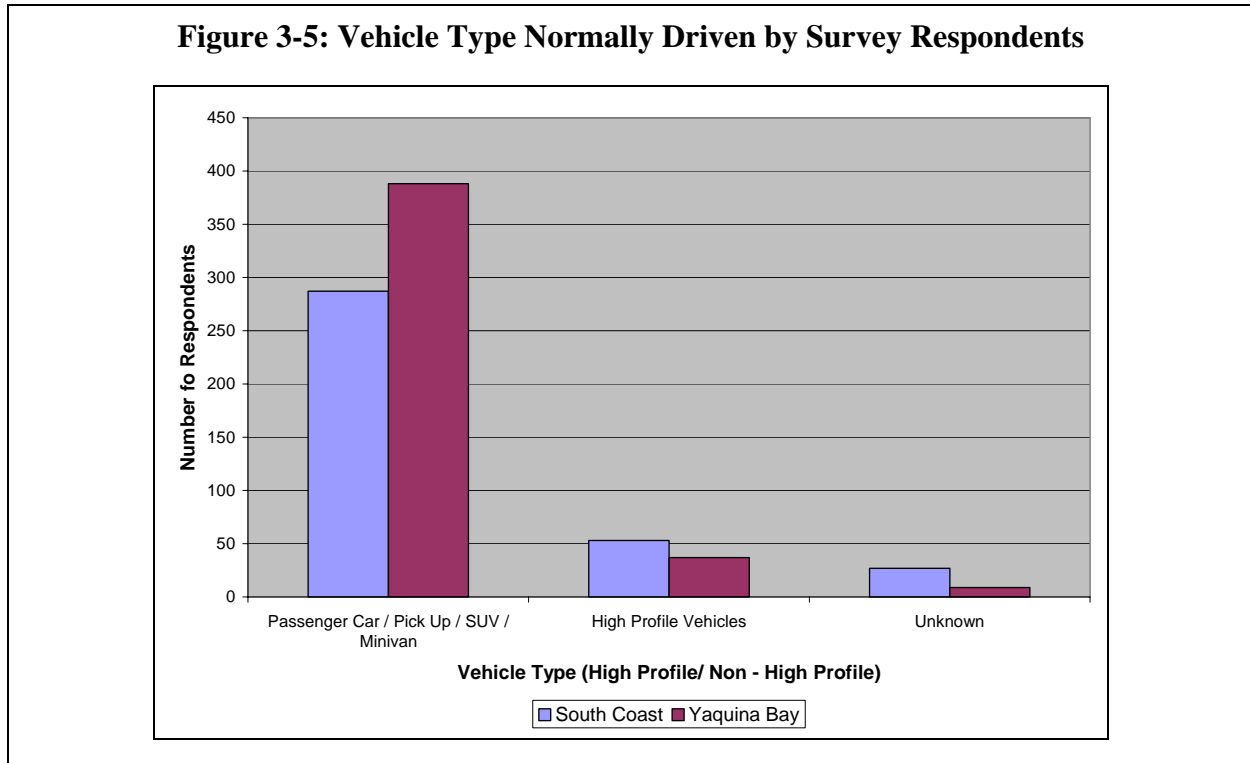
3.3. Age

Figure 3-4 displays the age distribution of survey respondents. Participants could choose from four age categories. People in the 45-64 year old category responded the most, comprising approximately half of the respondents in each survey. The average age for respondents to the South Coast system survey was 55.3 years while the same for Yaquina Bay system respondents was 53.7 years. The average age was calculated using the middle point of the age ranges in the questionnaire (e.g. 19.5 was used for the 15-24 yrs. range).



3.4. Vehicle Type

“Passenger car / pick up / sport utility vehicle / minivan” was the most used category of vehicles by respondents for both systems. The vehicle categories listed on the survey were re-grouped into high-profile vehicles and non-high profile vehicles; the distribution of responses regarding these vehicle types is shown in Figure 3-5.



Because of the over-sampling of commercial vehicles, the vehicle mix at these locations is expected to have a higher percentage of high-profile vehicles than the percentage of respondents who normally drive high-profile vehicles.

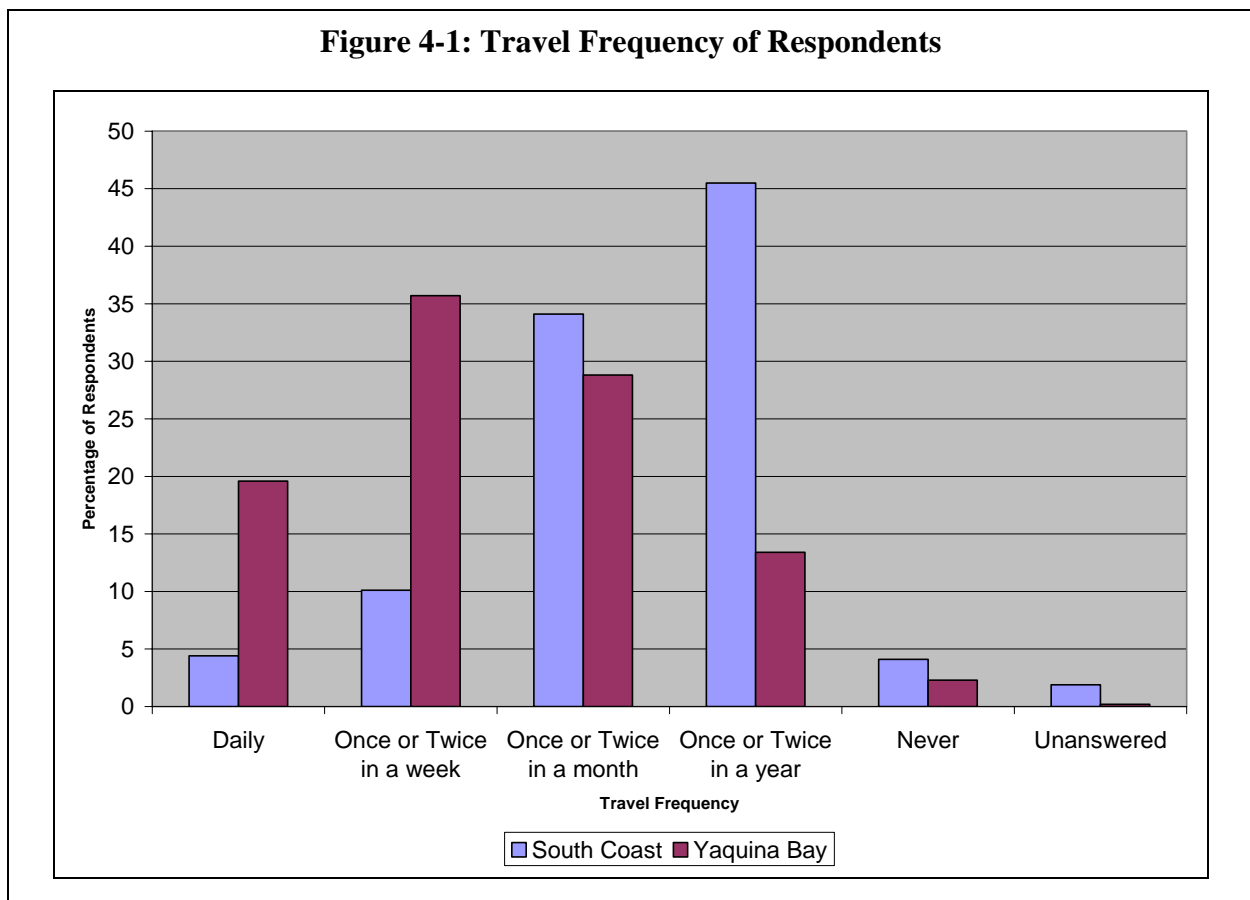
14.4 percent of all respondents for the South Coast System and 8.5 percent of all respondents for the Yaquina Bay System indicated that their primary vehicle was a high profile vehicle. When respondents who did not indicate their primary vehicle type were excluded, these percentages were 13 percent for the South Coast system and 6.4 percent for the Yaquina Bay system. From the traffic counts at nearby Automatic Traffic Recorder (ATR) stations, the percentages of heavy vehicles are estimated to be 8.7 percent for South Coast system and 5.1 percent for Yaquina Bay system. The ATR stations do not classify the Recreational Vehicles / Campers as heavy vehicles and the high profile vehicle percentages include recreational Vehicles / Campers.

4. TRAVEL CHARACTERISTICS

Several questions were asked to gain an overall understanding of survey respondents' travel characteristics with respect to each location. More specifically, travelers were asked these questions to determine travel frequency through the system locations, what seasons they travel through these locations and what resources they use to obtain travel information.

4.1. Frequency of Travel

The first question on each survey asked respondents to estimate how often they travel through the AWWs locations, selecting among a list of categories. Survey responses are shown in Figure 4-1. The most common travel frequency category for respondents to the Yaquina Bay survey is "once or twice in a week," while the most frequent choice for the South Coast system was "once or twice in a year".



Accordingly, the average number of trips per year for the respondents of the South Coast System survey was estimated to be 52 trips per year and the average number of trips for respondents of the Yaquina Bay System survey was estimated to be 203 trips per year. This confirms the assumption in the survey design that Yaquina Bay Bridge traffic is more commute-oriented while traffic through the South Coast system is mostly long-distance.

Table 4-1, Table 4-2 and Table 4-3 show the cross tabulation of the travel frequency against respondents from different zip codes and a comparison of travel frequencies of respondents that drive different types of vehicles.

Table 4-1: Travel Frequency of Respondents for South Coast System

| ZIP Code | | Grouped Frequency | | | Total |
|----------|--------------|-----------------------|------------------|------------------------|-------|
| | | More than once a week | Twice in a Month | Less than Twice a Year | |
| 0 | Count | 16 | 24 | 47 | 87 |
| | % within Zip | 18.39 | 27.59 | 54.02 | 100 |
| 97415 | Count | 7 | 37 | 30 | 74 |
| | % within Zip | 9.46 | 50.00 | 40.54 | 100 |
| 97420 | Count | 13 | 34 | 77 | 124 |
| | % within Zip | 10.48 | 27.42 | 62.10 | 100 |
| 97423 | Count | 4 | 11 | 27 | 42 |
| | % within Zip | 9.52 | 26.19 | 64.29 | 100 |
| 97444 | Count | 13 | 19 | 1 | 33 |
| | % within Zip | 39.39 | 57.58 | 3.03 | 100 |
| Total | Count | 53 | 125 | 182 | 360 |
| | % within Zip | 14.72 | 34.72 | 50.56 | 100 |

Table 4-2: Travel Frequency of Respondents for Yaquina Bay System

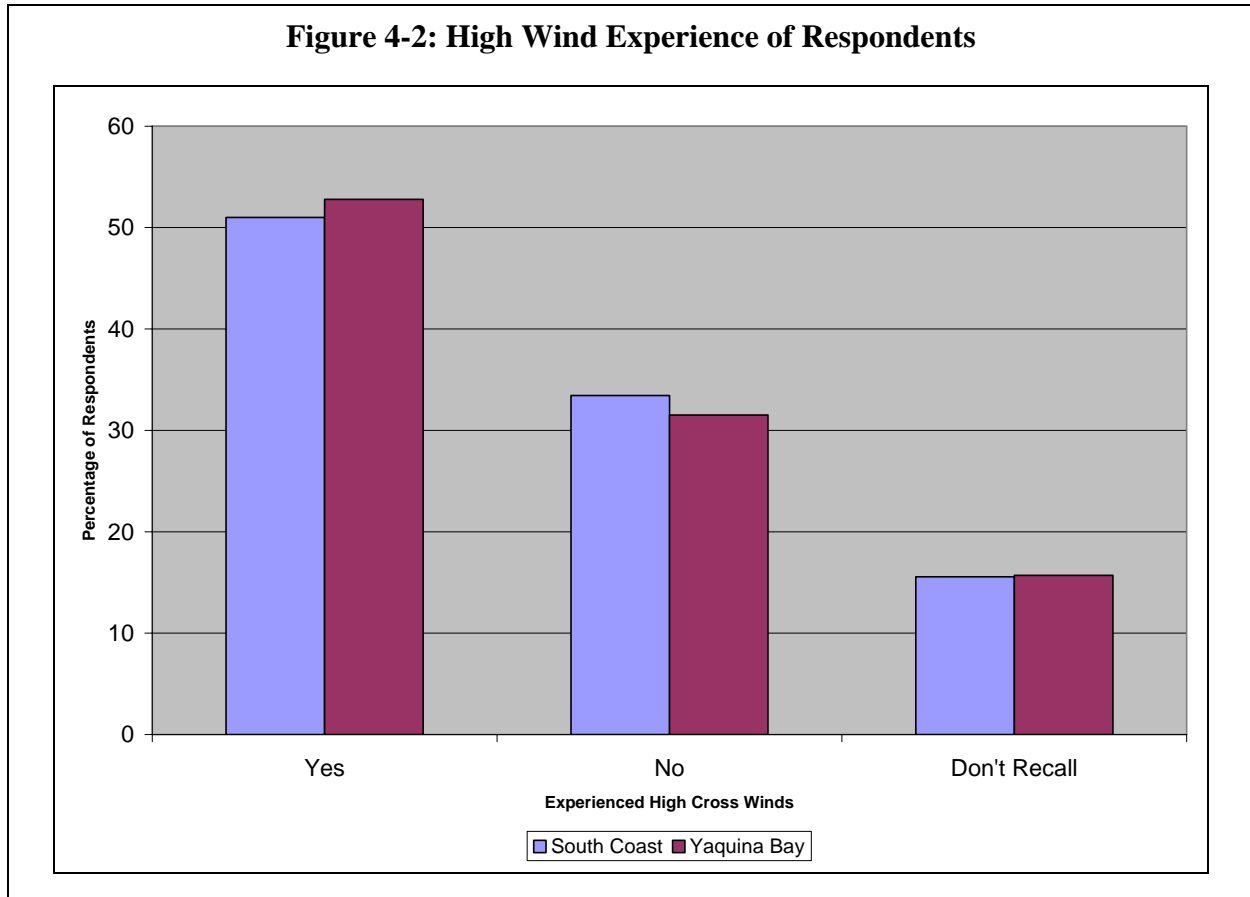
| Zip Code | | Grouped Frequency | | | Total |
|----------|--------------|-----------------------|------------------|------------------------|-------|
| | | More than once a week | Twice in a Month | Less than Twice a Year | |
| 0 | Count | 51 | 37 | 34 | 122 |
| | % within Zip | 41.80 | 30.33 | 27.87 | 100 |
| 97365 | Count | 103 | 36 | 4 | 143 |
| | % within Zip | 72.03 | 25.17 | 2.80 | 100 |
| 97367 | Count | 13 | 27 | 28 | 68 |
| | % within Zip | 19.12 | 39.71 | 41.18 | 100 |
| 97391 | Count | 34 | 22 | 2 | 58 |
| | % within Zip | 58.62 | 37.93 | 3.45 | 100 |
| 97394 | Count | 39 | 3 | 0 | 42 |
| | % within Zip | 92.86 | 7.14 | 0.00 | 100 |
| Total | Count | 240 | 125 | 68 | 433 |
| | % within Zip | 55.43 | 28.87 | 15.70 | 100 |

Table 4-3: Cross Tab Table between Travel Frequency and Vehicle Type

| Vehicle Type | | Grouped Frequency | | | | | | | |
|--------------|----------------|-----------------------|--------------------------|------------------------|-------|-----------------------|--------------------------|------------------------|-------|
| | | South Coast System | | | | Yaquina Bay System | | | |
| | | More than once a week | Once or Twice in a Month | Less than Twice a Year | Total | More than once a week | Once or Twice in a Month | Less than Twice a Year | Total |
| Low Profile | Count | 31 | 99 | 152 | 282 | 218 | 116 | 53 | 387 |
| | % in Veh. Type | 10.99 | 35.11 | 53.90 | 100 | 56.33 | 29.97 | 13.70 | 100 |
| High Profile | Count | 17 | 12 | 15 | 44 | 20 | 8 | 9 | 37 |
| | % in Veh. Type | 38.64 | 27.27 | 34.09 | 100 | 54.05 | 21.62 | 24.32 | 100 |
| Others | Count | 5 | 14 | 15 | 34 | | | | |
| | % in Veh. Type | 14.71 | 41.18 | 44.12 | 100 | | | | |
| Total | Count | 53 | 125 | 182 | 360 | 238 | 124 | 62 | 424 |
| | % in Veh. Type | 14.72 | 34.72 | 50.56 | 100 | 56.13 | 29.25 | 14.62 | 100 |

4.2. Driving Experience in High Cross Winds

The second question in the survey asked the respondents whether they have encountered high winds while driving through the system locations since November 2003. The surveys were distributed in May 2004. Figure 4-2 shows that a little more than half of the respondents for each survey reported experiencing high winds at these locations, while about 15 percent of respondents could not recall. It should be noted that the question specifically asked whether the respondents experienced high cross winds after November 2003. This time gap may explain a reasonable number of respondents not being able to recall.



4.3. Road & Weather Information Resources Used

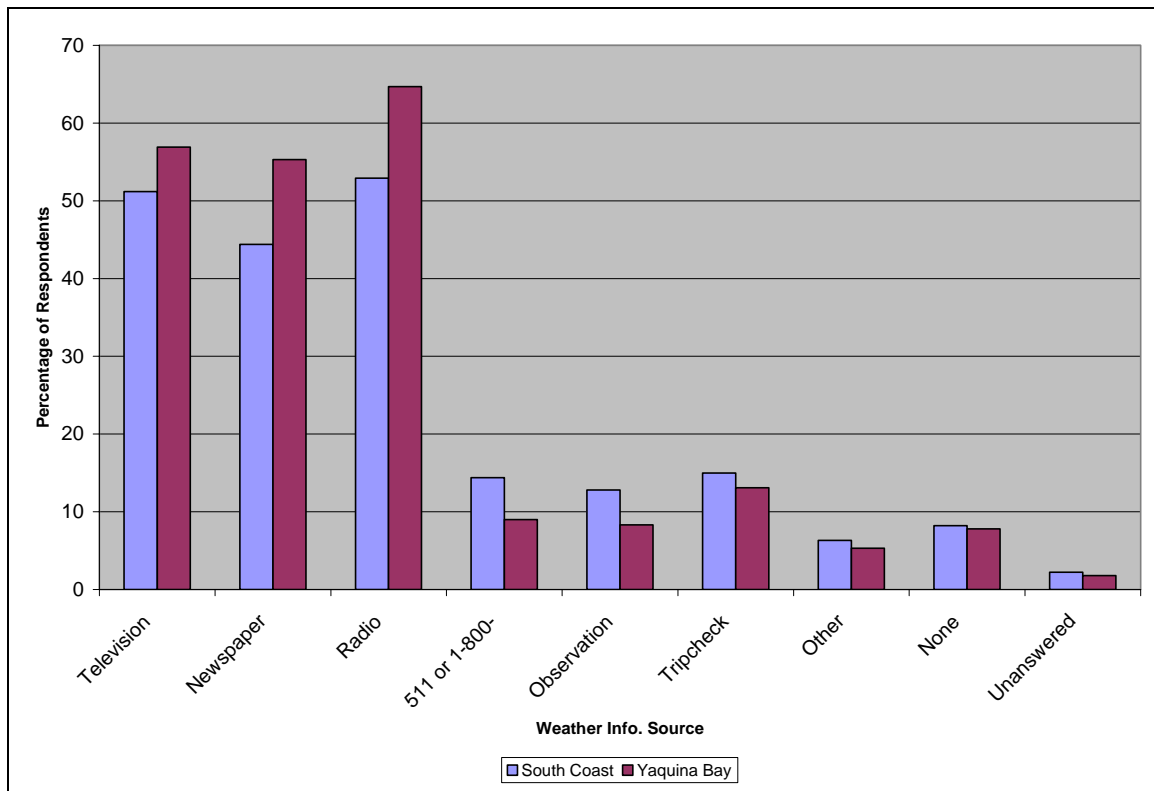
Respondents were asked about what types of information sources they most frequently use to determine road conditions and weather forecasts. The format of the question provided a list of potential resources, allowing respondents to choose all resources that apply. The responses are summarized in Table 4-4. The order of weather information resources most used by travelers was the same for both the system locations; the top four choices were radio, television, newspaper and TripCheck, in that order.

Table 4-4. Weather Information Resources Used by Respondents

| Weather Info. Source | Ranking for South Coast and Yaquina Bay Systems | % Responses for South Coast | % Responses for Yaquina Bay |
|-----------------------------|--|------------------------------------|------------------------------------|
| Television | 2 | 57 | 51 |
| Newspaper | 3 | 55 | 44 |
| Radio | 1 | 65 | 53 |
| 511 or 1-800- | 5 | - | - |
| Observation | 6 | - | - |
| Tripcheck | 4 | 13 | 15 |
| Other | 8 | - | - |
| None | 7 | - | - |
| Unanswered | 9 | - | - |

The percentages of respondents that use other resources are shown in Figure 4-3. Respondents for both system locations indicated using radio a majority of the time for accessing road and weather information. The use of TripCheck was indicated in the survey to be between 13 percent and 15 percent. The comparatively low percentage of TripCheck use may be due to the fact that the average ages of respondents were 55.3 and 53.7 for South Coast System and Yaquina Bay System respectively. This may not be indicative of the market share of TripCheck in providing weather-related traveler information, because lower percentages of older respondents usually tend to use Internet-based resources. For example, a recent telephone survey conducted to assess the usage of TripCheck by ODOT through Oregon State University showed a 10 percent market share for Internet-based weather information sources, and the average age of respondents was 42 years old (2).

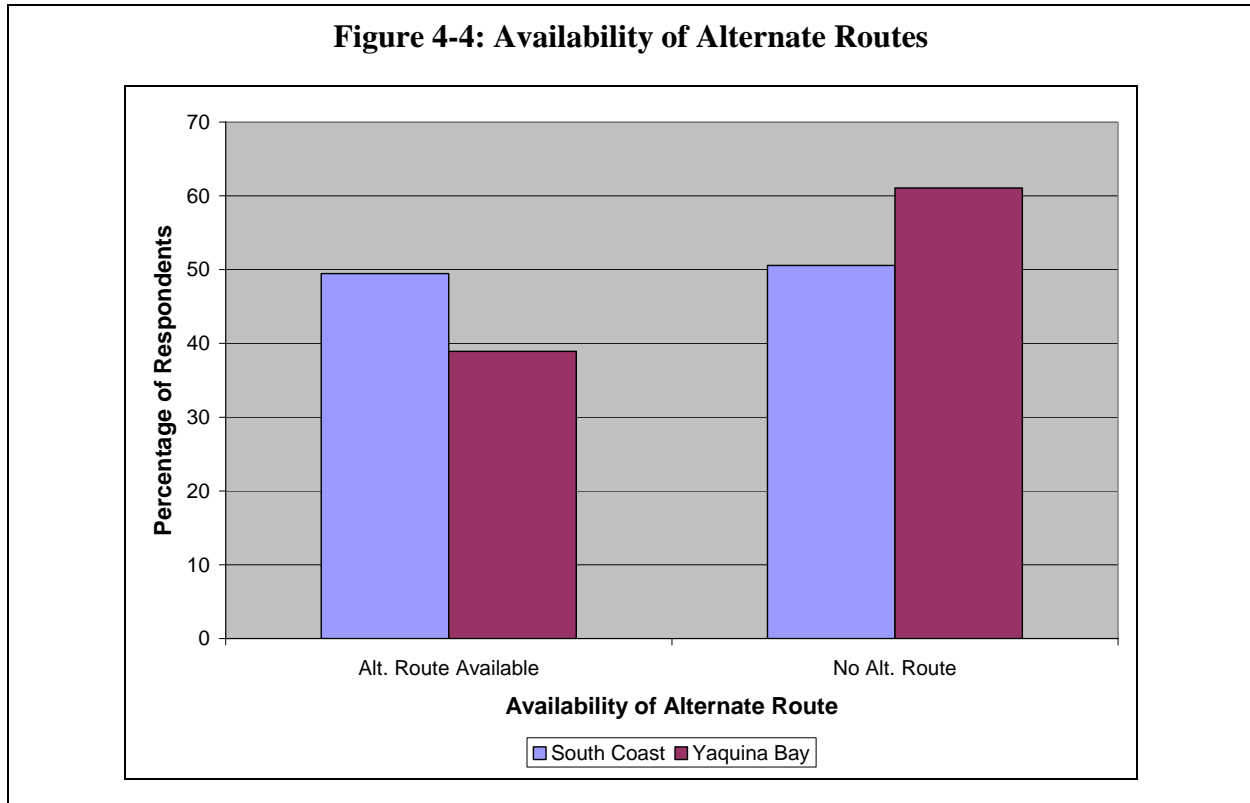
Figure 4-3: Weather Information Resources Used by Respondents



The test of dependency of this variable (primary weather information source) on demographic variables shows that there was a statistically significant dependency on zip code and travel frequency for the South Coast system and on vehicle type for the Yaquina Bay Bridge system. In other words, the usage levels of weather information sources for South Coast system respondents changed based on zip code and travel frequency, whereas usage levels for Yaquina Bay Bridge system respondents varied based on vehicle type. More details on statistical dependencies are provided in Table C-1.

4.4. Alternate Route

Respondents were asked whether they had an option of taking an alternate route when they were advised about unsafe cross winds. Respondents were given the opportunity to indicate if there was no alternate route to their usual trip through the system locations by marking a box indicating “no alternate route.” Otherwise, they were asked to indicate how likely they were to take an alternate route. About 50 percent of the respondents for South Coast System indicated that there was an alternate route that they could use to avoid that section of US Route 101, while 61 percent of the respondents to the Yaquina Bay Bridge survey said that they did not have an alternate route to traveling over the bridge. Results from this question are shown in Figure 4-4.



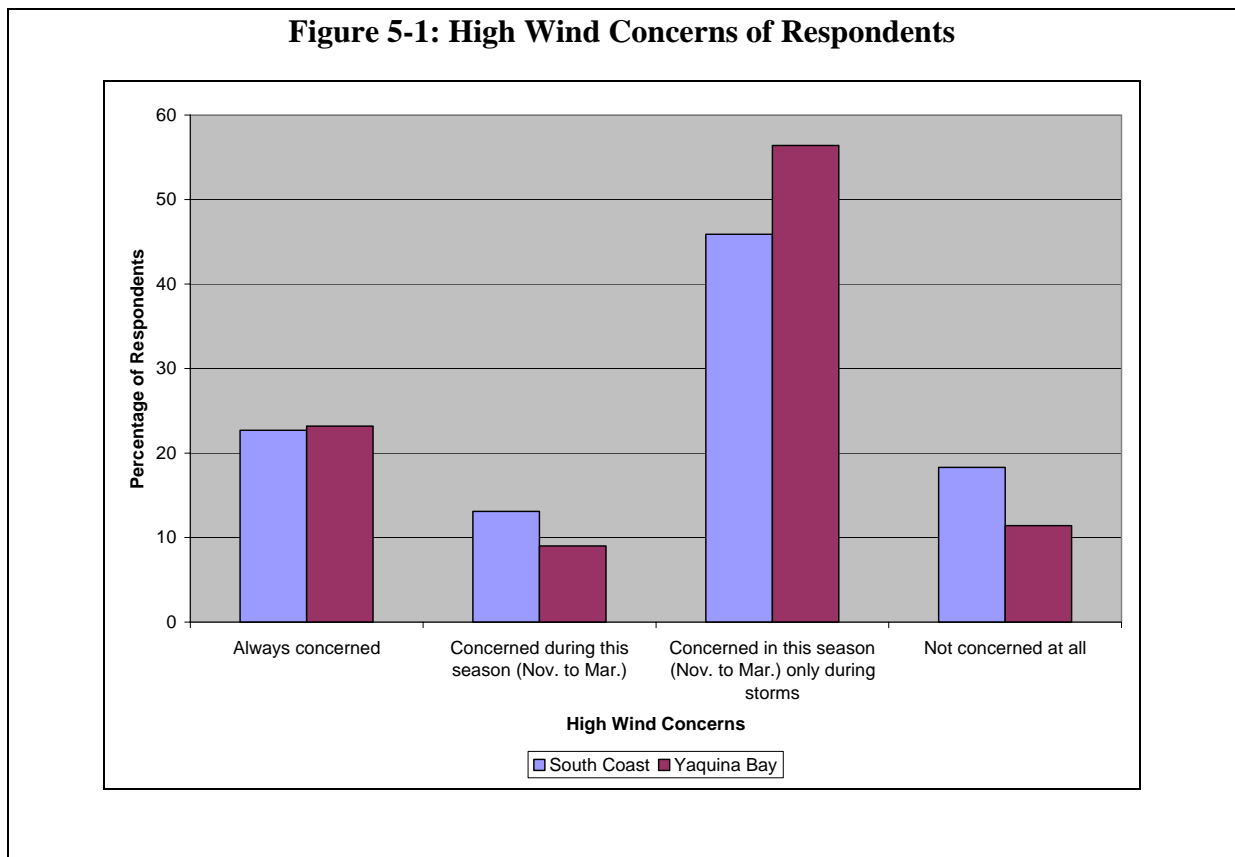
Before AWWS was implemented at these two system locations, ODOT staff had to monitor the wind speeds across the system locations and had to travel to these locations to close the roads when the wind or gust speeds reached 65 mph. The roads at these locations have not been closed due to high winds since the implementation of AWWS. The results from this survey show that a road closure will cause significant delays because more than half of the traveling public driving through these system locations does not have an alternate route.

5. TRAVELER PERCEPTION OF HIGH WINDS

One of the objectives of the evaluation was to determine how concerned the respondents were about high cross winds and what their concerns about high cross winds were. These concerns are discussed in this chapter.

5.1. High Wind Concerns

The respondents were asked how concerned they were about driving in high cross winds. Most of the respondents said that they were concerned about high cross winds only during storms in the season (November to March) for both system locations, as shown in Figure 5-1.



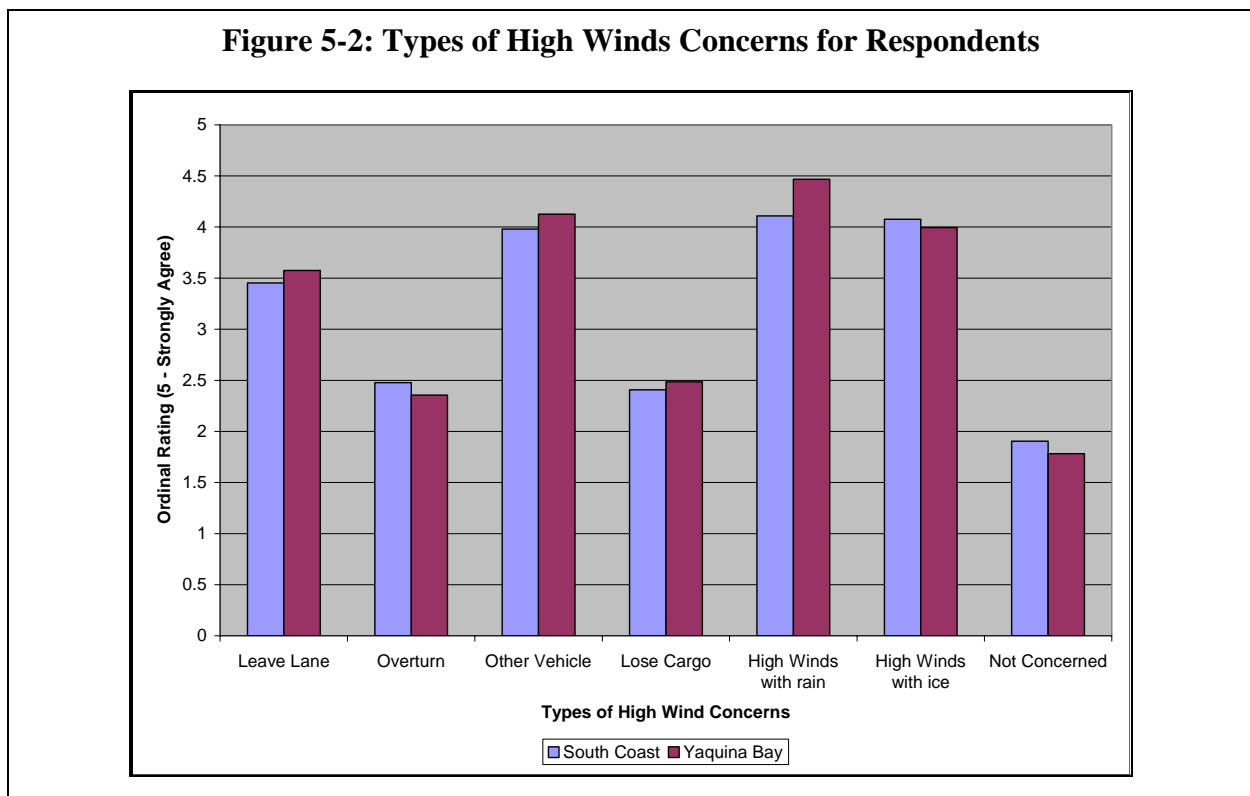
For the South Coast system, the chi-square test results showed that the level of concern about high cross winds expressed by survey respondents varied significantly (statistically) with their gender, the type of vehicle that they normally drove, the frequency of travel through the system location and their previous encounter with wind. For the Yaquina Bay Bridge system, the expressed concerns about high cross winds varied significantly only with the gender (statistically significant). These dependencies explain some of the trends discussed later.

5.2. Types of High Wind Concerns

The respondents were asked what their concerns were while driving in a high cross wind environment. A set of statements were given, and the respondents were asked to rate how much they agreed with each of those statements on a 1-to-5 Likert scale. This was an ordinal rating question with five levels of rating (5 – Strongly Agree, 4 – Somewhat Agree, 3 – Neutral, 2 – Somewhat Disagree, 1 – Strongly Disagree). The statements that respondents were asked to rate are as follows.

- My vehicle may leave its lane
- My vehicle may overturn
- Other vehicles may overturn or leave their lane
- I may lose part of my cargo
- I'm more concerned about high winds with rain
- I am more concerned about high winds when it is icy
- I am not at all concerned

Figure 5-2 shows the mean values of the ratings for these questions. As a majority of the respondents selected passenger car / pickup / sport utility vehicle / minivan as their vehicle type, it is not unexpected to see that “my vehicle may overturn” and “I may lose part of my cargo” had a mean rating less than 2.5 (i.e. respondents generally disagree with these statements). It should be noted that the “I’m not at all concerned” category received an ordinal rating less than 2. This may mean that most travelers at these two system locations have some level of concern about high cross winds.



As shown in Table 5-1, the chi-square test results show that a statistically significant variation in the responses to the question on the concerns about driving in high cross winds was found for several demographic variables. These relationships are discussed in the following sections.

Table 5-1: Variables Correlated with High Wind Concern Ratings

| No. | Statement | Correlated Variables | |
|-----|--|---------------------------|------------------|
| | | South Coast | Yaquina Bay |
| 5a | My vehicle may leave its lane | Gender Wind Experience | None |
| 5b | My vehicle may overturn | Gender | Vehicle Type |
| 5c | Other vehicles may leave lane or overturn | None | Travel Frequency |
| 5d | I may lose part of my cargo | None | None |
| 5e | I'm more concerned with winds while raining | Gender | None |
| 5f | I'm more concerned with winds when it is icy | None | Gender |
| 5g | Not at all concerned | Gender Wind Experience | None |

5.2.1. South Coast

As shown in Table 5-2, 72 percent of the female respondents either somewhat agreed or strongly agreed with the statement “My vehicle may leave its lane” while only about 61 percent of male respondents had similar agreement. This variable failing the chi-square test implies that the female and male respondents answered this question in different ways.

Table 5-2: Cross Tabulation of Gender and Question 5a Response (South Coast)

| Gender | | Vehicle may leave its lane in high winds | | | | | Total |
|--------|-----------------|--|-------------------|---------|----------------|----------------|-------|
| | | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree | |
| Male | Count | 23 | 39 | 32 | 93 | 49 | 236 |
| | % within Gender | 9.75 | 16.53 | 13.56 | 39.41 | 20.76 | 100 |
| Female | Count | 10 | 8 | 14 | 44 | 38 | 114 |
| | % within Gender | 8.77 | 7.02 | 12.28 | 38.6 | 33.33 | 100 |

The cross tabulation in Table 5-3 shows that 71 percent of respondents who had a previous encounter with high cross winds either somewhat agreed or strongly agreed with the statement “My vehicle may leave its lane,” while only 53 percent of the respondents that have not encountered high cross winds while driving the system location had a similar response.

Table 5-3: Cross Tabulation of Wind Experience and Question 5a Response (South Coast)

| High Wind Experience | | Vehicle may leave its lane in high winds | | | | | Total |
|----------------------|----------------|--|-------------------|---------|----------------|----------------|-------|
| | | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree | |
| Yes | Count | 17 | 19 | 15 | 76 | 47 | 174 |
| | % in Wind Exp. | 9.77 | 10.92 | 8.62 | 43.68 | 27.01 | 100 |
| No | Count | 11 | 22 | 20 | 29 | 31 | 113 |
| | % in Wind Exp. | 9.73 | 19.47 | 17.70 | 25.66 | 27.43 | 100 |
| Don't Recall | Count | 7 | 6 | 11 | 35 | 10 | 69 |
| | % in Wind Exp. | 10.14 | 8.70 | 15.94 | 50.72 | 14.49 | 100 |

The cross tabulation in Table 5-4 shows that 57 percent of male respondents either strongly disagreed or somewhat disagreed with the statement “My vehicle may overturn” while only 42 percent of the female respondents had a similar response.

Table 5-4: Cross Tabulation of Gender and Question 5b Response (South Coast)

| Gender | | Vehicle may overturn in high winds | | | | | Total |
|--------|-------------|------------------------------------|-------------------|---------|----------------|----------------|-------|
| | | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree | |
| Male | Count | 83 | 50 | 45 | 31 | 26 | 235 |
| | % in Gender | 35.32 | 21.28 | 19.15 | 13.19 | 11.06 | 100 |
| Female | Count | 28 | 20 | 23 | 31 | 12 | 114 |
| | % in Gender | 24.56 | 17.54 | 20.18 | 27.19 | 10.53 | 100 |

Table 5-5 shows how respondents’ concern regarding high winds and rain related to their gender. Ninety percent of female respondents either strongly agreed or somewhat agreed with the statement “I’m more concerned with winds when it rains” compared to 76 percent of male respondents with similar response.

Table 5-5: Cross Tabulation of Gender and Question 5e Response (South Coast)

| Gender | | More concerned with high winds with rain | | | | | Total |
|--------|-----------------|--|-------------------|---------|----------------|----------------|-------|
| | | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree | |
| Male | Count | 10 | 6 | 40 | 87 | 92 | 235 |
| | % within Gender | 4.26 | 2.55 | 17.02 | 37.02 | 39.15 | 100 |
| Female | Count | 2 | 2 | 8 | 38 | 66 | 116 |
| | % within Gender | 1.72 | 1.72 | 6.90 | 32.76 | 56.90 | 100 |

Table 5-6 shows that 74 percent of the female respondents either strongly disagreed or somewhat disagreed with the statement “Not at all concerned about high winds” compared to 64 percent of male respondents with similar response.

Table 5-6: Cross Tabulation of Gender and Question 5g Response (South Coast)

| Gender | | Not at all concerned | | | | | Total |
|--------|-----------------|----------------------|-------------------|---------|----------------|----------------|-------|
| | | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree | |
| Male | Count | 104 | 38 | 56 | 14 | 10 | 222 |
| | % within Gender | 46.85 | 17.12 | 25.23 | 6.31 | 4.50 | 100 |
| Female | Count | 66 | 14 | 16 | 10 | 2 | 108 |
| | % within Gender | 61.11 | 12.96 | 14.81 | 9.26 | 1.85 | 100 |

Respondents’ prior experience with high cross winds was correlated with the extent to which they were concerned about high winds; these results are shown in Table 5-7. The statement was intentionally framed as a negative statement, so negative responses could be taken as positive responses to the converse of the statement. Therefore, about three-quarters of the respondents who had previously experienced high cross winds either agreed or strongly agreed that they were concerned about high winds, against only 56 percent of respondents who had not experienced high winds while driving through the system location previously.

Table 5-7: Cross Tabulation of Wind Experience and Question 5g Response (South Coast)

| Wind Experience | | Not at all concerned | | | | | Total |
|-----------------|---------------|----------------------|-------------------|---------|----------------|----------------|-------|
| | | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree | |
| Yes | Count | 98 | 25 | 30 | 7 | 2 | 162 |
| | % in Wind Exp | 60.49 | 15.43 | 18.52 | 4.32 | 1.23 | 100 |
| No | Count | 43 | 17 | 29 | 11 | 7 | 107 |
| | % in Wind Exp | 40.19 | 15.89 | 27.10 | 10.28 | 6.54 | 100 |
| Don't Recall | Count | 31 | 11 | 14 | 6 | 3 | 65 |
| | % in Wind Exp | 47.69 | 16.92 | 21.54 | 9.23 | 4.62 | 100 |

5.2.2. Yaquina Bay Bridge

The agreement rating for the statement “my vehicle may overturn” had a statistically significant correlation with the respondent’s vehicle type. Forty three percent of the respondents who drive high-profile vehicles either strongly agreed or somewhat agreed with the statement, while only 18 percent of the respondents who drive low profile vehicles had a similar response.

Table 5-8: Cross Tabulation of Vehicle Type and Question 5b Response (Yaquina Bay)

| Vehicle Type | | Vehicle may overturn in high winds | | | | | Total |
|--------------|----------------|------------------------------------|-------------------|---------|----------------|----------------|-------|
| | | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree | |
| Low Profile | Count | 126 | 101 | 86 | 47 | 23 | 383 |
| | % in Veh. Type | 32.90 | 26.37 | 22.45 | 12.27 | 6.01 | 100 |
| High Profile | Count | 9 | 6 | 6 | 11 | 5 | 37 |
| | % in Veh. Type | 24.32 | 16.22 | 16.22 | 29.73 | 13.51 | 100 |

Travel frequency was the demographic variable which showed statistically significant differences in the responses to the statement “Other vehicle may leave its lane or overturn”. This may be explained by the fact that the responses from those who drive through this area less than twice a year were less likely to agree with this statement than the other two travel frequency groups that responded similar to each other. It may be concluded that the respondents that drive these locations more frequently have more experience with windy conditions and would tend to be more aware of the risk.

Table 5-9: Cross Tabulation of Travel Frequency and Question 5c Response (Yaquina Bay)

| Travel Frequency | | Other vehicles may overturn or leave lane in high winds | | | | | Total |
|--------------------------|-------------------|---|-------------------|---------|----------------|----------------|-------|
| | | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree | |
| Once in a week or more | Count | 9 | 6 | 18 | 104 | 102 | 239 |
| | % in Travel Freq. | 3.77 | 2.51 | 7.53 | 43.51 | 42.68 | 100 |
| Once or Twice in a Month | Count | 2 | 11 | 7 | 50 | 54 | 124 |
| | % in Travel Freq. | 1.61 | 8.87 | 5.65 | 40.32 | 43.55 | 100 |
| Twice or less in a year | Count | 0 | 1 | 17 | 22 | 21 | 61 |
| | % in Travel Freq. | 0.00 | 1.64 | 27.87 | 36.07 | 34.43 | 100 |

Gender was correlated with responses to the statement “I’m more concerned about winds when it is icy”. As shown in Table 5-10, the distribution of the responses among the five rating options was very similar, contrary to the chi-square test. This may be due to the higher percentages of female respondents that either strongly disagreed or somewhat disagreed.

Table 5-10: Cross Tabulation of Gender and Question 5f Response (Yaquina Bay)

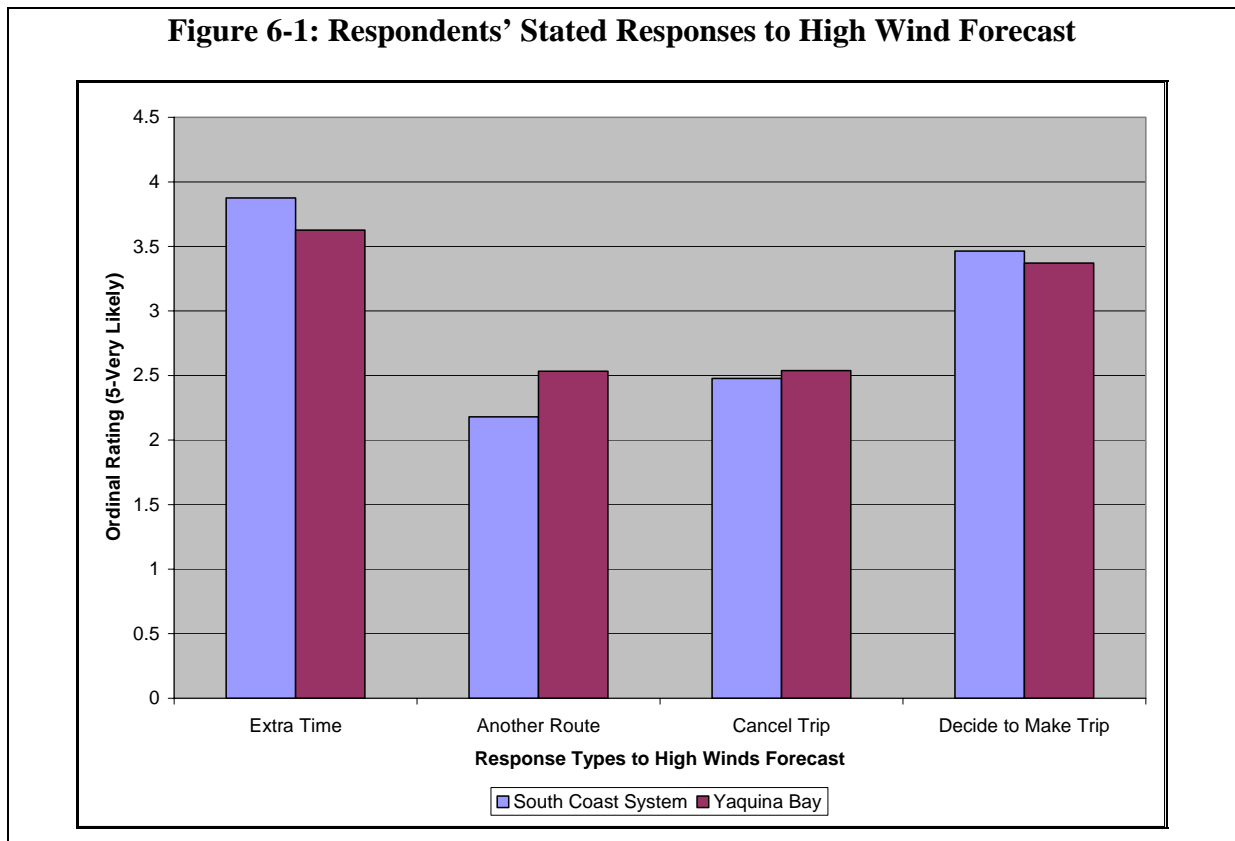
| Gender | | More concerned about it when it is icy | | | | | Total |
|--------|-----------------|--|-------------------|---------|----------------|----------------|-------|
| | | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree | |
| Male | Count | 1 | 5 | 18 | 76 | 165 | 265 |
| | % within Gender | 0.38 | 1.89 | 6.79 | 28.68 | 62.26 | 100 |
| Female | Count | 7 | 5 | 7 | 34 | 105 | 158 |
| | % within Gender | 4.43 | 3.16 | 4.43 | 21.52 | 66.46 | 100 |

6. TRAVELER PERCEPTION OF HIGH WIND FORECAST

The research team was interested in determining how the traveling public used forecasts of high winds in these areas. The present perception of high wind forecasts will influence how well the travelers receive a high wind warning message. The respondents were asked how likely they were to perform any of the following actions.

1. Allow extra time for the trip
2. Take another route if applicable
3. Cancel the trip
4. Decide to make the trip

Each question was scored with an ordinal rating question on a 1-to-5 scale, with 1 meaning “very unlikely” and 5 meaning “very likely”. The mean values of the ordinal rating for each of these actions are shown in Figure 6-1. The mean response for the “take another route” statement was calculated based on the subset of respondents who stated that there was an alternate route. The responses for “decide to make the trip” and “allow extra time for the trip” seemed to be somewhat redundant, based on the consistency in their answers to these questions.



Chi-square analyses of the rating responses for this question determined that the ratings varied significantly (statistically) for several variables, as shown in Table 6-1.

Table 6-1: Variables Correlated with High Wind Responses

| No | Statement | Correlated Variables | |
|----|---------------------|--|------------------------|
| | | South Coast | Yaquina Bay |
| 6a | Allow Extra Time | Gender | None |
| 6b | Take Another Route | Gender | Gender |
| 6c | Cancel Trip | Zip Code Gender Travel Frequency | Gender Vehicle Type |
| 6d | Decide to Make Trip | Gender | Gender |

6.1. South Coast

As shown in Table 6-2, 60 percent of the female respondents stated that they are “very likely” to allow extra time when high winds are forecast while only 37 percent of male respondents stated the same. The variations in the responses between male and female respondents were found to be statistically significant.

Table 6-2: Cross Tabulation of Gender and Question 6a Response (South Coast)

| Gender | | More likely to allow extra time | | | | | Total |
|--------|-----------------|---------------------------------|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Male | Count | 14 | 20 | 27 | 85 | 87 | 233 |
| | % within Gender | 6.01 | 8.58 | 11.59 | 36.48 | 37.34 | 100 |
| Female | Count | 7 | 7 | 6 | 25 | 68 | 113 |
| | % within Gender | 6.19 | 6.19 | 5.31 | 22.12 | 60.18 | 100 |

As seen in Table 6-3, 34 percent of female respondents stated that they are “very likely” or “somewhat likely” to take an alternate route when high winds are forecast against 21 percent of male respondents with a similar response. As stated earlier, this includes only the respondents that replied that they had an alternate route for their usual trip through the system location.

Table 6-3: Cross Tabulation of Gender and Question 6b Response (South Coast)

| Gender | | Grouped Alternate Route | | | | | Total |
|--------|-----------------|-------------------------|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Male | Count | 65 | 22 | 11 | 15 | 11 | 124 |
| | % within Gender | 52.42 | 17.74 | 8.87 | 12.10 | 8.87 | 100 |
| Female | Count | 14 | 11 | 4 | 11 | 4 | 44 |
| | % within Gender | 31.82 | 25.00 | 9.09 | 25.00 | 9.09 | 100 |

The variations in the responses to Question 6c were found to be statistically different between male and female respondents, between respondents from different zip codes and between the

respondents with different travel frequencies. The cross tabulation of all the responses to Question 6 c against these variables is shown in the tables below.

As seen in Table 6-4, almost twice the percentage (65 percent) of male respondents as the percentage of female respondents (37 percent) stated that they are “very unlikely” or “somewhat unlikely” to cancel their trip due to a high wind forecast.

Table 6-4: Cross Tabulation of Gender and Question 6c Response (South Coast)

| Gender | | More likely to cancel trip when high winds are forecast | | | | | Total |
|--------|-----------------|---|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Male | Count | 107 | 46 | 25 | 35 | 21 | 234 |
| | % within Gender | 45.73 | 19.66 | 10.68 | 14.96 | 8.97 | 100 |
| Female | Count | 27 | 16 | 13 | 29 | 29 | 114 |
| | % within Gender | 23.68 | 14.04 | 11.40 | 25.44 | 25.44 | 100 |

A chi-square test on the responses to Question 6c against zip codes also showed a statistical dependency, as shown in Table 6-5. This may be due to the fact that the trip purposes may vary based upon where people live with respect to the system location, and that the predominant traffic through this system location is primarily long-distance, non-commuter trips.

Table 6-5: Cross Tabulation of Zip Code and Question 6c Response (South Coast)

| Zip Code | | More likely to cancel trip when high winds are forecast | | | | | Total |
|----------|--------------------|---|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Other | Count | 39 | 7 | 13 | 9 | 12 | 80 |
| | % within Zip Codes | 48.75 | 8.75 | 16.25 | 11.25 | 15.00 | 100 |
| 97415 | Count | 32 | 9 | 8 | 11 | 12 | 72 |
| | % within Zip Codes | 44.44 | 12.50 | 11.11 | 15.28 | 16.67 | 100 |
| 97420 | Count | 44 | 28 | 11 | 25 | 18 | 126 |
| | % within Zip Codes | 34.92 | 22.22 | 8.73 | 19.84 | 14.29 | 100 |
| 97423 | Count | 14 | 9 | 6 | 11 | 3 | 43 |
| | % within Zip Codes | 32.56 | 20.93 | 13.95 | 25.58 | 6.98 | 100 |
| 97444 | Count | 8 | 9 | 0 | 8 | 7 | 32 |
| | % within Zip Codes | 25.00 | 28.13 | 0.00 | 25.00 | 21.88 | 100 |

It can be seen from Table 6-6 that people are more likely to cancel their trip due to high winds when they are less frequent travelers in the corridor. This may be because less frequent travelers are likely on non-commute trips, which could often be more easily canceled.

Table 6-6: Cross Tabulation of Travel Frequency and Question 6c Response (South Coast)

| Travel Frequency | | Likelihood to cancel trip when high winds are forecast | | | | | Total |
|--------------------------|-------------------|--|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Once in a week or more | Count | 30 | 6 | 2 | 8 | 6 | 52 |
| | % in Travel Freq. | 57.69 | 11.54 | 3.85 | 15.38 | 11.54 | 100 |
| Once or Twice in a Month | Count | 53 | 20 | 8 | 23 | 16 | 120 |
| | % in Travel Freq. | 44.17 | 16.67 | 6.67 | 19.17 | 13.33 | 100 |
| Twice or less in a year | Count | 53 | 34 | 28 | 32 | 28 | 175 |
| | % in Travel Freq. | 30.29 | 19.43 | 16.00 | 18.29 | 16.00 | 100 |

As shown in Table 6-7, a higher percentage of female respondents said that it was “very unlikely” or “somewhat unlikely” that they will decide to make the trip with no changes. This is consistent with the responses for question 6b and 6c.

Table 6-7: Cross Tabulation of Gender and Question 6c Response (South Coast)

| Gender | | Likelihood to decide to make trip when high winds are forecast | | | | | Total |
|--------|-----------------|--|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Male | Count | 13 | 19 | 37 | 75 | 83 | 227 |
| | % within Gender | 5.73 | 8.37 | 16.30 | 33.04 | 36.56 | 100 |
| Female | Count | 21 | 15 | 20 | 32 | 24 | 112 |
| | % within Gender | 18.75 | 13.39 | 17.86 | 28.57 | 21.43 | 100 |

6.2. Yaquina Bay Bridge

Chi-square tests showed that the responses to Questions 6b, 6c and 6d had statistically significant variations against the gender of respondents, and responses to Question 6c had also statistically significant variations against the vehicle type normally driven by respondents. Table 6-8 shows that a higher percentage (72 percent) of male respondents said they were “unlikely” to take another route compared to female respondents that had a similar response to this question.

Table 6-8: Cross Tabulation of Gender and Question 6b Response (Yaquina Bay)

| Gender | | Likelihood to Take Another Route | | | Total |
|--------|-----------------|----------------------------------|---------|-----------------------|-------|
| | | Unlikely or Very Unlikely | Neutral | Likely or Very Likely | |
| Male | Count | 70 | 15 | 12 | 97 |
| | % within Gender | 72.16 | 15.46 | 12.37 | 100 |
| Female | Count | 30 | 8 | 16 | 54 |
| | % within Gender | 55.56 | 14.81 | 29.63 | 100 |

The responses to Question 6c failed the chi-square test against gender and vehicle type of the respondents. In Table 6-9, it can be seen that 51 percent of the female respondents said that they were “somewhat likely” or “very likely” to cancel their trip compared to only 23 percent of male respondents with a similar reaction.

Table 6-9: Cross Tabulation of Gender and Question 6c Response (Yaquina Bay)

| Gender | | Cancel trip when high winds are forecast | | | | | Total |
|--------|-----------------|--|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Male | Count | 104 | 61 | 35 | 32 | 29 | 261 |
| | % within Gender | 39.85 | 23.37 | 13.41 | 12.26 | 11.11 | 100 |
| Female | Count | 35 | 28 | 13 | 47 | 32 | 155 |
| | % within Gender | 22.58 | 18.06 | 8.39 | 30.32 | 20.65 | 100 |

As shown in Table 6-10, almost double the percentage of respondents (60 percent) driving high-profile vehicles compared to the percentage of respondents (31 percent) driving low-profile vehicles said that they would be very unlikely to cancel their trip if high winds are forecast. This is somewhat surprising since high-profile vehicles would be more susceptible to high winds. However, this may be explained by the fact that most of the respondents with high-profile vehicles drive commercial vehicles and therefore do not have very flexible schedules.

Table 6-10: Cross Tabulation of Vehicle Type and Question 6c Response (Yaquina Bay)

| Vehicle Type | | Cancel trip when high winds are forecast | | | | | Total |
|--------------|--------------------|--|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Low Profile | Count | 116 | 86 | 44 | 74 | 59 | 379 |
| | % within Veh. Type | 30.61 | 22.69 | 11.61 | 19.53 | 15.57 | 100 |
| High Profile | Count | 22 | 3 | 6 | 4 | 2 | 37 |
| | % within Veh. Type | 59.46 | 8.11 | 16.22 | 10.81 | 5.41 | 100 |

The rating for the question 6d showed a statistically significant dependency on the demographic variable gender. It can be seen from Table 6-11 that the percentage of male respondents who said they were “somewhat likely” or “very likely” to make the trip despite a forecast of high winds was higher (63 percent) than the percentage of female respondents (54 percent) that said the same.

Table 6-11: Cross Tabulation of Gender and Question 6d Response (Yaquina Bay)

| Gender | | Decide to make trip when high winds forecasted | | | | | Total |
|--------|-----------------|--|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Male | Count | 29 | 18 | 50 | 75 | 85 | 257 |
| | % within Gender | 11.28 | 7.00 | 19.46 | 29.18 | 33.07 | 100 |
| Female | Count | 13 | 28 | 27 | 46 | 35 | 149 |
| | % within Gender | 8.72 | 18.79 | 18.12 | 30.87 | 23.49 | 100 |

7. TRAVELER AWARENESS OF AWWS

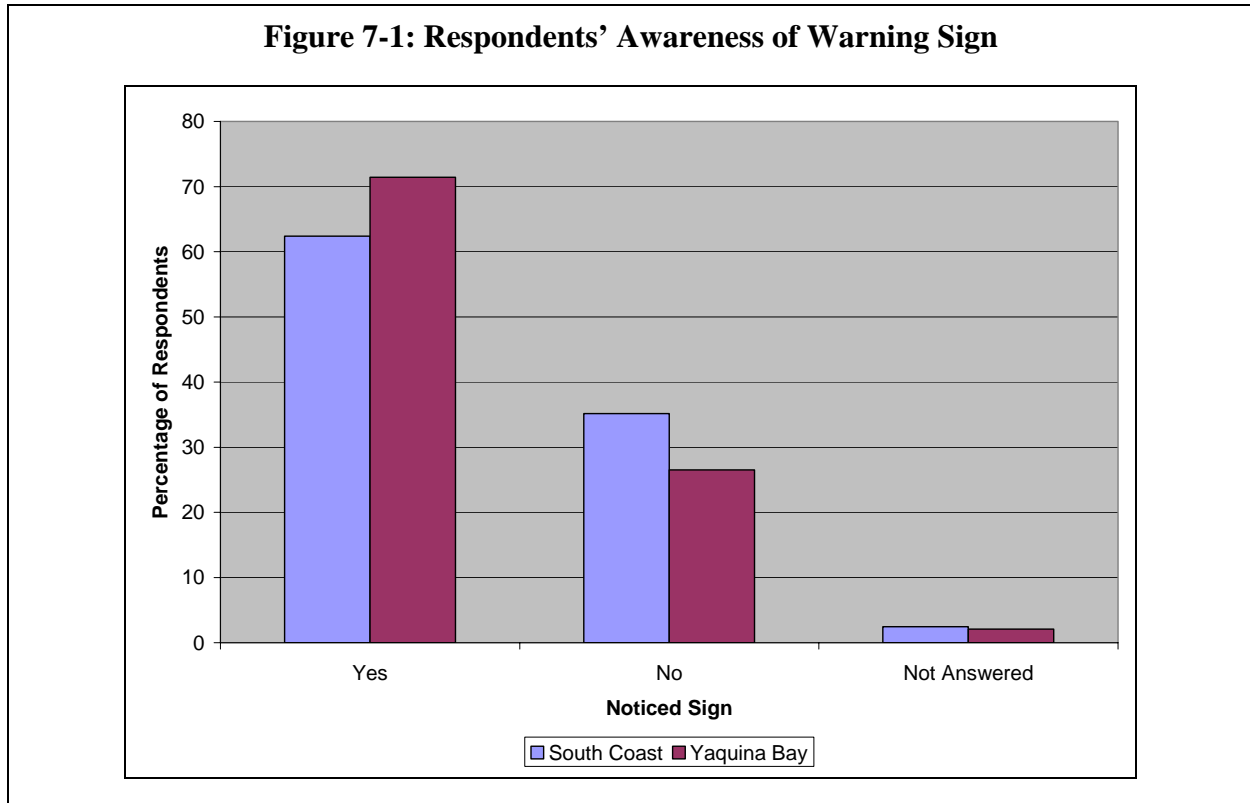
Another aspect of the motorist survey was to determine how aware motorists are at these locations of the presence, purpose and functions of these wind warning systems. The respondents were asked the following questions to determine their level of awareness of the system:

1. Have you seen this sign?
2. Have you seen the lights on top of the sign flashing?
3. Were there high winds present when the sign was on?
4. Would you find it helpful if wind speeds were posted on the sign?

These were multiple-choice questions. The first question needed to be answered by all the respondents, and the next three questions did not need to be answered by all depending on their response to the first question.

7.1. Sign Awareness

Figure 7-1 shows the spread of the responses to the question about sign awareness. It should be noted that more than 75 percent of the respondents for the Yaquina Bay Bridge system have noticed the sign and more than 60 percent of the respondents have noticed the sign for the South Coast system. The highway has five lanes at Port Orford and four lanes at Wedderburn (i.e. the two ends of the system location), while the highway is just one lane each way on Yaquina Bay Bridge. This may partly explain the fact that a higher percentage of respondents noticed the Yaquina Bay Bridge signs than the South Coast signs. Another reason for the higher awareness of the Yaquina Bay system may be that there are more commuters traveling over the Yaquina Bay Bridge than through the South Coast system.



The chi-square test on the response to question 7a showed a statistically significant dependency on zip code, travel frequency and wind experience for both systems.

As shown in Table 7-1, a significantly higher percentage of respondents from the 97444 zip code (Gold Beach and Pistol River) had seen the signs than the other four zip code groups. This may be because the highway (US 101) is just one lane facing the wind warning sign near Gold Beach in Wedderburn compared to two lanes facing the sign located near Port Orford. This increases the chances of local drivers noticing these signs. This could also be due to the trip patterns of the residents in Gold Beach and Pistol River area.

Table 7-1: Cross Tabulation of Zip Code and Question 7a Response (South Coast)

| Zip Code | | Sign Seen? | | Total |
|----------|---------------|------------|-------|-------|
| | | Yes | No | |
| Other | Count | 49 | 34 | 83 |
| | % in Zip Code | 59.04 | 40.96 | 100 |
| 97415 | Count | 47 | 28 | 75 |
| | % in Zip Code | 62.67 | 37.33 | 100 |
| 97420 | Count | 76 | 48 | 124 |
| | % in Zip Code | 61.29 | 38.71 | 100 |
| 97423 | Count | 25 | 18 | 43 |
| | % in Zip Code | 58.14 | 41.86 | 100 |
| 97444 | Count | 32 | 1 | 33 |
| | % in Zip Code | 96.97 | 3.03 | 100 |

As seen in Table 7-2, a significantly higher percentage of the local drivers from zip codes 97365 and 97394 (Newport, Agate Beach and Waldport) have seen the sign than the respondents from other areas. This may be because the local drivers drive through the system location more frequently than the drivers from other areas.

Table 7-2: Cross Tabulation of Zip Code and Question 7a Response (Yaquina Bay)

| Zip Code | | Sign Seen? | | Total |
|----------|---------------|------------|-------|-------|
| | | Yes | No | |
| Other | Count | 78 | 38 | 116 |
| | % in Zip Code | 67.24 | 32.76 | 100 |
| 97365 | Count | 119 | 24 | 143 |
| | % in Zip Code | 83.22 | 16.78 | 100 |
| 97367 | Count | 34 | 33 | 67 |
| | % in Zip Code | 50.75 | 49.25 | 100 |
| 97391 | Count | 42 | 15 | 57 |
| | % in Zip Code | 73.68 | 26.32 | 100 |
| 97394 | Count | 37 | 5 | 42 |
| | % in Zip Code | 88.10 | 11.90 | 100 |

Respondents who drive twice or less in a year through these system locations have noticed these signs in significantly lower percentages (44 percent for South Coast and 31 percent for Yaquina Bay) compared to more frequent travelers as shown in Table 7-3.

Table 7-3: Cross Tabulation of Travel Frequency and Question 7a Response

| Travel Frequency | | Sign Seen? | | | | | |
|--------------------------|-------------------|-------------|-------|-------|--------------------|-------|-------|
| | | South Coast | | | Yaquina Bay Bridge | | |
| | | Yes | No | Total | Yes | No | Total |
| Once in a week or more | Count | 45 | 8 | 53 | 205 | 33 | 238 |
| | % in Travel Freq. | 84.91 | 15.09 | 100 | 86.13 | 13.87 | 100 |
| Once or twice in a month | Count | 102 | 19 | 121 | 85 | 39 | 124 |
| | % in Travel Freq. | 84.30 | 15.70 | 100 | 68.55 | 31.45 | 100 |
| Twice or less in a year | Count | 79 | 100 | 179 | 19 | 43 | 62 |
| | % in Travel Freq. | 44.13 | 55.87 | 100 | 30.65 | 69.35 | 100 |

As shown in Table 7-4, a significantly higher percentage of respondents – 84 percent for South Coast and 86 percent for Yaquina Bay – who have driven through the system location when high winds were present have noticed the signs than drivers who have not experienced high cross winds while driving these system locations previously.

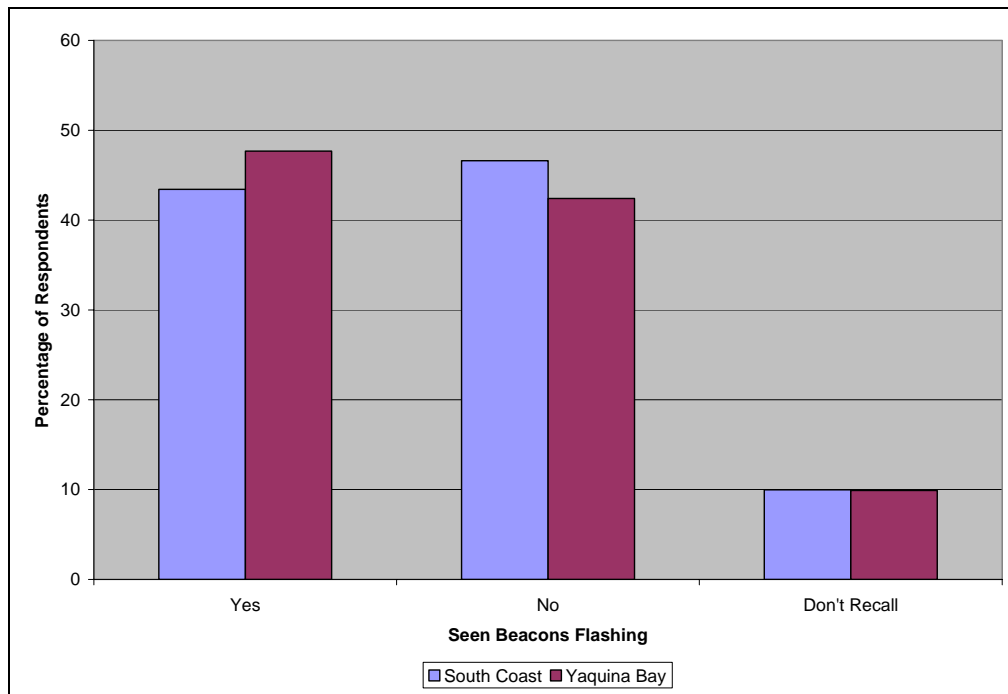
Table 7-4: Cross Tabulation of High Wind Driving Experience and Question 7a Response

| High Wind Experience | | Sign Seen? | | | | | |
|----------------------|---------------------|-------------|-------|-------|--------------------|-------|-------|
| | | South Coast | | | Yaquina Bay Bridge | | |
| | | Yes | No | Total | Yes | No | Total |
| Yes | Count | 144 | 28 | 172 | 192 | 32 | 224 |
| | % in High Wind Exp. | 83.72 | 16.28 | 100 | 85.71 | 14.29 | 100 |
| No | Count | 58 | 58 | 116 | 78 | 54 | 132 |
| | % in High Wind Exp. | 50.00 | 50.00 | 100 | 59.09 | 40.91 | 100 |
| Don't recall | Count | 27 | 43 | 70 | 39 | 27 | 66 |
| | % in High Wind Exp. | 38.57 | 61.43 | 100 | 59.09 | 40.91 | 100 |

7.2. Sign Activation

Only respondents who stated that they have noticed the high wind warning signs were asked to answer the second question (7b): Have you seen the lights on top of the sign flashing? Figure 7-2 shows the percentage of respondents that have seen the beacons flashing and the percentage of respondents that have not seen the beacons flashing. The percentage of respondents that said “No” to this question includes respondents who have not traveled through this system location when high winds were present.

Figure 7-2: Respondents Who Noticed Sign and Have Seen Beacons Flashing*



* “No” most likely represents drivers that have driven through the locations only during non wind conditions

About half of the respondents for both systems who have seen the static warning signs stated that they have not seen the beacons flashing. This could be for several reasons. First, they may have driven through the system locations when high winds were not present. Only about half of the respondents said that they experienced high winds when they traveled through these system locations. Second, they may have driven through when high winds were present, but did not notice the beacons were flashing. Third, high winds may have been present, but the flashing beacons did not activate. Respondents who said they have not seen the beacons flashing are most likely the respondents who drove through the system locations only during normal (i.e. no high cross winds) conditions between November 2003 and June 2004.

A chi-square test on the response to whether the respondents have seen the beacons on top of the signs flashing showed a statistically significant dependency on zip code, travel frequency and wind experience among the South Coast respondents and only on travel frequency and wind experience among Yaquina Bay respondents.

Respondents from zip code 97444 had a significantly higher percentage of drivers (91 percent) having seen the beacons flashing than respondents from the other four groups. This is consistent with the response distribution for question 7a.

A significantly higher percentage of respondents – 76 percent for South Coast and 55 percent for Yaquina Bay – that drive through the system at least once per week had seen the beacons flashing than the less frequent drivers through the system as shown in Table 7-5. This makes sense, as the more trips a person takes through the corridor, the more likely they would be to experience a high wind event, and see the beacons flash.

Table 7-5: Cross Tabulation of Travel Frequency and Question 7b Response

| Travel Frequency | | Were lights seen on top of sign flashing? | | | | | | | |
|--------------------------|-------------------|---|-------|--------------|-------|--------------------|-------|--------------|-------|
| | | South Coast | | | | Yaquina Bay Bridge | | | |
| | | Yes | No | Don't recall | Total | Yes | No | Don't recall | Total |
| Once in a week or more | Count | 35 | 10 | 1 | 46 | 114 | 77 | 17 | 208 |
| | % in Travel Freq. | 76.09 | 21.74 | 2.17 | 100 | 54.81 | 37.02 | 8.17 | 100 |
| Once or twice in a month | Count | 49 | 46 | 14 | 109 | 37 | 39 | 13 | 89 |
| | % in Travel Freq. | 44.95 | 42.20 | 12.84 | 100 | 41.57 | 43.82 | 14.61 | 100 |
| Twice or less in a year | Count | 23 | 58 | 10 | 91 | 2 | 21 | 2 | 25 |
| | % in Travel Freq. | 25.27 | 63.74 | 10.99 | 100 | 8.00 | 84.00 | 8.00 | 100 |

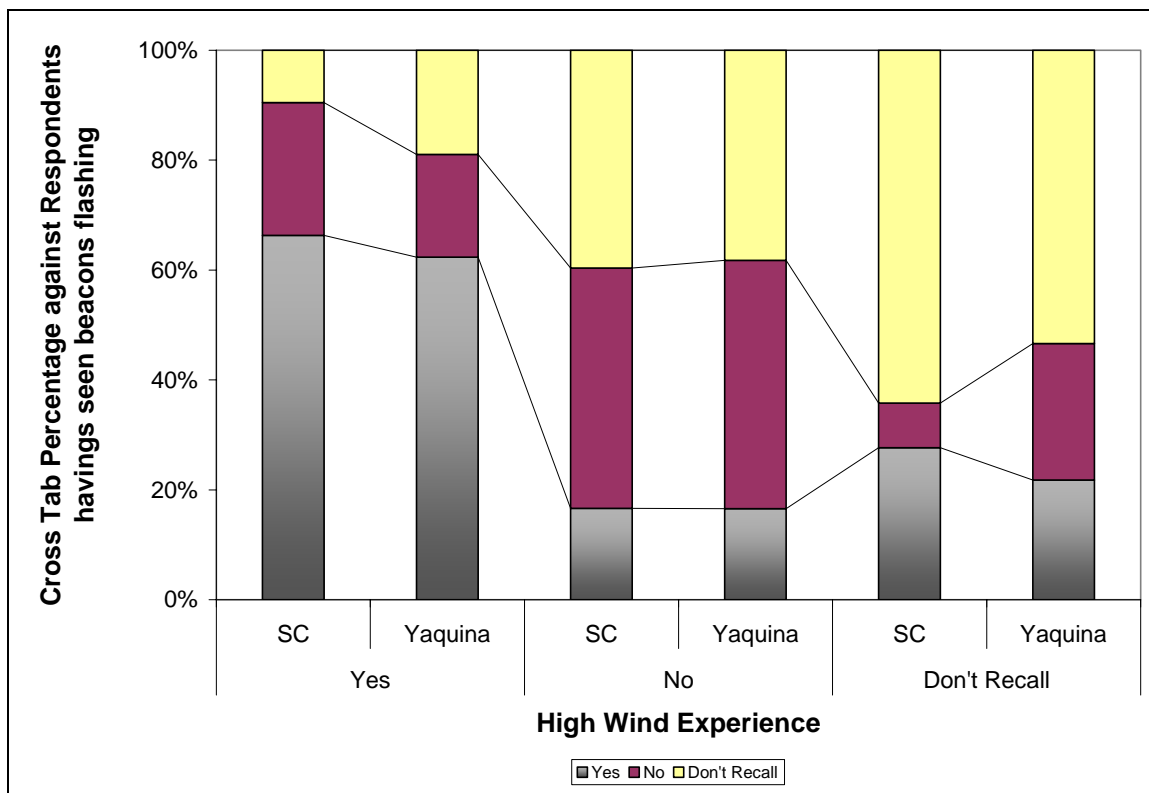
The percentage of respondents who have seen the beacons flashing and have experienced high cross winds while driving – 61 percent for South Coast and 66 percent for Yaquina Bay – was significantly higher than the percentage of respondents that have seen the signs flashing but have not experienced high cross winds while driving through these locations previously (22 percent for South Coast and 20 percent for Yaquina Bay). The variation in the interpretation of the term “high winds” by respondents could be a contributing factor for about a 20 percent “False” or “Missed” warnings. These cross-tabulations are shown in Table 7-6.

Table 7-6: Cross Tabulation of High Wind Experience and Question 7b Response

| High Wind Experience | | Were lights seen on top of sign flashing? | | | | | | | |
|----------------------|---------------------|---|-------|--------------|-------|--------------------|-------|--------------|-------|
| | | South Coast | | | | Yaquina Bay Bridge | | | |
| | | Yes | No | Don't recall | Total | Yes | No | Don't recall | Total |
| Yes | Count | 91 | 42 | 15 | 148 | 129 | 51 | 16 | 196 |
| | % in High Wind Exp. | 61.49 | 28.38 | 10.14 | 100 | 65.82 | 26.02 | 8.16 | 100 |
| No | Count | 15 | 50 | 2 | 67 | 17 | 61 | 8 | 86 |
| | % in High Wind Exp. | 22.39 | 74.63 | 2.99 | 100 | 19.77 | 70.93 | 9.30 | 100 |
| Don't recall | Count | 3 | 23 | 8 | 34 | 8 | 24 | 8 | 40 |
| | % in High Wind Exp. | 8.82 | 67.65 | 23.53 | 100 | 20.00 | 60.00 | 20.00 | 100 |

Figure 7-3 graphs the cross tabulation shown in Table 7-6. It should be noted that more than 70 percent of the respondents either said they saw the beacons flashing or that they could not recall whether they saw the beacons flashing for both the systems. Conversely, only 20 to 25 percent of respondents indicated having experience with high winds in these areas but not seeing the flashing beacon.

Figure 7-3: High Wind Experience vs. Seen Beacons Flashing

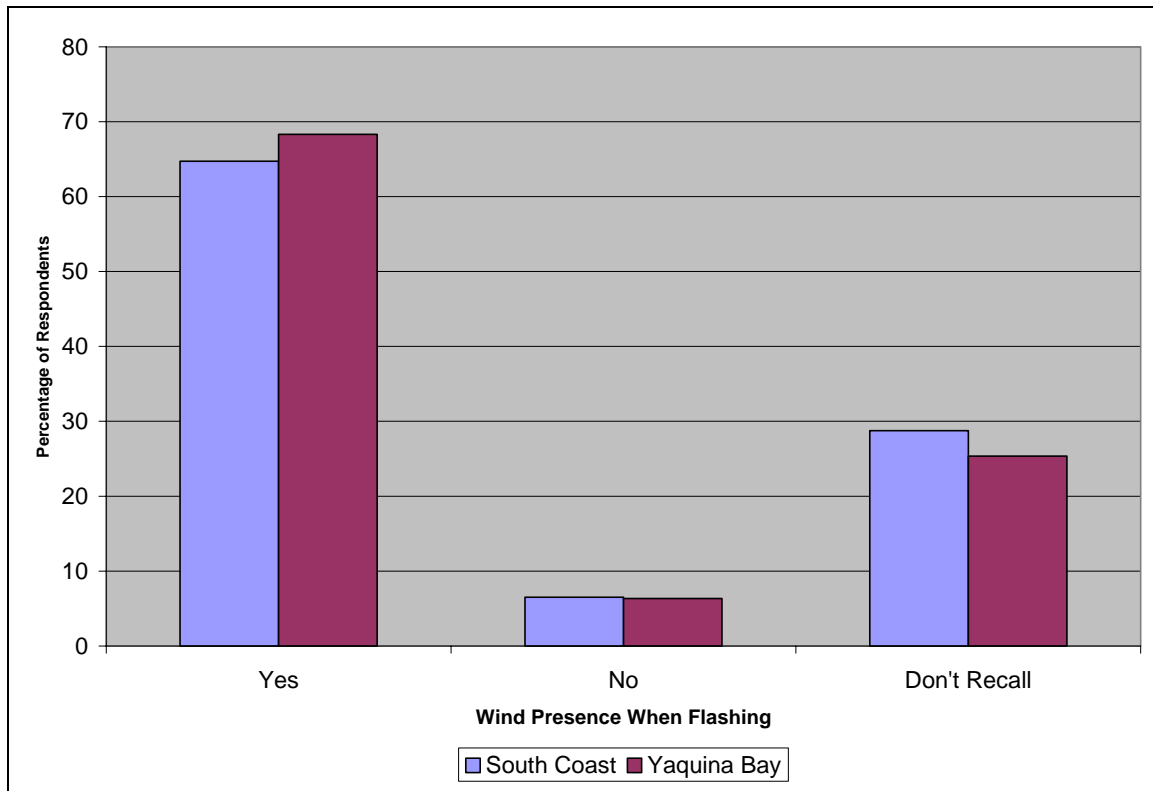


7.3. Accuracy

Respondents who stated they have noticed the beacons flashing were asked whether they experienced high cross winds when they saw the beacons flashing. Figure 7-4 shows the

percentage of respondents that answered this question (i.e. high winds were present or high winds were not present when they saw the lights flashing).

Figure 7-4: Respondents' Observation of High Winds Presence When Beacons Flashed

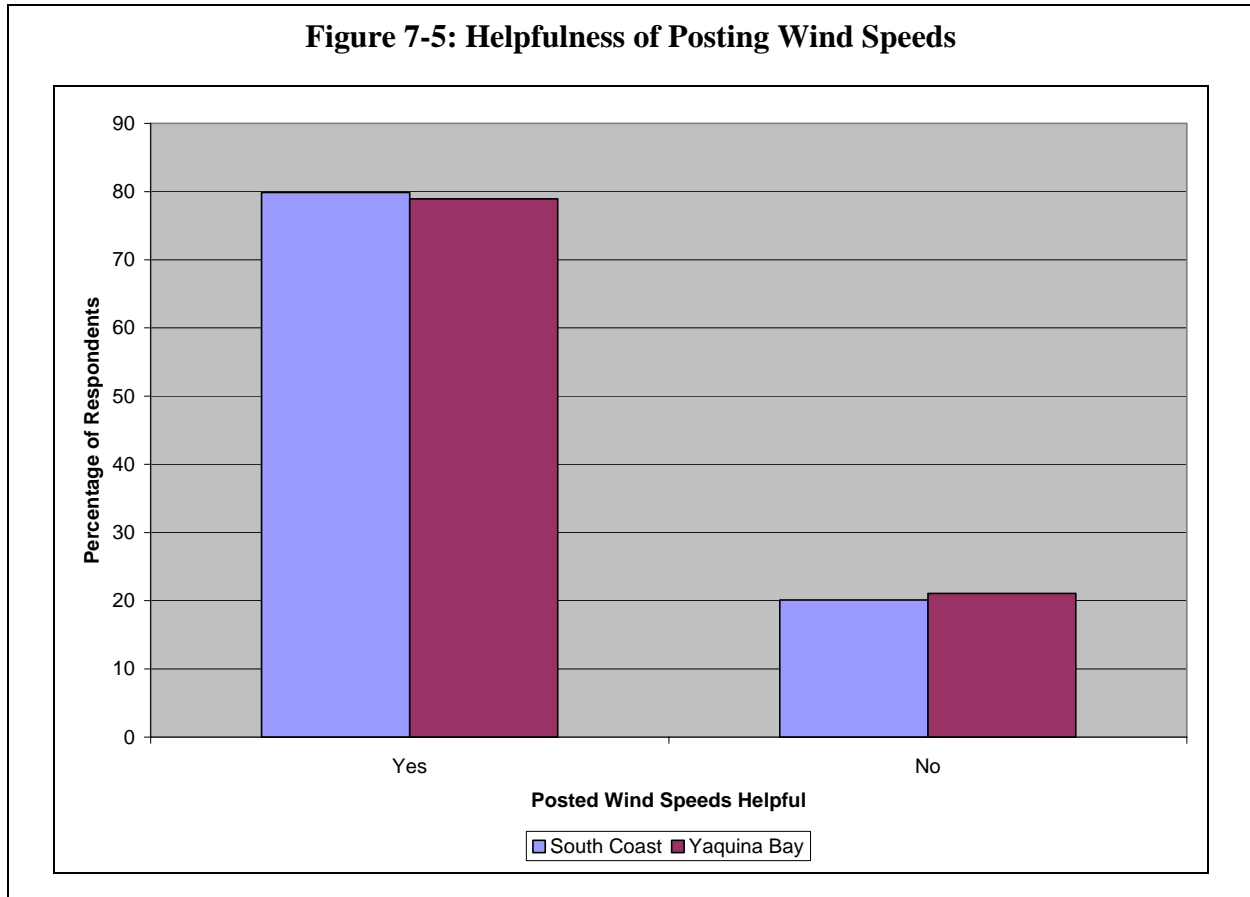


A potentially harmful scenario is the negative perception of the reliability of the sign by the public. The percentage of respondents that stated that there were no high cross winds when they saw the sign flashing is about 5 percent. Since the phrase “high cross winds” was not defined, some of these respondents may not have perceived the winds as high. Moreover, the system is designed to be activated when average wind speeds over a two-minute period are 35 mph or higher. Motorists may drive through the most wind-exposed parts of these system locations when gusts have subsided.

Chi-square tests of the responses to Question 7c showed no statistically significant dependency on any of the demographic variables.

7.4. Usefulness of Wind Speed Report

Respondents were also asked whether they would find it useful if the wind speeds were posted along with warning beacons flashing. Respondents who stated they had seen the beacons flashing were asked to answer this question; 80 percent of these respondents for both system locations said that they would find it useful if wind speeds were posted along with the warning. Figure 7-5 shows the distribution of the response to the question.



A chi-square test of these responses against demographic variables found that there was a significant dependency of these responses for the South Coast system based on gender. Table 7-7 shows the cross tabulation.

Table 7-7: Cross Tabulation of Gender and Question 7d Response (South Coast)

| Gender | | Would like to see wind speed posted | | |
|--------|-----------------|-------------------------------------|-------|-------|
| | | Yes | No | Total |
| Male | Count | 95 | 30 | 125 |
| | % within Gender | 76.00 | 24.00 | 100 |
| Female | Count | 48 | 4 | 52 |
| | % within Gender | 92.31 | 7.69 | 100 |

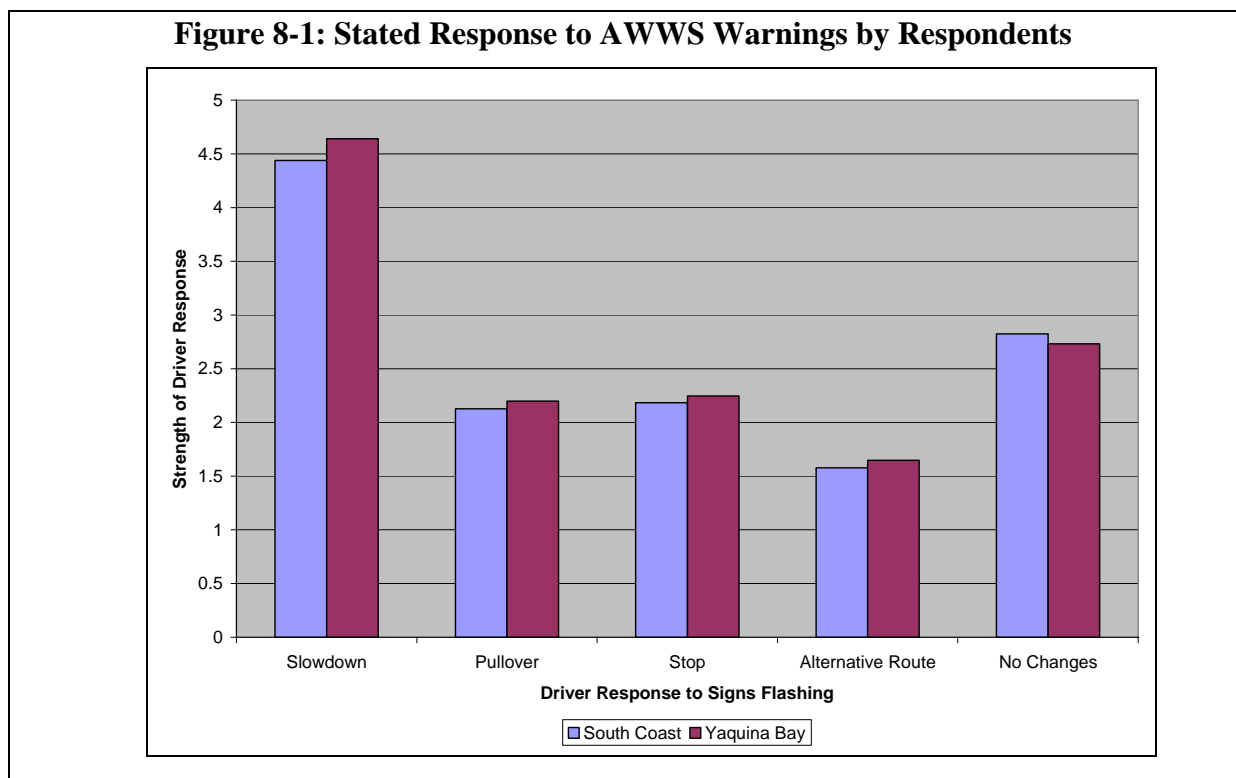
8. SYSTEM FUNCTIONALITY

A significant purpose of this survey was to evaluate how drivers would react to a high wind warning message by AWWS. Drivers' reaction will depend on their perception of the reliability of the system. The respondents were asked two sets of questions to determine their perception of AWWS.

The first set of questions asked the respondents to express how likely they were to do a given set of actions in response to a warning message from AWWS. The set of reactions included the following.

1. Drive more slowly
2. Pull over to the shoulder and wait
3. Stop at a nearby area and wait
4. Take an alternate route, if available
5. Make no changes

This was an ordinal rating question with five levels of rating, similar to question 6 (regarding a driver's likely reaction to a high wind forecast). The mean rating of the respondents on how likely they were to take these actions is shown in descending order in Figure 8-1. Most of the respondents agreed with "drive more slowly" option with a mean response rating of about 4.5. All respondents were asked to rate their likelihood of taking an alternate route, and the mean rate includes the responses from drivers who do not have an alternate route. This may explain the low rating of this option, as about half of respondents reported not having a viable alternative route.



A chi-square test on the ratings by the respondents to the questions on their response to a high wind warning from AWWS showed that some of the ratings had a statistically significant correlation with gender, travel frequency, wind experience and zip codes, as shown in Table 8-1.

Table 8-1: Variables Correlated with Responses to AWWS Warning

| No. | Description | Correlated Variables | |
|-----|----------------------------|----------------------------|---|
| | | South Coast | Yaquina Bay Bridge |
| 8a | Drive more slowly | None | None |
| 8b | Pull Over | Gender Travel Frequency | None |
| 8c | Stop at a nearby rest area | Gender Travel Frequency | Gender |
| 8d | Take an alternate route | None | Gender Travel Frequency Wind Experience |
| 8e | Make no changes | Zip Codes Gender | None |

8.1. South Coast System

As shown in Table 8-2, a significantly higher percentage of male respondents (71 percent) compared to female respondents (55 percent) said that they were either “very unlikely” or “somewhat unlikely” to pull over to the shoulder and wait when AWWS shows a high wind warning.

Table 8-2: Cross Tabulation of Gender and Question 8b Response (South Coast)

| Gender | | Likelihood to Pull Over and Wait due to High Winds | | | | | Total |
|--------|-------------|--|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Male | Count | 96 | 68 | 35 | 17 | 15 | 231 |
| | % in Gender | 41.56 | 29.44 | 15.15 | 7.36 | 6.49 | 100 |
| Female | Count | 31 | 31 | 15 | 28 | 7 | 112 |
| | % in Gender | 27.68 | 27.68 | 13.39 | 25.00 | 6.25 | 100 |

Table 8-3 shows that a higher percentage of respondents that travel through the system location once or more in a week (75 percent) compared to less frequent drivers said that they were “very unlikely” or “somewhat unlikely” to pull over to the shoulder and wait. This may be due to the fact that the more frequent drivers are more familiar with driving through high winds through these locations; therefore they feel more confident driving in these conditions.

Table 8-3: Cross Tabulation of Travel Frequency and Question 8b Response (South Coast)

| Travel Frequency | | Likely to Pull Over and Wait Due to High Winds | | | | | Total |
|--------------------------|-------------------|--|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Once in a week or more | Count | 28 | 12 | 9 | 3 | 1 | 53 |
| | % in Travel Freq. | 52.83 | 22.64 | 16.98 | 5.66 | 1.89 | 100 |
| Once or twice in a month | Count | 50 | 32 | 12 | 17 | 6 | 117 |
| | % in Travel Freq. | 42.74 | 27.35 | 10.26 | 14.53 | 5.13 | 100 |
| Twice or less in a year | Count | 51 | 53 | 29 | 25 | 15 | 173 |
| | % in Travel Freq. | 29.48 | 30.64 | 16.76 | 14.45 | 8.67 | 100 |

Sixty-nine percent of the male respondents for the South Coast system said that they were very or somewhat unlikely to stop at a nearby rest area, compared to 49 percent of the female respondents, when the AWWS indicated high winds were present (see Table 8-4).

Table 8-4: Cross Tabulation of Gender and Question 8c Response (South Coast)

| Gender | | Likely to Stop at Rest Area and Wait Due to High Winds | | | | | Total |
|--------|-------------|--|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Male | Count | 100 | 60 | 30 | 27 | 15 | 232 |
| | % in Gender | 43.10 | 25.86 | 12.93 | 11.64 | 6.47 | 100 |
| Female | Count | 31 | 25 | 20 | 23 | 12 | 111 |
| | % in Gender | 27.93 | 22.52 | 18.02 | 20.72 | 10.81 | 100 |

More frequent travelers – those who travel once or more per week through the corridor – were more unlikely to stop at a nearby rest area and wait compared to the less frequent drivers, as shown in Table 8-5.

Table 8-5: Cross Tabulation of Travel Frequency and Question 8c Response (South Coast)

| Travel Frequency | | Likely to Stop at Rest Area and Wait Due to High Winds | | | | | Total |
|--------------------------|-------------------|--|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Once in a week or more | Count | 28 | 11 | 10 | 3 | 1 | 53 |
| | % in Travel Freq. | 52.83 | 20.75 | 18.87 | 5.66 | 1.89 | 100 |
| Once or twice in a month | Count | 52 | 32 | 11 | 17 | 6 | 118 |
| | % in Travel Freq. | 44.07 | 27.12 | 9.32 | 14.41 | 5.08 | 100 |
| Twice or less in a year | Count | 52 | 41 | 29 | 29 | 21 | 172 |
| | % in Travel Freq. | 30.23 | 23.84 | 16.86 | 16.86 | 12.21 | 100 |

The responses to Question 8e showed a statistically significant dependency on zip codes, as shown in Table 8-6. The local respondents from zip code 97444 stated that they were less likely to make changes due to high winds as compared to respondents from other zip codes.

Table 8-6: Cross Tabulation of Zip Code and Question 8e Response (South Coast)

| Zip Code | | Likelihood to Make No Changes Due to High Winds | | | | | Total |
|----------|----------------|---|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Others | Count | 24 | 3 | 23 | 14 | 14 | 78 |
| | % in Zip Codes | 30.77 | 3.85 | 29.49 | 17.95 | 17.95 | 100 |
| 97415 | Count | 13 | 6 | 21 | 18 | 13 | 71 |
| | % in Zip Codes | 18.31 | 8.45 | 29.58 | 25.35 | 18.31 | 100 |
| 97420 | Count | 18 | 24 | 27 | 26 | 22 | 117 |
| | % in Zip Codes | 15.38 | 20.51 | 23.08 | 22.22 | 18.80 | 100 |
| 97423 | Count | 6 | 4 | 11 | 13 | 8 | 42 |
| | % in Zip Codes | 14.29 | 9.52 | 26.19 | 30.95 | 19.05 | 100 |
| 97444 | Count | 13 | 4 | 5 | 8 | 2 | 32 |
| | % in Zip Codes | 40.63 | 12.50 | 15.63 | 25.00 | 6.25 | 100 |

As shown in Table 8-7, 45 percent of the male respondents said that they were either very or somewhat likely to make no changes when AWWS shows high wind warning compared to 31 percent of female respondents (Table 8-7).

Table 8-7: Cross Tab Table between Gender and Responses to Question 8e

| Gender | | Likelihood to Make No Changes Due to High Winds | | | | | Total |
|--------|-------------|---|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Male | Count | 39 | 22 | 64 | 54 | 49 | 228 |
| | % in Gender | 17.11 | 9.65 | 28.07 | 23.68 | 21.49 | 100 |
| Female | Count | 32 | 19 | 22 | 25 | 9 | 107 |
| | % in Gender | 29.91 | 17.76 | 20.56 | 23.36 | 8.41 | 100 |

8.2. Yaquina Bay Bridge System

As was the case among the respondents for the South Coast System, a significantly higher percentage of male respondents (70 percent) compared to female respondents (52 percent) stated that they were very or somewhat unlikely to stop at a nearby rest area when the AWWS is showing a high wind warning. This is shown in Table 8-8.

Table 8-8: Cross Tabulation of Gender and Question 8c Response (Yaquina Ba)

| Gender | | Likelihood to Stop at Rest Area and Wait Due to High Winds | | | | | Total |
|--------|-------------|--|-------------------|---------|-----------------|-------------|-------|
| | | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | |
| Male | Count | 114 | 66 | 33 | 32 | 14 | 259 |
| | % in Gender | 44.02 | 25.48 | 12.74 | 12.36 | 5.41 | 100 |
| Female | Count | 45 | 37 | 26 | 32 | 16 | 156 |
| | % in Gender | 28.85 | 23.72 | 16.67 | 20.51 | 10.26 | 100 |

The responses to Question 8d, regarding the likelihood of taking an alternative route, showed a statistically significant dependency on gender, travel frequency and wind experience. As expected, Table 8-9 shows that a higher percentage of female respondents said that they are likely to take an alternate route when the beacons are flashing. However, most respondents, regardless of gender, were unlikely to take another route, which likely correlates with the lack of viable alternative routes.

Table 8-9: Cross Tabulation of Gender and Question 8d Response (Yaquina Bay)

| Gender | | Likely to Take Another Route | | | Total |
|--------|-------------|------------------------------|---------|--------|-------|
| | | Unlikely | Neutral | Likely | |
| Male | Count | 70 | 15 | 12 | 97 |
| | % in Gender | 72.16 | 15.46 | 12.37 | 100 |
| Female | Count | 30 | 8 | 16 | 54 |
| | % in Gender | 55.56 | 14.81 | 29.63 | 100 |

Table 8-10 and Table 8-11 show the cross tabulation of the responses to Question 8d against travel frequency and high wind experience.

Table 8-10: Cross Tabulation of Travel Frequency and Question 8d Response (Yaquina Bay)

| Travel Frequency | | Likelihood to Take Another Route | | | Total |
|--------------------------|-------------------|----------------------------------|---------|--------|-------|
| | | Unlikely | Neutral | Likely | |
| Once in a week or more | Count | 51 | 11 | 13 | 75 |
| | % in Travel Freq. | 68.00 | 14.67 | 17.33 | 100 |
| Once or twice in a month | Count | 29 | 7 | 8 | 44 |
| | % in Travel Freq. | 65.91 | 15.91 | 18.18 | 100 |
| Twice or less in a year | Count | 20 | 6 | 8 | 34 |
| | % in Travel Freq. | 58.82 | 17.65 | 23.53 | 100 |

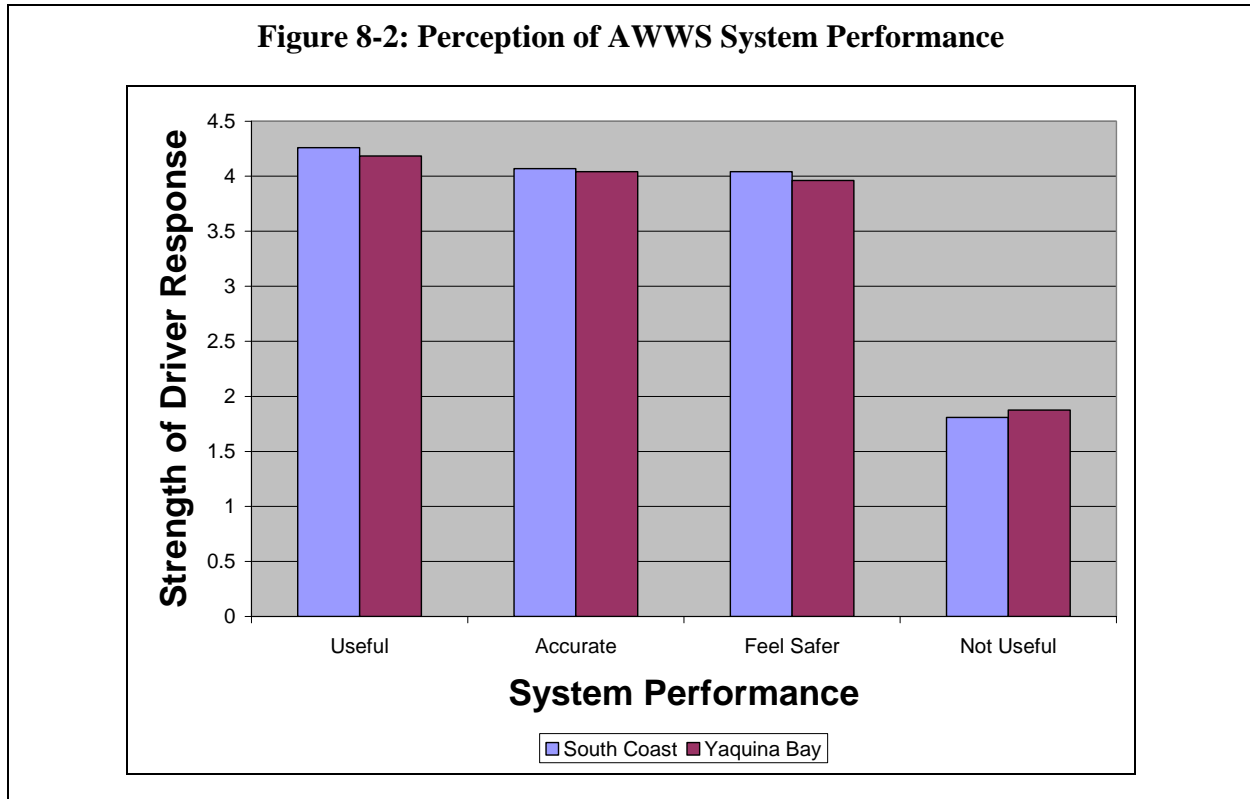
Table 8-11: Cross Tabulation of High Wind Experience and Question 8d Response (Yaquina Bay)

| High Wind Experience | | Likelihood to Take Another Route | | | Total |
|----------------------|---------------------|----------------------------------|---------|--------|-------|
| | | Unlikely | Neutral | Likely | |
| Yes | Count | 49 | 10 | 8 | 67 |
| | % in High Wind Exp. | 73.13 | 14.93 | 11.94 | 100 |
| No | Count | 37 | 11 | 14 | 62 |
| | % in High Wind Exp. | 59.68 | 17.74 | 22.58 | 100 |
| Don't recall | Count | 15 | 3 | 7 | 25 |
| | % in High Wind Exp. | 60.00 | 12.00 | 28.00 | 100 |

The respondents were also asked to rate their agreement with the following set of statements.

1. This system would provide me with useful information
2. The system would accurately indicate when high winds are present
3. I would feel safer driving this road knowing the system is in place
4. This system does not sound useful

This question was also scored on a 1-to-5 ordinal rating scale, with 1 representing strongly disagree, and 5 representing strongly agree. The mean rating of respondents for these statements are shown in Figure 8-2. The response to the statement “This system would provide me with useful information” received the highest average rating (4.26 and 4.18 for South Coast and Yaquina Bay Bridge systems, respectively) on the ordinal scale explained above. The respondents also agreed with the statements regarding system accuracy and improved safety with an average score of about 4 for both the systems. Survey respondents disagreed with the statement “This system does not sound very useful” on an average scale of about 1.75 for both the systems.



A chi-square test on the responses to Question 9 on the user perception of the system effectiveness against the demographic variables showed that there was a statistically significant dependency between gender and the rating for Question 9c among the Yaquina Bay Bridge system respondents. The cross tabulation for this chi-square test is shown in Table 8-12. It shows that a significantly higher percentage of female respondents (86 percent) either agreed or strongly agreed with the statement regarding improved safety than did male respondents (73 percent).

Table 8-12: Cross Tabulation of Gender and Question 9c Response (Yaquina Bay)

| Gender | | Feel safer driving with system in place | | | | | Total |
|--------|-------------|---|----------|---------|-------|----------------|-------|
| | | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | |
| Male | Count | 6 | 7 | 50 | 94 | 79 | 236 |
| | % in Gender | 2.54 | 2.97 | 21.19 | 39.83 | 33.47 | 100 |
| Female | Count | 3 | 3 | 10 | 37 | 63 | 116 |
| | % in Gender | 2.59 | 2.59 | 8.62 | 31.90 | 54.31 | 100 |

The respondents were also asked whether they thought that there were other locations in Oregon where the system would be useful for the travelers. The summary of the comments from respondents for the locations is provided in Appendix B under Tabular Analysis Results.

The survey questionnaire also contained an open-ended question and space for respondents' comments. A summary of these comments is also provided in the Appendix B. The most

frequent comment among those who replied was that trucks and high profile vehicles should be restricted on these corridors during high wind events.

9. CONCLUSIONS

The goals of the automated wind warning systems (AWWS) deployed in Oregon are threefold:

- Improve the safety and security of the region’s rural transportation system
- Provide sustainable advanced traveler information systems that collect and disseminate credible, accurate “real-time” information
- Increase operational efficiency and productivity focusing on system providers

A motorist survey was conducted to assess the following MOEs:

- System usage by motorists
- System awareness among motorists
- Sign clarity
- Message credibility and reliability

The following conclusions on the measures of effectiveness can be derived from the analysis of the survey responses. Table 9-1 shows that most of the survey respondents thought the sign would provide them useful and accurate information and a significant percentage of the respondents have seen the sign.

Table 9-1: Summary of Measures of Effectiveness (MOE) Results from Motorist Survey

| MOE | Measures | |
|-------------------------------------|---|---|
| | South Coast | Yaquina Bay |
| System Awareness | 84 percent of the respondents who have driven through the location during high cross winds have seen the beacons flashing. | 86 percent of the respondents who have driven through the location during high cross winds have seen the beacons flashing. |
| System Usage | 90 percent of the survey respondents are “very likely” or “likely” to slow down when high wind warning sign is on. | 92 percent of the survey respondents are “very likely” or “likely” to slow down when high wind warning sign is on. |
| Sign Clarity | More than 60 percent have seen the sign | More than 75 percent have seen the sign |
| Message Credibility and Reliability | 84 percent of the survey respondents either “strongly agree” or “agree” that the system will provide them accurate information | 80 percent of the survey respondents either “strongly agree” or “agree” that the system will provide them accurate information |

APPENDIX A: SURVEY INSTRUMENTS

Figure A-1: Survey Instrument for South Coast System

Thank you for taking the time to complete this survey! Your responses will help the Oregon Department of Transportation improve safety challenges associated with driving in high wind areas. **For your privacy, this survey is anonymous.** This project is sponsored by the U.S. Department of Transportation and is administered by the Western Transportation Institute, Montana State University - Bozeman.

1. **How often do you travel the section of Highway US 101 between Port Orford and Wedderburn (see map). (Check only ONE box)**
 Daily Once or twice in a week
 Once or twice in a month Once or twice in a year
 Never

2. **Did you encounter high winds when you drove this road anytime since November 2003? (Check only ONE box)**
 Yes No Don't recall

3. **How concerned are you about high winds when driving the section of Highway 101 between Port Orford and Wedderburn? (Check only ONE box)**
 Always concerned
 Concerned during this season (November to March)
 Concerned only during storms in this season (November to March)
 Not at all concerned

4. **What information sources do you use for weather information before traveling? (Check ALL that apply)**
 Television Newspaper
 Radio Dial 511 or 1-800-977-ODOT
 Observation of existing conditions TripCheck Website
 Other (please specify) _____ None

5. **How much do you agree with the following statements related to your driving in high winds? (Circle only ONE number per line)**

| | Strongly Agree | Somewhat Agree | Neutral | Somewhat Disagree | Strongly Disagree |
|---|----------------|----------------|---------|-------------------|-------------------|
| a) My vehicle may leave its lane. | 5 | 4 | 3 | 2 | 1 |
| b) My vehicle may overturn. | 5 | 4 | 3 | 2 | 1 |
| c) Other vehicles may overturn or leave their lane. | 5 | 4 | 3 | 2 | 1 |
| d) I may lose part of my cargo. | 5 | 4 | 3 | 2 | 1 |
| e) I'm more concerned about high winds with rain. | 5 | 4 | 3 | 2 | 1 |
| f) I'm more concerned about it when it is icy. | 5 | 4 | 3 | 2 | 1 |
| g) I'm not at all concerned | 5 | 4 | 3 | 2 | 1 |

6. **When high winds are forecasted on this roadway, HOW LIKELY are you to? (Circle only ONE number per line)**

| | Very Likely | Somewhat Likely | Neutral | Somewhat Unlikely | Very Unlikely |
|---|-------------|-----------------|---------|-------------------|---------------|
| a) allow extra time for the trip? | 5 | 4 | 3 | 2 | 1 |
| b) take another route? <input type="checkbox"/> Check if there is no alternate route | 5 | 4 | 3 | 2 | 1 |
| c) cancel trip? | 5 | 4 | 3 | 2 | 1 |
| d) decide to make the trip? | 5 | 4 | 3 | 2 | 1 |

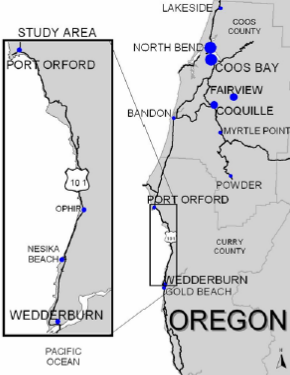

7. **ODOT has installed a high wind warning system for motorists on Highway US 101 between Port Orford and Wedderburn. The system includes a sign with flashing lights that is turned on during high winds as shown in the picture. (Check only ONE box per question)**

a) Have you seen this sign?
 Yes No – go to Question 8

b) Have you seen the lights on top of the sign flashing?
 Yes No – go to Question 8 Don't recall

c) Were there high winds present when the sign was on?
 Yes No Don't recall

d) Would you find it helpful if wind speeds were posted on the sign?
 Yes No

Survey continued on next page

8. If the lights on the sign WERE flashing indicating high cross winds, when you are driving, HOW LIKELY would you be to...? (Circle only ONE number per line)

| | Very Likely | Somewhat Likely | Neutral | Somewhat Unlikely | Very Unlikely |
|--|-------------|-----------------|---------|-------------------|---------------|
| a) drive more slowly? | 5 | 4 | 3 | 2 | 1 |
| b) pull over to the shoulder and wait? | 5 | 4 | 3 | 2 | 1 |
| c) stop at a nearby area and wait? | 5 | 4 | 3 | 2 | 1 |
| d) take an alternate route? | 5 | 4 | 3 | 2 | 1 |
| e) make no changes? | 5 | 4 | 3 | 2 | 1 |

9. Based on your experience, how much do you agree with the following statements. (Circle only ONE per line)

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|----------------|-------|---------|----------|-------------------|
| a) This system would provide me useful information. | 5 | 4 | 3 | 2 | 1 |
| b) The system would accurately indicate when high winds are present. | 5 | 4 | 3 | 2 | 1 |
| c) I would feel safer driving this road knowing the system is in place. | 5 | 4 | 3 | 2 | 1 |
| d) This system does not sound very useful. | 5 | 4 | 3 | 2 | 1 |

10. Are there other locations that you travel in Oregon where this system might be beneficial? If so, please list them in the space below.

11. The following information is needed to ensure that your travel needs are properly represented in this survey. It will be used for the purposes of this survey only. (Check ONE box per question)

a) What is your home zip code? Zip _____

b) What is your age? 15 – 24 years
 25 – 44 years
 45 – 64 years
 65 + years

c) What is your gender? Male
 Female

d) What type of vehicle do you normally drive when you go on Hwy 101 between Wedderburn and Port Orford? Passenger car / pickup / Sport-utility vehicle / minivan
 Recreational vehicle / camper
 Semi Truck
 Bus
 Motorcycle
 Other _____

Please provide any comments that you think would help us in this study. _____

When finished, please return the completed survey in the postage paid envelope along with the yellow card to enter the drawing for \$100 by **June 15, 2004**. If you are interested in receiving a summary of the survey results, please check the box on the yellow card.

THANK YOU VERY MUCH FOR YOUR PARTICIPATION!

Figure A-2: Survey Instrument for Yaquina Bay Bridge System

Thank you for taking the time to complete this survey! Your responses will help the Oregon Department of Transportation improve safety challenges associated with driving in high wind areas. **For your privacy, this survey is anonymous.** This project is sponsored by the U.S. Department of Transportation and is administered by the Western Transportation Institute, Montana State University - Bozeman.

1. **How often do you travel over Yaquina Bay Bridge on Highway US 101(see map).** (Check only ONE box)
 Daily Once or twice in a week
 Once or twice in a month Once or twice in a year
 Never

2. **Did you encounter high winds when you drove over this bridge anytime since November 2003?** (Check only ONE box)
 Yes No Don't recall

3. **How concerned are you about high winds when driving on this bridge?** (Check only ONE box)
 Always concerned
 Concerned during this season (November to March)
 Concerned only during storms in this season (November to March)
 Not at all concerned

4. **What information sources do you use for weather information before traveling?** (Check ALL that apply)
 Television Newspaper
 Radio Dial 511 or 1-800-977-ODOT
 Observation of existing conditions TripCheck Website
 Other (please specify) _____ None

5. **How much do you agree with the following statements related to your driving in high winds?** (Circle only ONE number per line)

| | Strongly Agree | Somewhat Agree | Neutral | Somewhat Disagree | Strongly Disagree |
|---|----------------|----------------|---------|-------------------|-------------------|
| a) My vehicle may leave its lane. | 5 | 4 | 3 | 2 | 1 |
| b) My vehicle may overturn. | 5 | 4 | 3 | 2 | 1 |
| c) Other vehicles may overturn or leave their lane. | 5 | 4 | 3 | 2 | 1 |
| d) I may lose part of my cargo. | 5 | 4 | 3 | 2 | 1 |
| e) I'm more concerned about high winds with rain. | 5 | 4 | 3 | 2 | 1 |
| f) I'm more concerned about it when it is icy. | 5 | 4 | 3 | 2 | 1 |
| g) I'm not at all concerned | 5 | 4 | 3 | 2 | 1 |

6. **When high winds are forecasted over this bridge, HOW LIKELY are you to?** (Circle only ONE number per line)

| | Very Likely | Somewhat Likely | Neutral | Somewhat Unlikely | Very Unlikely |
|---|-------------|-----------------|---------|-------------------|---------------|
| a) allow extra time for the trip? | 5 | 4 | 3 | 2 | 1 |
| b) take another route? | 5 | 4 | 3 | 2 | 1 |
| <input type="checkbox"/> Check if there is no alternate route | | | | | |
| c) cancel trip? | 5 | 4 | 3 | 2 | 1 |
| d) decide to make the trip? | 5 | 4 | 3 | 2 | 1 |

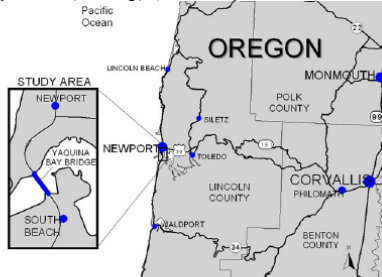

7. **ODOT has installed a high wind warning system for motorists on Yaquina bay bridge on US Route 101. The system includes a sign with flashing lights that automatically turn on during high winds as shown in the picture.** (Check only ONE box per question)

a) Have you seen this sign?
 Yes No – go to Question 8

b) Have you seen the lights on top of the sign flashing?
 Yes No – go to Question 8 Don't recall

c) Were there high winds present when the sign was on?
 Yes No Don't recall

d) Would you find it helpful if wind speeds were posted on the sign?
 Yes No

Survey continued on next page

8. If the lights on the sign WERE flashing due to high winds, when you are driving, HOW LIKELY would you be to...? (Circle only ONE number per line)

| | Very Likely | Somewhat Likely | Neutral | Somewhat Unlikely | Very Unlikely |
|--|-------------|-----------------|---------|-------------------|---------------|
| a) drive more slowly? | 5 | 4 | 3 | 2 | 1 |
| b) pull over to the shoulder and wait? | 5 | 4 | 3 | 2 | 1 |
| c) stop at a nearby area and wait? | 5 | 4 | 3 | 2 | 1 |
| d) take an alternate route? | 5 | 4 | 3 | 2 | 1 |
| e) make no changes? | 5 | 4 | 3 | 2 | 1 |

9. Based on your experience, how much do you agree with the following statements. (Circle only ONE per line)

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|----------------|-------|---------|----------|-------------------|
| a) This system would provide me useful information. | 5 | 4 | 3 | 2 | 1 |
| b) The system would accurately indicate when high winds are present. | 5 | 4 | 3 | 2 | 1 |
| c) I would feel safer driving this road knowing the system is in place. | 5 | 4 | 3 | 2 | 1 |
| d) This system does not sound very useful. | 5 | 4 | 3 | 2 | 1 |

10. Are there other locations that you travel in Oregon where this system might be beneficial? If so, please list them in the space below.

11. The following information is needed to ensure that your travel needs are properly represented in this survey. It will be used for the purposes of this survey only. (Check ONE box per question)

a) What is your home zip code? Zip _____

b) What is your age? 15 – 24 years
 25 – 44 years
 45 – 64 years
 65 + years

c) What is your gender? Male
 Female

d) What type of vehicle do you normally drive when you go over Yaquina Bay Bridge? Passenger car / pickup / Sport-utility vehicle / minivan
 Recreational vehicle / camper
 Semi Truck
 Bus
 Motorcycle
 Other _____

Please provide any comments that you think would help us in this study. _____

When finished, please return the completed survey in the postage paid envelope along with the yellow card to enter the drawing for \$100 by **June 15, 2004**. If you are interested in receiving a summary of the survey results, please check the box on the yellow card.

THANK YOU VERY MUCH FOR YOUR PARTICIPATION!

3. How concerned are you about high winds when driving the section of Highway 101 between Port Orford and Wedderburn?

(Check only ONE box)

- Always concerned
- Concerned during this season (November to March)
- Concerned only during storms in this season (November to March)
- Not at all concerned

| | Count | Percent | Valid Percent | Cumulative Percent |
|---|-------|---------|---------------|--------------------|
| Valid Always concerned | 82 | 22.3 | 22.8 | 22.8 |
| Concerned during this season (Nov-Mar) | 47 | 12.8 | 13.1 | 35.9 |
| Concerned only during storms in this season (Nov-Mar) | 163 | 44.4 | 45.4 | 81.3 |
| Not concerned at all | 67 | 18.3 | 18.7 | 100.0 |
| Total | 359 | 97.8 | 100.0 | |
| Missing System | 8 | 2.2 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 89.75 | | | |
| Median Count | 74.50 | | | |
| Std. Deviation Count | 50.89 | | | |

4. What information sources do you use for weather information before traveling? (Check ALL that apply)

- Television
- Radio
- Observation of existing conditions
- Other (please specify) _____
- Newspaper
- Dial 511 or 1-800-977-ODOT
- TripCheck Website
- None

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------------------|-------|---------|---------------|--------------------|
| Valid Television | 188 | 51.2 | 51.2 | 51.2 |
| Radio | 72 | 19.6 | 19.6 | 70.8 |
| Observation of existing | 51 | 13.9 | 13.9 | 84.7 |
| Newspaper | 6 | 1.6 | 1.6 | 86.4 |
| Dial 511 or 1 - 800 - 977 - ODOT | 6 | 1.6 | 1.6 | 88.0 |
| TripCheck Website | 10 | 2.7 | 2.7 | 90.7 |
| None | 31 | 8.4 | 8.4 | 99.2 |
| Other | 3 | 0.8 | 0.8 | 100.0 |
| Total | 367 | 100.0 | 100.0 | |
| Mean Count | 45.88 | | | |
| Median Count | 20.50 | | | |
| Std. Deviation Count | 62.60 | | | |

5. How much do you agree with the following statements related to your driving in high winds?

(Circle only ONE number per line)

| | Strongly Agree | Somewhat Agree | Neutral | Somewhat Disagree | Strongly Disagree |
|---|----------------|----------------|---------|-------------------|-------------------|
| a) My vehicle may leave its lane. | 5 | 4 | 3 | 2 | 1 |
| b) My vehicle may overturn. | 5 | 4 | 3 | 2 | 1 |
| c) Other vehicles may overturn or leave their lane. | 5 | 4 | 3 | 2 | 1 |
| d) I may lose part of my cargo. | 5 | 4 | 3 | 2 | 1 |
| e) I'm more concerned about high winds with rain. | 5 | 4 | 3 | 2 | 1 |
| f) I'm more concerned about it when it is icy. | 5 | 4 | 3 | 2 | 1 |
| g) I'm not at all concerned | 5 | 4 | 3 | 2 | 1 |

a) My vehicle may leave its lane

| | Count | Percent | Valid Percent | Cumulative Percent |
|-------------------------|-------|--------------------------|---------------|--------------------|
| Valid Strongly Disagree | 35 | 9.5 | 9.8 | 9.8 |
| Somewhat Disagree | 47 | 12.8 | 13.2 | 23.0 |
| Neutral | 46 | 12.5 | 12.9 | 36.0 |
| Somewhat Agree | 140 | 38.1 | 39.3 | 75.3 |
| Strongly Agree | 88 | 24.0 | 24.7 | 100.0 |
| Total | 356 | 97.0 | 100.0 | |
| Missing System | 11 | 3.0 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 71.20 | Mean Agreement | | 4 |
| Median Count | 47.00 | Median Agreement | | 0.39 |
| Std. Deviation Count | 43.44 | Std. Deviation Agreement | | 0.65 |

b) My vehicle may overturn

| | Count | Percent | Valid Percent | Cumulative Percent |
|-------------------------|-------|--------------------------|---------------|--------------------|
| Valid Strongly Disagree | 113 | 30.8 | 31.8 | 31.8 |
| Somewhat Disagree | 70 | 19.1 | 19.7 | 51.5 |
| Neutral | 71 | 19.3 | 20.0 | 71.5 |
| Somewhat Agree | 62 | 16.9 | 17.5 | 89.0 |
| Strongly Agree | 39 | 10.6 | 11.0 | 100.0 |
| Total | 355 | 96.7 | 100.0 | |
| Missing System | 12 | 3.3 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 71.00 | Mean Agreement | | 3 |
| Median Count | 70.00 | Median Agreement | | 0.55 |
| Std. Deviation Count | 26.79 | Std. Deviation Agreement | | 0.15 |

c) Other vehicles may overturn or leave their lane

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|--------------------------|---------------|--------------------|
| Valid | Strongly Disagree | 11 | 3.0 | 3.1 | 3.1 |
| | Somewhat Disagree | 13 | 3.5 | 3.7 | 6.8 |
| | Neutral | 37 | 10.1 | 10.5 | 17.2 |
| | Somewhat Agree | 152 | 41.4 | 42.9 | 60.2 |
| | Strongly Agree | 141 | 38.4 | 39.8 | 100.0 |
| | Total | 354 | 96.5 | 100.0 | |
| Missing System | | 13 | 3.5 | | |
| Total | | 367 | 100.0 | | |
| Mean Count | | 70.80 | Mean Agreement | | 4 |
| Median Count | | 37.00 | Median Agreement | | 0.31 |
| Std. Deviation Count | | 69.97 | Std. Deviation Agreement | | 0.94 |

d) I may lose part of my cargo

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|--------------------------|---------------|--------------------|
| Valid | Strongly Disagree | 116 | 31.6 | 34.1 | 34.1 |
| | Somewhat Disagree | 31 | 8.4 | 9.1 | 43.2 |
| | Neutral | 102 | 27.8 | 30.0 | 73.2 |
| | Somewhat Agree | 56 | 15.3 | 16.5 | 89.7 |
| | Strongly Agree | 35 | 9.5 | 10.3 | 100.0 |
| | Total | 340 | 92.6 | 100.0 | |
| Missing System | | 27 | 7.4 | | |
| Total | | 367 | 100.0 | | |
| Mean Count | | 68.00 | Mean Agreement | | 3 |
| Median Count | | 56.00 | Median Agreement | | 0.51 |
| Std. Deviation Count | | 38.93 | Std. Deviation Agreement | | 0.26 |

e) I'm more concerned about high winds with rain

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|--------------------------|---------------|--------------------|
| Valid | Strongly Disagree | 12 | 3.3 | 3.4 | 3.4 |
| | Somewhat Disagree | 9 | 2.5 | 2.5 | 5.9 |
| | Neutral | 48 | 13.1 | 13.4 | 19.3 |
| | Somewhat Agree | 126 | 34.3 | 35.3 | 54.6 |
| | Strongly Agree | 162 | 44.1 | 45.4 | 100.0 |
| | Total | 357 | 97.3 | 100.0 | |
| Missing System | | 10 | 2.7 | | |
| Total | | 367 | 100.0 | | |
| Mean Count | | 71.40 | Mean Agreement | | 4 |
| Median Count | | 48.00 | Median Agreement | | 0.40 |
| Std. Deviation Count | | 69.21 | Std. Deviation Agreement | | 0.98 |

f) I'm more concerned about it when it is icy

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|----------------------|---------------|--------------------|
| Valid | Strongly Disagree | 11 | 3.0 | 3.2 | 3.2 |
| | Somewhat Disagree | 13 | 3.5 | 3.7 | 6.9 |
| | Neutral | 37 | 10.1 | 10.7 | 17.6 |
| | Somewhat Agree | 82 | 22.3 | 23.6 | 41.2 |
| | Strongly Agree | 204 | 55.6 | 58.8 | 100.0 |
| | Total | 347 | 94.6 | 100.0 | |
| Missing System | | 20 | 5.4 | | |
| Total | | 367 | 100.0 | | |
| Mean Count | | 69.40 | Mean Agreement | | 4 |
| Median Count | | 37.00 | Median Agreement | | 0.32 |
| Std. Deviation Count | | 80.49 | Std. Deviation Agree | | 1.18 |

g) I'm not at all concerned

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|----------------------|---------------|--------------------|
| Valid | Strongly Disagree | 172 | 46.9 | 51.5 | 51.5 |
| | Somewhat Disagree | 53 | 14.4 | 15.9 | 67.4 |
| | Neutral | 73 | 19.9 | 21.9 | 89.2 |
| | Somewhat Agree | 24 | 6.5 | 7.2 | 96.4 |
| | Strongly Agree | 12 | 3.3 | 3.6 | 100.0 |
| | Total | 334 | 91.0 | 100.0 | |
| Missing System | | 33 | 9.0 | | |
| Total | | 367 | 100.0 | | |
| Mean Count | | 66.80 | Mean Agreement | | 2 |
| Median Count | | 53.00 | Median Agreement | | 0.32 |
| Std. Deviation Count | | 63.50 | Std. Deviation Agree | | 0.18 |

6. When high winds are forecasted on this roadway, HOW LIKELY are you to? (Circle only ONE number per line)

| | Very Likely | Somewh at Likely | Neutral | Somewhat Unlikely | Very Unlikely |
|--|-------------|------------------|---------|-------------------|---------------|
| a) allow extra time for the trip? | 5 | 4 | 3 | 2 | 1 |
| b) take another route? Check if there is no alternate route | 5 | 4 | 3 | 2 | 1 |
| c) cancel trip? | 5 | 4 | 3 | 2 | 1 |
| d) decide to make the trip? | 5 | 4 | 3 | 2 | 1 |

a) allow extra time for the trip?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|----------------------|---------------|--------------------|
| Valid Very Unlikely | 23 | 6.3 | 6.6 | 6.6 |
| Somewhat Unlikely | 28 | 7.6 | 8.0 | 14.5 |
| Neutral | 33 | 9.0 | 9.4 | 23.9 |
| Somewhat Likely | 110 | 30.0 | 31.3 | 55.3 |
| Very Likely | 157 | 42.8 | 44.7 | 100.0 |
| Total | 351 | 95.6 | 100.0 | |
| Missing System | 16 | 4.4 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 70.20 | Mean Agreement | | 4 |
| Median Count | 33.00 | Median Agreement | | 0.28 |
| Std. Deviation Count | 60.23 | Std. Deviation Agree | | 0.92 |

b) take another route?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|----------------------|---------------|--------------------|
| Valid Very Unlikely | 80 | 21.8 | 22.7 | 22.7 |
| Somewhat Unlikely | 33 | 9.0 | 9.3 | 32.0 |
| Neutral | 15 | 4.1 | 4.2 | 36.3 |
| Somewhat Likely | 26 | 7.1 | 7.4 | 43.6 |
| Very Likely | 16 | 4.4 | 4.5 | 48.2 |
| No alternate route | 183 | 49.9 | 51.8 | 100.0 |
| Total | 353 | 96.2 | 100.0 | |
| Missing System | 14 | 3.8 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 54.60 | Mean Agreement | | 1 |
| Median Count | 26.00 | Median Agreement | | 0.27 |
| Std. Deviation Count | 72.16 | Std. Deviation Agree | | 0.07 |

c) cancel trip?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|----------------------|---------------|--------------------|
| Valid Very Unlikely | 137 | 37.3 | 38.8 | 38.8 |
| Somewhat Unlikely | 62 | 16.9 | 17.6 | 56.4 |
| Neutral | 38 | 10.4 | 10.8 | 67.1 |
| Somewhat Likely | 64 | 17.4 | 18.1 | 85.3 |
| Very Likely | 52 | 14.2 | 14.7 | 100.0 |
| Total | 353 | 96.2 | 100.0 | |
| Missing System | 14 | 3.8 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 70.60 | Mean Agreement | | 3 |
| Median Count | 62.00 | Median Agreement | | 0.39 |
| Std. Deviation Count | 38.52 | Std. Deviation Agree | | 0.21 |

d) decide to make the trip?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|----------------------|---------------|--------------------|
| Valid Very Unlikely | 35 | 9.5 | 10.2 | 10.2 |
| Somewhat Unlikely | 35 | 9.5 | 10.2 | 20.3 |
| Neutral | 57 | 15.5 | 16.6 | 36.9 |
| Somewhat Likely | 107 | 29.2 | 31.1 | 68.0 |
| Very Likely | 110 | 30.0 | 32.0 | 100.0 |
| Total | 344 | 93.7 | 100.0 | |
| Missing System | 23 | 6.3 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 68.80 | Mean Agreement | | 4 |
| Median Count | 57.00 | Median Agreement | | 0.50 |
| Std. Deviation Count | 37.35 | Std. Deviation Agree | | 0.64 |

7. ODOT has installed a high wind warning system for motorists on Highway US 101 between Port Orford and Wedderburn. The system includes a sign with flashing lights that is turned on during high winds as shown in the picture.

(Check only ONE box per question)

a) Have you seen this sign?

- Yes No – go to Question 8

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------|---------|---------------|--------------------|
| Valid Yes | 229 | 62.4 | 64.0 | 64.0 |
| No | 129 | 35.1 | 36.0 | 100.0 |
| Total | 358 | 97.5 | 100.0 | |
| Missing System | 9 | 2.5 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 179.00 | | | |
| Median Count | 179.00 | | | |
| Std. Deviation Count | 70.71 | | | |

b) Have you seen the lights on top of the sign flashing?

Yes No – go to Question 8 Don't recall

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------|---------|---------------|--------------------|
| Valid Yes | 109 | 29.7 | 43.8 | 43.8 |
| No | 115 | 31.3 | 46.2 | 90.0 |
| Don't recal | 25 | 6.8 | 10.0 | 100.0 |
| Total | 249 | 67.8 | 100.0 | |
| Missing System | 118 | 32.2 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 83.00 | | | |
| Median Count | 109.00 | | | |
| Std. Deviation Count | 50.32 | | | |

c) Were there high winds present when the sign was on?

Yes No Don't recall

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|---------|---------------|--------------------|
| Valid Yes | 99 | 27.0 | 64.7 | 64.7 |
| No | 10 | 2.7 | 6.5 | 71.2 |
| Don't recall | 44 | 12.0 | 28.8 | 100.0 |
| Total | 153 | 41.7 | 100.0 | |
| Missing System | 214 | 58.3 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 51.00 | | | |
| Median Count | 44.00 | | | |
| Std. Deviation Count | 44.91 | | | |

d) Would you find it helpful if wind speeds were posted on the sign?

Yes No

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|---------|---------------|--------------------|
| Valid Yes | 143 | 39.0 | 79.9 | 79.9 |
| No | 36 | 9.8 | 20.1 | 100.0 |
| Total | 179 | 48.8 | 100.0 | |
| Missing System | 188 | 51.2 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 89.50 | | | |
| Median Count | 89.50 | | | |
| Std. Deviation Count | 75.66 | | | |

8. If the lights on the sign WERE flashing indicating high cross winds, when you are driving, HOW LIKELY would you be to...? (Circle only ONE number per line)

| | Very Likely | Somewhat Likely | Neutral | Somewhat Unlikely | Very Unlikely |
|--|-------------|-----------------|---------|-------------------|---------------|
| a) drive more slowly? | 5 | 4 | 3 | 2 | 1 |
| b) pull over to the shoulder and wait? | 5 | 4 | 3 | 2 | 1 |
| c) stop at a nearby area and wait? | 5 | 4 | 3 | 2 | 1 |
| d) take an alternate route? | 5 | 4 | 3 | 2 | 1 |
| e) make no changes? | 5 | 4 | 3 | 2 | 1 |

a) drive more slowly?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------|--------------------------|---------------|--------------------|
| Valid Very Unlikely | 7 | 1.9 | 2.0 | 2.0 |
| Somewhat Unlikely | 7 | 1.9 | 2.0 | 3.9 |
| Neutral | 11 | 3.0 | 3.1 | 7.0 |
| Somewhat Likely | 93 | 25.3 | 26.1 | 33.1 |
| Very Likely | 238 | 64.9 | 66.9 | 100.0 |
| Total | 356 | 97.0 | 100.0 | |
| Missing System | 11 | 3.0 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 71.20 | Mean Agreement | | 5 |
| Median Count | 11.00 | Median Agreement | | 0.09 |
| Std. Deviation Count | 100.21 | Std. Deviation Agreement | | 1.42 |

b) pull over to the shoulder and wait?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|--------------------------|---------------|--------------------|
| Valid Very Unlikely | 129 | 35.1 | 37.2 | 37.2 |
| Somewhat Unlikely | 100 | 27.2 | 28.8 | 66.0 |
| Neutral | 50 | 13.6 | 14.4 | 80.4 |
| Somewhat Likely | 45 | 12.3 | 13.0 | 93.4 |
| Very Likely | 23 | 6.3 | 6.6 | 100.0 |
| Total | 347 | 94.6 | 100.0 | |
| Missing System | 20 | 5.4 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 69.40 | Mean Agreement | | 2 |
| Median Count | 50.00 | Median Agreement | | 0.43 |
| Std. Deviation Count | 43.63 | Std. Deviation Agreement | | 0.10 |

c) stop at a nearby area and wait?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|--------------------------|---------------|--------------------|
| Valid Very Unlikely | 133 | 36.2 | 38.3 | 38.3 |
| Somewhat Unlikely | 86 | 23.4 | 24.8 | 63.1 |
| Neutral | 50 | 13.6 | 14.4 | 77.5 |
| Somewhat Likely | 50 | 13.6 | 14.4 | 91.9 |
| Very Likely | 28 | 7.6 | 8.1 | 100.0 |
| Total | 347 | 94.6 | 100.0 | |
| Missing System | 20 | 5.4 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 69.40 | Mean Agreement | | 2 |
| Median Count | 50.00 | Median Agreement | | 0.43 |
| Std. Deviation Count | 41.19 | Std. Deviation Agreement | | 0.08 |

d) take an alternate route?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|--------------------------|---------------|--------------------|
| Valid Very Unlikely | 220 | 59.9 | 65.3 | 65.3 |
| Somewhat Unlikely | 58 | 15.8 | 17.2 | 82.5 |
| Neutral | 25 | 6.8 | 7.4 | 89.9 |
| Somewhat Likely | 19 | 5.2 | 5.6 | 95.5 |
| Very Likely | 15 | 4.1 | 4.5 | 100.0 |
| Total | 337 | 91.8 | 100.0 | |
| Missing System | 30 | 8.2 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 67.40 | Mean Agreement | | 2 |
| Median Count | 25.00 | Median Agreement | | 0.23 |
| Std. Deviation Count | 86.98 | Std. Deviation Agreement | | 0.18 |

e) make no changes?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|--------------------------|---------------|--------------------|
| Valid Very Unlikely | 74 | 20.2 | 21.8 | 21.8 |
| Somewhat Unlikely | 41 | 11.2 | 12.1 | 33.8 |
| Neutral | 87 | 23.7 | 25.6 | 59.4 |
| Somewhat Likely | 79 | 21.5 | 23.2 | 82.6 |
| Very Likely | 59 | 16.1 | 17.4 | 100.0 |
| Total | 340 | 92.6 | 100.0 | |
| Missing System | 27 | 7.4 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 68.00 | Mean Agreement | | 3 |
| Median Count | 74.00 | Median Agreement | | 0.77 |
| Std. Deviation Count | 18.22 | Std. Deviation Agreement | | 0.33 |

9. Based on your experience, how much do you agree with the following statements. (Circle only ONE per line)

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|----------------|-------|---------|----------|-------------------|
| a) This system would provide me useful information. | 5 | 4 | 3 | 2 | 1 |
| b) The system would accurately indicate when high winds are present. | 5 | 4 | 3 | 2 | 1 |
| c) I would feel safer driving this road knowing the system is in place. | 5 | 4 | 3 | 2 | 1 |
| d) This system does not sound very useful. | 5 | 4 | 3 | 2 | 1 |

a) This system would provide me useful information

| | Count | Percent | Valid Percent | Cumulative Percent |
|-------------------------|-------|--------------------------|---------------|--------------------|
| Valid Strongly disagree | 6 | 1.6 | 1.7 | 1.7 |
| Disagree | 7 | 1.9 | 2.0 | 3.6 |
| Neutral | 26 | 7.1 | 7.3 | 10.9 |
| Agree | 151 | 41.1 | 42.2 | 53.1 |
| Strongly agree | 168 | 45.8 | 46.9 | 100.0 |
| Total | 358 | 97.5 | 100.0 | |
| Missing System | 9 | 2.5 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 71.60 | Mean Agreement | | 4 |
| Median Count | 26.00 | Median Agreement | | 0.22 |
| Std. Deviation Count | 80.86 | Std. Deviation Agreement | | 1.09 |

b) This system would accurately indicate when high winds are present

| | Count | Percent | Valid Percent | Cumulative Percent |
|-------------------------|-------|--------------------------|---------------|--------------------|
| Valid Strongly disagree | 6 | 1.6 | 1.7 | 1.7 |
| Disagree | 5 | 1.4 | 1.4 | 3.1 |
| Neutral | 47 | 12.8 | 13.4 | 16.5 |
| Agree | 154 | 42.0 | 43.8 | 60.2 |
| Strongly agree | 140 | 38.1 | 39.8 | 100.0 |
| Total | 352 | 95.9 | 100.0 | |
| Missing System | 15 | 4.1 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 70.40 | Mean Agreement | | 4 |
| Median Count | 47.00 | Median Agreement | | 0.40 |
| Std. Deviation Count | 72.12 | Std. Deviation Agreement | | 0.95 |

c) I would feel safer driving this road knowing the system is in place

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|--------------------------|---------------|--------------------|
| Valid | Strongly disagree | 10 | 2.7 | 2.8 | 2.8 |
| | Disagree | 10 | 2.7 | 2.8 | 5.6 |
| | Neutral | 60 | 16.3 | 16.8 | 22.4 |
| | Agree | 132 | 36.0 | 37.0 | 59.4 |
| | Strongly agree | 145 | 39.5 | 40.6 | 100.0 |
| | Total | 357 | 97.3 | 100.0 | |
| Missing System | | 10 | 2.7 | | |
| Total | | 367 | 100.0 | | |
| Mean Count | | 71.40 | Mean Agreement | | 4 |
| Median Count | | 60.00 | Median Agreement | | 0.50 |
| Std. Deviation Count | | 64.73 | Std. Deviation Agreement | | 0.90 |

d) This system does not sound very useful

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|--------------------------|---------------|--------------------|
| Valid | Strongly disagree | 165 | 45.0 | 47.6 | 47.6 |
| | Disagree | 93 | 25.3 | 26.8 | 74.4 |
| | Neutral | 65 | 17.7 | 18.7 | 93.1 |
| | Agree | 11 | 3.0 | 3.2 | 96.3 |
| | Strongly agree | 13 | 3.5 | 3.7 | 100.0 |
| | Total | 347 | 94.6 | 100.0 | |
| Missing System | | 20 | 5.4 | | |
| Total | | 367 | 100.0 | | |
| Mean Count | | 69.40 | Mean Agreement | | 2 |
| Median Count | | 65.00 | Median Agreement | | 0.48 |
| Std. Deviation Count | | 63.85 | Std. Deviation Agreement | | 0.20 |

*Technical Memorandum 1***10. Are there other locations that you travel in Oregon where this system might be beneficial? If so, please list them in the space below.**

| | | | |
|---|---|--|---|
| Anywhere on the coast if a wind speed is mentioned. | 4 | Lincoln through Gold Beach and Okiah through Crescent City | 1 |
| Ashland | 1 | Many places along the coast experience very high winds. | 1 |
| Between Bandon and Coos Bay | 4 | Maybe up around Newport, Lincoln City | 1 |
| Between Florence and Yachats; Heceta Head and Cape Perpetua | 1 | McCoullough Bridge, Coos Bay | 1 |
| Bridge on 101 between North Bend and Glasgow | 1 | McCully Bridge North Bend | 1 |
| Bridge to Newport on 101 | 1 | Meacham & Cabbage Hill | 1 |
| Cape Blanco | 1 | Most bridges on coast, we had a near fatality on the bridge near us due to high wind. | 1 |
| Cape Perpetua | 1 | Move sign from Port Orford north to Bandon | 1 |
| Columbia River Gorge | 8 | Myers Creek Beach coming down the hill | 1 |
| Coos Bay Hwy 101 on coast | 1 | Near Cape Blance - above Port Orford and areas on Hwy 199 | 2 |
| Entire coastal 101 | 1 | Near Pistol River on Hwy 101 (Gold Beach to Brookings) | 1 |
| Florence to Yachats | 4 | Newport to Lincoln City | 2 |
| Going North to Newport | 1 | No, wast of ODOT money. | 1 |
| Goldbeach to Creasent City | 3 | Normally we don't travel when we have knowledge of strong winds on our coastal area which are seldom. | 1 |
| Gorge, I 205 Bridge over the Columbia River | 1 | North Bend Bridge | 2 |
| Hood River - Columbia Gorge | 1 | North of Newport on 101, crossing the Astoria Bridge on bridges by Gold Beach. | 1 |
| Hwy 101 from Bandon north to Coos Bay | 1 | On Hwy 199 & Hwy 5 over Mt Ashland | 1 |
| Hwy 101 from Brookings to Florence | 1 | Pistor River area @ Hwy 101. Short bridge over river tunnels high wind and will move vehicle 2-3 feet as you enter bridge, Gold Beach to Brookings. | 6 |
| Hwy 101 just north of North Bend at the Dunes. | 1 | Rocky Point between Port Orford and Humbug Mt. | 1 |
| Hwy 101 north of Florence. | 2 | Sea Lion Caves, just nort of Florence. | 3 |
| Hwy 199 | 1 | Siskyou Pass | 1 |
| Hwy 42 and 38 both heading along the river and hills, winds often catch you in different areas. | 3 | Slide warning signs!! Hwy 38, all along 101 North and South | 1 |
| Hwy 84 signs east part of state and other places along 101, Hwy J and I-84 | 2 | The Dalles on the South end of town on the freeway | 1 |
| Hwy from Grants pass headed to Mt. Shasta | 1 | The Gorge between Cascade Locks and The Dalles | 1 |
| I am more concerned with icy roads than winds. True temperature indicators at various points on coast to valley routes #42, 36, and 126 and others. | 1 | The Marquna, Fremont, and Sam Jackson Bridges in Portland | 1 |
| I live on the Coast, so you could pretty much pick a place between M.P. and Coos Bay. | 1 | This is probably the worst area on Hwy 101, although there are other areas, expecially open bridge areas taht are dangerous. Even on other coastal highways such as where I live on Cape Arago hwy bad | 1 |
| I think this system is useful for people not used to the area or are not used to driving vehicles with an extra large surface area. | 1 | Traveling over mountain passes | 1 |
| I would go the long way. I think this road is very dangerous. | 1 | Very short distances north of Florence near Sea Lion Caves. | 4 |
| I-5 between Eugene & Albany | 1 | | |
| I-84 South of Portland (Columbia Gorge) | 5 | | |
| I've been hearing about strong winds ever since I moved to Oregon two years ago, so far I haven't seen any | 1 | | |
| Jordan Cave; North Bend -up the Columbia River Gorge | 1 | | |
| Lane County Hwy 58 | 1 | | |

11. The following information is needed to ensure that your travel needs are properly represented in this survey. It will be used for the purposes of this survey only.
 (Check ONE box per question)

a) What is your home zip code?

| Zip Code | Count | Percent | Valid Percent | Cumulative Percent |
|----------------|-------|---------|---------------|--------------------|
| Valid 35501 | 1 | 0.3 | 0.3 | 0.3 |
| 57465 | 1 | 0.3 | 0.3 | 0.6 |
| 83617 | 1 | 0.3 | 0.3 | 0.9 |
| 95485 | 1 | 0.3 | 0.3 | 1.1 |
| 95531 | 1 | 0.3 | 0.3 | 1.4 |
| 97015 | 1 | 0.3 | 0.3 | 1.7 |
| 97060 | 1 | 0.3 | 0.3 | 2.0 |
| 97071 | 1 | 0.3 | 0.3 | 2.3 |
| 97266 | 1 | 0.3 | 0.3 | 2.6 |
| 97325 | 1 | 0.3 | 0.3 | 2.9 |
| 97402 | 3 | 0.8 | 0.9 | 3.7 |
| 97410 | 1 | 0.3 | 0.3 | 4.0 |
| 97411 | 22 | 6.0 | 6.3 | 10.3 |
| 97415 | 75 | 20.4 | 21.4 | 31.7 |
| 97420 | 128 | 34.9 | 36.6 | 68.3 |
| 97423 | 44 | 12.0 | 12.6 | 80.9 |
| 97426 | 1 | 0.3 | 0.3 | 81.1 |
| 97444 | 33 | 9.0 | 9.4 | 90.6 |
| 97450 | 1 | 0.3 | 0.3 | 90.9 |
| 97458 | 22 | 6.0 | 6.3 | 97.1 |
| 97459 | 3 | 0.8 | 0.9 | 98.0 |
| 97477 | 1 | 0.3 | 0.3 | 98.3 |
| 97501 | 1 | 0.3 | 0.3 | 98.6 |
| 97508 | 1 | 0.3 | 0.3 | 98.9 |
| 97527 | 1 | 0.3 | 0.3 | 99.1 |
| 97603 | 1 | 0.3 | 0.3 | 99.4 |
| 98374 | 1 | 0.3 | 0.3 | 99.7 |
| 98564 | 1 | 0.3 | 0.3 | 100.0 |
| Total | 350 | 95.4 | 100.0 | |
| Missing System | 17 | 4.6 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 12.50 | | | |
| Median Count | 1.00 | | | |
| Std. Deviation | 28.33 | | | |

b) What is your age?

| Age | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|--------------------|---------------|--------------------|
| Valid 15 - 24 years | 2 | 0.5 | 0.6 | 0.6 |
| 25 - 44 years | 56 | 15.3 | 15.6 | 16.2 |
| 45 - 64 years | 171 | 46.6 | 47.6 | 63.8 |
| 65 + years | 130 | 35.4 | 36.2 | 100.0 |
| Total | 359 | 97.8 | 100.0 | |
| Missing System | 8 | 2.2 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 89.75 | Mean Age | | 56 |
| Median Count | 93.00 | Median Age | | 14.91 |
| Std. Deviation Count | 75.41 | Std. Deviation Age | | 13.16 |

c) What is your gender?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------|---------|---------------|--------------------|
| Valid Male | 242 | 65.9 | 67.4 | 67.4 |
| Female | 117 | 31.9 | 32.6 | 100.0 |
| Total | 359 | 97.8 | 100.0 | |
| Missing System | 8 | 2.2 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 179.50 | | | |
| Median Count | 179.50 | | | |
| Std. Deviation Count | 88.39 | | | |

d) What type of vehicle do you normally drive when you go over Yaquina Bay Bridge?

| | Count | Percent | Valid Percent | Cumulative Percent |
|--|--------|---------|---------------|--------------------|
| Valid Passenger car/pickup/sport-utility vehicle/minivan | 287 | 78.2 | 84.4 | 84.4 |
| Recreational | 15 | 4.1 | 4.4 | 88.8 |
| Semi Truck | 27 | 7.4 | 7.9 | 96.8 |
| Bus | 2 | 0.5 | 0.6 | 97.4 |
| Other | 9 | 2.5 | 2.6 | 100.0 |
| Total | 340 | 92.6 | 100.0 | |
| Missing System | 27 | 7.4 | | |
| Total | 367 | 100.0 | | |
| Mean Count | 68.00 | | | |
| Median Count | 15.00 | | | |
| Std. Deviation Count | 122.77 | | | |

Please provide any comments that you think would help us in this study.

| Comments | Count |
|--|-------|
| No Comments/Too Long | 247 |
| Change Survey Questions | 4 |
| A major study & action in improve Hwy 199 (it is very important to get to medical facilities in the Medford area from Brookings. | |
| About 2 weeks ago a car blew off the road, hit a large rock and turned over (per driver's story). This was on hwy 101 about 2 miles N. of Brookings. I saw the vehicle lying on its top just after it happened but did not notice high wind when I passed. | |
| Actually stay home if weather is bad. | 2 |
| As all drivers should know is: know your own ability to drive what ever vehicle you driver and drive accordingly to weather conditions not the maximum legal speed. | 4 |
| At high winds I'm more concerned about falling limbs and trees. | |
| Family took a motorhome there this section before the lights & sign and almost lost control in the high winds. THis sign is a must on this section. | |
| Fix and repair the road, all the dips & highwinds may blow you into the other lane with the combination of these and speeds.Repairing road would help!. Road maintenance & repair is way more important! | 8 |
| How about some emergency roadside phones in case of an emergency. Eliminate passing lanes used by both directions on hills. | |
| 1. Hwy 101 is the most beautiful, I have ever seen. Use more of the wind warning systems they are very helpful. 2. I'm sure the warning should help. I think this survey is great. Nice job, very good survey. 3.Keep up the good work, we're glad the sign is | 17 |
| I answered #1 as 1 time per week because last year I worked for a Durable Medical Co. & drove down & back every week. Some days you could see the wind blow across the road (sand) | |
| I believe such signs are useful in all areas where high winds can be common & pose a risk to motorists. | |
| I do not travel the 101 coast unless snow stops me on I-5 going south to Mexico. | |
| I feel that posting the wind speeds would be very helpful. Also that knowing the speeds of the wind may determine, the likelihood of my traveling the higher the winds the less likely I would travel during that time. | 4 |
| I have frequently called ODOT during high winds and the sign near Wedderburn was not flashing. I'd feel better if I knew the system was really working. | 4 |
| I have traveled this route since 1991 in all types of weather. Speed is a major factor to safely drive this route. Semis and large recreational vehicles should always be rerouted or parked during extremely high winds. | 27 |
| I previously seen a truck pulling a trailer blown off the bridge of Humbug . | |
| I really feel that more of the signs (placed closer together) would be reminding people to slow down. Remeber the old saying "out of sight, out of mind"? People do that!! | |
| I think the sign will be very helpful for people who are not familiar with that stretch of highway. In adverse conditions I stay closer to home. | 5 |
| I traveled that route to Brooking during many basketball games for my younger brother & then with my son. I never recall cancelling my trip | |
| If there is lots of wind, why not put up wind turbines, we could sure use the added power. | |
| I'm very afraid of high, gusty winds with rain particularly. | |
| It's just one windy place and I don't know what you could do to change that. It would be great if you could! | |
| I've been driving this highway from over 65 years with trucks with lowboy loads, pickup with 29' trailer, pickup with a camper, model H Fords, only fools get in trouble on this road. | |
| Just seeing the sign is a good reminder of potential high winds & would make me think to be more cautious. | |
| Lights should be controlled locally - not from Portland ODOT Headquarters | |
| Most drivers do not pay attention to signs, speed limits, or passing lanes, which makes it difficult for those of us who do! | |
| My wife put in her input along with mine and she is a driver to at times and from her passenger seat gives me information to help me drive. | |
| No mention of how this high wind machine recieves its signal to warn people - If it's by a person who decides, if its set off by sensors along the way, if sign is between Port Orford & Wedderburn the persons on their way need one on each end.... | |

Technical Memorandum 1

| Comments | Count |
|--|-------|
| Not only the wind but slide conditions are a definite concern. Curry Co. has a type of soil that causes sections of the highway to crack, drop, slip and slide. Hazardous at times. DETOURS | 1 |
| Place warning signs or flashing lights at or near the bluffs, they know the wind blows across the road. | 1 |
| Put another warning at Humbug Mt. | 1 |
| Some drivers are not too smart, and need all the help they can get. | 1 |
| Storm watching (surf and wind) along this section of highway is popular so wind warning may alert some people that good storm watching conditions may be enjoyed. | 1 |
| The light should have been put up years ago. | 1 |
| The reconstruction of 101 around Humbug Mt was a tremendous success. Accident (mainly due to speed and ice) have decreased markedly!. This system added would be great. Ice indicator were good here too! | 1 |
| There are numerous areas along the coast on hwy 101 which a system such as this would be helpful and beneficial to motorist safety. These areas are along the numerous bluffs where hwy 101 traverses the coast line going north and south. | 1 |
| There is no alternate route. In 40 years of traveling this route we have never hesitated to travel because of weather. It is an open route when I-5 is closed to San Francisco. | 1 |
| This is an excellent system. | 1 |
| this kind of sign may be somewhat helpful but there is no substitute for careful & attentive driving. I think cost of installing these signs will bring minimal results | 1 |
| This will help but you have to get people to slow down. | 1 |
| Usually we have plenty of high wind warning for large storms - television, radio and internet. | 1 |
| Very Good | 1 |
| we drive a 32'G RV with special handling equipment front & rear so wind under 60 mph have little effect. However winds go much higher along 101, 5, and 84 wind warning help to drive both defensively and offensively, canyon areas are always bad. | 1 |
| We have driven this part of 101 about three times in the last 10 or 15 years without incident. | 1 |
| We recently traveled this route on memorial day weekend and experienced high enough winds to cause weaving within our lane. The sign was not flashing but would have given us a good heads-up if it had been. | 1 |
| High winds can occur other than Nov-Mar. | 1 |
| We travel this often. My husband's Drs. are in Coos Bay, North Bend. Yes we fight the winds bad highway and unpainted lines in several places. We don't live close to Salem or Portland, so nothing is done. | 1 |
| We use our van when going to Coos Bay and our truck and 5th wheel when going north camping. Strong winds have caused us concern in the past on several occasions. | 1 |
| We were born & raised in the Coos Bay area, but 10.5 years in Gold Beach area, so we are aware of what the wind can do. We were in Wedderburn overlooking the ocean during the 62 flood and 64 storm. We think you are on the right track. | 1 |
| When you consider we have hurricane force winds on the NW coast, it only makes sense to have some type of educational or warning system in places for those who may not realize this. | 1 |
| Out-of-state study concerns | 2 |
| Wind is just another element when living on the south coast, life goes on. | 1 |
| Winds can come up suddenly and be very treacherous along the coast and not only between Nov & Mar, One of the worst storms took place Oct 12. 2003 | 1 |
| Total N | 367 |

Results of Survey for Yaquina Bay Bridge System

1. **How often do you travel over Yaquina Bay Bridge on Highway US 101(see map).** *(Check only ONE box)*

- Daily
- Once or twice in a week
- Once or twice in a month
- Once or twice in a year
- Never

| | Count | Percent | Valid Percent | Cumulative Percent |
|--------------------------|-------|-----------------------------|---------------|--------------------|
| Valid Daily | 85 | 19.6 | 19.6 | 19.6 |
| Once or twice in a week | 155 | 35.7 | 35.8 | 55.4 |
| Once or twice in a month | 125 | 28.8 | 28.9 | 84.3 |
| Once or twice in a year | 58 | 13.4 | 13.4 | 97.7 |
| Never | 10 | 2.3 | 2.3 | 100.0 |
| Total | 433 | 99.8 | 100.0 | |
| Missing System | 1 | 0.2 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 86.60 | Mean Annual Trips | | 84 |
| Median Count | 85.00 | Median Annual Trips | | 5.20 |
| Std. Deviation Count | 56.66 | Std. Deviation Annual Trips | | 22.30 |

2. **Did you encounter high winds when you drove over this bridge anytime since November 2003?**

(Check only ONE box)

- Yes
- No
- Don't recall

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------|--------|---------|---------------|--------------------|
| Valid Yes | 225 | 51.8 | 52.8 | 52.8 |
| No | 134 | 30.9 | 31.5 | 84.3 |
| Don't recall | 67 | 15.4 | 15.7 | 100.0 |
| Total | 426 | 98.2 | 100.0 | |
| Missing System | 8 | 1.8 | | |
| Total | 434 | 100.0 | | |
| Mean | 142.00 | | | |
| Median | 134.00 | | | |
| Std. Deviation | 79.30 | | | |

3. How concerned are you about high winds when driving on this bridge? (Check only ONE box)

- Always concerned
- Concerned during this season (November to March)
- Concerned **only during storms** in this season (November to March)
- Not at all concerned

| | Count | Percent | Valid Percent | Cumulative Percent |
|---|--------|---------|---------------|--------------------|
| Valid Always concerned | 101 | 23.3 | 23.7 | 23.7 |
| Concerned during this season (Nov - Mar) | 38 | 8.8 | 8.9 | 32.6 |
| Concerned only during storms in this season (Nov - Mar) | 236 | 54.4 | 55.4 | 88.0 |
| Not concerned at all | 51 | 11.8 | 12.0 | 100.0 |
| Total | 426 | 98.2 | 100.0 | |
| Missin System | 8 | 1.8 | | |
| Total | 434 | 100.0 | | |
| Mean | 106.50 | | | |
| Median | 76.00 | | | |
| Std. Deviation | 90.50 | | | |

4. What information sources do you use for weather information before traveling? (Check ALL that apply)

- Television
- Radio
- Observation of existing conditions
- Other (please specify) _____
- Newspaper
- Dial 511 or 1-800-977-ODOT
- TripCheck Website
- None

| | Count | Percent | Valid Percent | Cumulative Percent |
|------------------------------------|-------|---------|---------------|--------------------|
| Valid Television | 247 | 56.9 | 58.0 | 58.0 |
| Radio | 88 | 20.3 | 20.7 | 78.6 |
| Observation of existing conditions | 63 | 14.5 | 14.8 | 93.4 |
| Dial 511 or 1 - 800 - 977 - ODOT | 1 | 0.2 | 0.2 | 93.7 |
| TripCheck Website | 3 | 0.7 | 0.7 | 94.4 |
| None | 22 | 5.1 | 5.2 | 99.5 |
| Other | 2 | 0.5 | 0.5 | 100.0 |
| Total | 426 | 98.2 | 100.0 | |
| Missing System | 8 | 1.8 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 18.20 | | | |
| Median Count | 3.00 | | | |
| Std. Deviation Count | 26.51 | | | |

5. How much do you agree with the following statements related to your driving in high winds?

(Circle only ONE number per line)

| | Strongly Agree | Somewhat Agree | Neutral | Somewhat Disagree | Strongly Disagree |
|---|----------------|----------------|---------|-------------------|-------------------|
| a) My vehicle may leave its lane. | 5 | 4 | 3 | 2 | 1 |
| b) My vehicle may overturn. | 5 | 4 | 3 | 2 | 1 |
| c) Other vehicles may overturn or leave their lane. | 5 | 4 | 3 | 2 | 1 |
| d) I may lose part of my cargo. | 5 | 4 | 3 | 2 | 1 |
| e) I'm more concerned about high winds with rain. | 5 | 4 | 3 | 2 | 1 |
| f) I'm more concerned about it when it is icy. | 5 | 4 | 3 | 2 | 1 |
| g) I'm not at all concerned | 5 | 4 | 3 | 2 | 1 |

a) My vehicle may leave its lane

| | Count | Percent | Valid Percent | Cumulative Percent |
|-------------------------|-------|--------------------------|---------------|--------------------|
| Valid Strongly Disagree | 41 | 9.4 | 9.6 | 9.6 |
| Somewhat Disagree | 53 | 12.2 | 12.4 | 22.0 |
| Neutral | 55 | 12.7 | 12.9 | 34.9 |
| Somewhat Agree | 172 | 39.6 | 40.3 | 75.2 |
| Strongly Agree | 106 | 24.4 | 24.8 | 100.0 |
| Total | 427 | 98.4 | 100.0 | |
| Missing System | 7 | 1.6 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 85.40 | Mean Agreement | | 4 |
| Median Count | 55.00 | Median Agreement | | 0.39 |
| Std. Deviation Count | 54.47 | Std. Deviation Agreement | | 3.13 |

b) My vehicle may overturn

| | Count | Percent | Valid Percent | Cumulative Percent |
|-------------------------|-------|--------------------------|---------------|--------------------|
| Valid Strongly Disagree | 136 | 31.3 | 32.1 | 32.1 |
| Somewhat Disagree | 108 | 24.9 | 25.5 | 57.5 |
| Neutral | 92 | 21.2 | 21.7 | 79.2 |
| Somewhat Agree | 60 | 13.8 | 14.2 | 93.4 |
| Strongly Agree | 28 | 6.5 | 6.6 | 100.0 |
| Total | 424 | 97.7 | 100.0 | |
| Missing System | 10 | 2.3 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 84.80 | Mean Agreement | | 2 |
| Median Count | 92.00 | Median Agreement | | 0.51 |
| Std. Deviation Count | 41.99 | Std. Deviation Agreement | | 0.68 |

c) Other vehicles may overturn or leave its lane

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|--------------------------|---------------|--------------------|
| Valid | Strongly Disagree | 11 | 2.5 | 2.6 | 2.6 |
| | Somewhat Disagree | 18 | 4.1 | 4.2 | 6.8 |
| | Neutral | 42 | 9.7 | 9.9 | 16.7 |
| | Somewhat Agree | 177 | 40.8 | 41.6 | 58.4 |
| | Strongly Agree | 177 | 40.8 | 41.6 | 100.0 |
| | Total | 425 | 97.9 | 100.0 | |
| Missing | System | 9 | 2.1 | | |
| | Total | 434 | 100.0 | | |
| Mean Count | | 85.00 | Mean Agreement | | 4 |
| Median Count | | 42.00 | Median Agreement | | 0.30 |
| Std. Deviation Count | | 84.77 | Std. Deviation Agreement | | 4.51 |

d) I may lose part of my cargo

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|--------------------------|---------------|--------------------|
| Valid | Strongly Disagree | 130 | 30.0 | 31.3 | 31.3 |
| | Somewhat Disagree | 67 | 15.4 | 16.1 | 47.4 |
| | Neutral | 115 | 26.5 | 27.6 | 75.0 |
| | Somewhat Agree | 65 | 15.0 | 15.6 | 90.6 |
| | Strongly Agree | 39 | 9.0 | 9.4 | 100.0 |
| | Total | 416 | 95.9 | 100.0 | |
| Missing | System | 18 | 4.1 | | |
| | Total | 434 | 100.0 | | |
| Mean Count | | 83.20 | Mean Agreement | | 3 |
| Median Count | | 67.00 | Median Agreement | | 0.47 |
| Std. Deviation Count | | 37.91 | Std. Deviation Agreement | | 1.00 |

e) I'm more concerned about high winds with rain

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|--------------------------|---------------|--------------------|
| Valid | Strongly Disagree | 14 | 3.2 | 3.3 | 3.3 |
| | Somewhat Disagree | 22 | 5.1 | 5.1 | 8.4 |
| | Neutral | 70 | 16.1 | 16.4 | 24.8 |
| | Somewhat Agree | 169 | 38.9 | 39.5 | 64.3 |
| | Strongly Agree | 153 | 35.3 | 35.7 | 100.0 |
| | Total | 428 | 98.6 | 100.0 | |
| Missing | System | 6 | 1.4 | | |
| | Total | 434 | 100.0 | | |
| Mean Count | | 85.60 | Mean Agreement | | 4 |
| Median Count | | 70.00 | Median Agreement | | 0.49 |
| Std. Deviation Count | | 72.31 | Std. Deviation Agreement | | 3.89 |

f) I'm more concerned about it when it is icy

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|--------|--------------------------|---------------|--------------------|
| Valid | Strongly Disagree | 8 | 1.8 | 1.9 | 1.9 |
| | Somewhat Disagree | 10 | 2.3 | 2.3 | 4.2 |
| | Neutral | 25 | 5.8 | 5.9 | 10.1 |
| | Somewhat Agree | 111 | 25.6 | 26.0 | 36.1 |
| | Strongly Agree | 273 | 62.9 | 63.9 | 100.0 |
| | Total | 427 | 98.4 | 100.0 | |
| Missing System | 7 | 1.6 | | | |
| Total | | 434 | 100.0 | | |
| Mean Count | | 85.40 | Mean Agreement | | 4 |
| Median Count | | 25.00 | Median Agreement | | 0.18 |
| Std. Deviation Count | | 113.11 | Std. Deviation Agreement | | 6.33 |

g) I'm not at all concerned

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|--------------------------|---------------|--------------------|
| Valid | Strongly Disagree | 225 | 51.8 | 54.2 | 54.2 |
| | Somewhat Disagree | 78 | 18.0 | 18.8 | 73.0 |
| | Neutral | 82 | 18.9 | 19.8 | 92.8 |
| | Somewhat Agree | 14 | 3.2 | 3.4 | 96.1 |
| | Strongly Agree | 16 | 3.7 | 3.9 | 100.0 |
| | Total | 415 | 95.6 | 100.0 | |
| Missing System | 19 | 4.4 | | | |
| Total | | 434 | 100.0 | | |
| Mean Count | | 83.00 | Mean Agreement | | 2 |
| Median Count | | 78.00 | Median Agreement | | 0.38 |
| Std. Deviation Count | | 85.79 | Std. Deviation Agreement | | 0.93 |

6. When high winds are forecasted over this bridge, HOW LIKELY are you to? (Circle only ONE number per line)

| | Very Likely | Somewhat Likely | Neutral | Somewhat Unlikely | Very Unlikely |
|--|-------------|-----------------|---------|-------------------|---------------|
| a) allow extra time for the trip? | 5 | 4 | 3 | 2 | 1 |
| b) take another route? Check if there is no alternate route | 5 | 4 | 3 | 2 | 1 |
| c) cancel trip? | 5 | 4 | 3 | 2 | 1 |
| d) decide to make the trip? | 5 | 4 | 3 | 2 | 1 |

a) allow extra time for the trip?

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|--------------------------|---------------|--------------------|
| Valid | Very Unlikely | 40 | 9.2 | 9.5 | 9.5 |
| | Somewhat Unlikely | 35 | 8.1 | 8.3 | 17.8 |
| | Neutral | 61 | 14.1 | 14.5 | 32.3 |
| | Somewhat Likely | 144 | 33.2 | 34.2 | 66.5 |
| | Very Likely | 141 | 32.5 | 33.5 | 100.0 |
| | Total | 421 | 97.0 | 100.0 | |
| Missing System | | 13 | 3.0 | | |
| Total | | 434 | 100.0 | | |
| Mean Count | | 84.20 | Mean Agreement | | 4 |
| Median Count | | 61.00 | Median Agreement | | 0.43 |
| Std. Deviation Count | | 54.12 | Std. Deviation Agreement | | 3.35 |

b) take another route?

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------------------|--------|--------------------------|---------------|--------------------|
| Valid | Very Unlikely | 71 | 16.4 | 16.9 | 16.9 |
| | Somewhat Unlikely | 30 | 6.9 | 7.2 | 24.1 |
| | Neutral | 24 | 5.5 | 5.7 | 29.8 |
| | Somewhat Likely | 12 | 2.8 | 2.9 | 32.7 |
| | Very Likely | 17 | 3.9 | 4.1 | 36.8 |
| | No alternate route | 265 | 61.1 | 63.2 | 100.0 |
| | Total | 419 | 96.5 | 100.0 | |
| Missing System | | 15 | 3.5 | | |
| Total | | 434 | 100.0 | | |
| Mean Count | | 69.60 | Mean Agreement | | 1 |
| Median Count | | 24.00 | Median Agreement | | 0.19 |
| Std. Deviation Count | | 109.45 | Std. Deviation Agreement | | 0.17 |

c) cancel trip?

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------------------|-------|--------------------------|---------------|--------------------|
| Valid | Very Unlikely | 140 | 32.3 | 33.3 | 33.3 |
| | Somewhat Unlikely | 89 | 20.5 | 21.2 | 54.5 |
| | Neutral | 50 | 11.5 | 11.9 | 66.4 |
| | Somewhat Likely | 80 | 18.4 | 19.0 | 85.5 |
| | Very Likely | 61 | 14.1 | 14.5 | 100.0 |
| | Total | 420 | 96.8 | 100.0 | |
| Missing System | | 14 | 3.2 | | |
| Total | | 434 | 100.0 | | |
| Mean Count | | 84.00 | Mean Agreement | | 3 |
| Median Count | | 80.00 | Median Agreement | | 0.42 |
| Std. Deviation Count | | 34.86 | Std. Deviation Agreement | | 0.95 |

d) decide to make the trip?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|--------------------------|---------------|--------------------|
| Valid Very Unlikely | 42 | 9.7 | 10.2 | 10.2 |
| Somewhat Unlikely | 47 | 10.8 | 11.5 | 21.7 |
| Neutral | 78 | 18.0 | 19.0 | 40.7 |
| Somewhat Likely | 122 | 28.1 | 29.8 | 70.5 |
| Very Likely | 121 | 27.9 | 29.5 | 100.0 |
| Total | 410 | 94.5 | 100.0 | |
| Missing System | 24 | 5.5 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 82.00 | Mean Agreement | | 4 |
| Median Count | 78.00 | Median Agreement | | 0.57 |
| Std. Deviation Count | 38.61 | Std. Deviation Agreement | | 2.69 |

7. ODOT has installed a high wind warning system for motorists on Yaquina bay bridge on US Route 101. The system includes a sign with flashing lights that automatically turn on during high winds as shown in the picture. (Check only ONE box per question)

a) Have you seen this sign?

- Yes No – go to Question 8

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------|---------|---------------|--------------------|
| Valid Yes | 310 | 71.4 | 72.9 | 72.9 |
| No | 115 | 26.5 | 27.1 | 100.0 |
| Total | 425 | 97.9 | 100.0 | |
| Missing System | 9 | 2.1 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 212.50 | | | |
| Median Count | 212.50 | | | |
| Std. Deviation Count | 137.89 | | | |

b) Have you seen the lights on top of the sign flashing?

- Yes No – go to Question 8 Don't recall

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------|---------|---------------|--------------------|
| Valid Yes | 154 | 35.5 | 47.7 | 47.7 |
| No | 137 | 31.6 | 42.4 | 90.1 |
| Don't recal | 32 | 7.4 | 9.9 | 100.0 |
| Total | 323 | 74.4 | 100.0 | |
| Missing System | 111 | 25.6 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 107.67 | | | |
| Median Count | 137.00 | | | |
| Std. Deviation Count | 66.08 | | | |

c) Were there high winds present when the sign was on?

Yes No Don't recall

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|---------|---------------|--------------------|
| Valid Yes | 140 | 32.3 | 68.3 | 68.3 |
| No | 13 | 3.0 | 6.3 | 74.6 |
| Don't recall | 52 | 12.0 | 25.4 | 100.0 |
| Total | 205 | 47.2 | 100.0 | |
| Missin System | 229 | 52.8 | | |
| g Total | 434 | 100.0 | | |
| Mean Count | 68.33 | | | |
| Median Count | 52.00 | | | |
| Std. Deviation Count | 65.06 | | | |

d) Would you find it helpful if wind speeds were posted on the sign?

Yes No

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------|---------|---------------|--------------------|
| Valid Yes | 176 | 40.6 | 78.9 | 78.9 |
| No | 47 | 10.8 | 21.1 | 100.0 |
| Total | 223 | 51.4 | 100.0 | |
| Missin System | 211 | 48.6 | | |
| g Total | 434 | 100.0 | | |
| Mean Count | 111.50 | | | |
| Median Count | 111.50 | | | |
| Std. Deviation Count | 91.22 | | | |

8. If the lights on the sign WERE flashing due to high winds, when you are driving, HOW LIKELY would you be to...? (Circle only ONE number per line)

| | Very Likely | Somewhat Likely | Neutral | Somewhat Unlikely | Very Unlikely |
|--|-------------|-----------------|---------|-------------------|---------------|
| a) drive more slowly? | 5 | 4 | 3 | 2 | 1 |
| b) pull over to the shoulder and wait? | 5 | 4 | 3 | 2 | 1 |
| c) stop at a nearby area and wait? | 5 | 4 | 3 | 2 | 1 |
| d) take an alternate route? | 5 | 4 | 3 | 2 | 1 |
| e) make no changes? | 5 | 4 | 3 | 2 | 1 |

a) drive more slowly?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------|--------------------------|---------------|--------------------|
| Valid Very Unlikely | 3 | 0.7 | 0.7 | 0.7 |
| Somewhat Unlikely | 6 | 1.4 | 1.4 | 2.1 |
| Neutral | 12 | 2.8 | 2.9 | 5.0 |
| Somewhat Likely | 74 | 17.1 | 17.6 | 22.6 |
| Very Likely | 326 | 75.1 | 77.4 | 100.0 |
| Total | 421 | 97.0 | 100.0 | |
| Missing System | 13 | 3.0 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 84.20 | Mean Agreement | | 5 |
| Median Count | 12.00 | Median Agreement | | 0.09 |
| Std. Deviation Count | 138.29 | Std. Deviation Agreement | | 7.68 |

b) pull over to the shoulder and wait?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|--------------------------|---------------|--------------------|
| Valid Very Unlikely | 146 | 33.6 | 34.9 | 34.9 |
| Somewhat Unlikely | 128 | 29.5 | 30.6 | 65.6 |
| Neutral | 65 | 15.0 | 15.6 | 81.1 |
| Somewhat Likely | 55 | 12.7 | 13.2 | 94.3 |
| Very Likely | 24 | 5.5 | 5.7 | 100.0 |
| Total | 418 | 96.3 | 100.0 | |
| Missing System | 16 | 3.7 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 83.60 | Mean Agreement | | 2 |
| Median Count | 65.00 | Median Agreement | | 0.47 |
| Std. Deviation Count | 51.43 | Std. Deviation Agreement | | 0.60 |

c) stop at a nearby area and wait?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|--------------------------|---------------|--------------------|
| Valid Very Unlikely | 159 | 36.6 | 38.0 | 38.0 |
| Somewhat Unlikely | 104 | 24.0 | 24.9 | 62.9 |
| Neutral | 60 | 13.8 | 14.4 | 77.3 |
| Somewhat Likely | 65 | 15.0 | 15.6 | 92.8 |
| Very Likely | 30 | 6.9 | 7.2 | 100.0 |
| Total | 418 | 96.3 | 100.0 | |
| Missing System | 16 | 3.7 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 83.60 | Mean Agreement | | 2 |
| Median Count | 65.00 | Median Agreement | | 0.43 |
| Std. Deviation Count | 49.69 | Std. Deviation Agreement | | 0.49 |

d) take an alternate route?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------|--------------------------|---------------|--------------------|
| Valid Very Unlikely | 261 | 60.1 | 65.4 | 65.4 |
| Somewhat Unlikely | 58 | 13.4 | 14.5 | 79.9 |
| Neutral | 37 | 8.5 | 9.3 | 89.2 |
| Somewhat Likely | 20 | 4.6 | 5.0 | 94.2 |
| Very Likely | 23 | 5.3 | 5.8 | 100.0 |
| Total | 399 | 91.9 | 100.0 | |
| Missing System | 35 | 8.1 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 79.80 | Mean Agreement | 2 | |
| Median Count | 37.00 | Median Agreement | 0.29 | |
| Std. Deviation Count | 102.40 | Std. Deviation Agreement | 0.78 | |

e) make no changes?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|--------------------------|---------------|--------------------|
| Valid Very Unlikely | 107 | 24.7 | 25.8 | 25.8 |
| Somewhat Unlikely | 67 | 15.4 | 16.1 | 41.9 |
| Neutral | 103 | 23.7 | 24.8 | 66.7 |
| Somewhat Likely | 76 | 17.5 | 18.3 | 85.1 |
| Very Likely | 62 | 14.3 | 14.9 | 100.0 |
| Total | 415 | 95.6 | 100.0 | |
| Missing System | 19 | 4.4 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 83.00 | Mean Agreement | 3 | |
| Median Count | 76.00 | Median Agreement | 0.73 | |
| Std. Deviation Count | 20.75 | Std. Deviation Agreement | 1.13 | |

9. Based on your experience, how much do you agree with the following statements.

(Circle only ONE per line)

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|----------------|-------|---------|----------|-------------------|
| a) This system would provide me useful information. | 5 | 4 | 3 | 2 | 1 |
| b) The system would accurately indicate when high winds are present. | 5 | 4 | 3 | 2 | 1 |
| c) I would feel safer driving this road knowing the system is in place. | 5 | 4 | 3 | 2 | 1 |
| d) This system does not sound very useful. | 5 | 4 | 3 | 2 | 1 |

a) This system would provide me useful information

| | Count | Percent | Valid Percent | Cumulative Percent |
|-------------------------|-------|--------------------------|---------------|--------------------|
| Valid Strongly disagree | 9 | 2.1 | 2.1 | 2.1 |
| Disagree | 10 | 2.3 | 2.4 | 4.5 |
| Neutral | 40 | 9.2 | 9.4 | 13.9 |
| Agree | 192 | 44.2 | 45.2 | 59.1 |
| Strongly agree | 174 | 40.1 | 40.9 | 100.0 |
| Total | 425 | 97.9 | 100.0 | |
| Missing System | 9 | 2.1 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 85.00 | Mean Agreement | | 4 |
| Median Count | 40.00 | Median Agreement | | 0.28 |
| Std. Deviation Count | 90.55 | Std. Deviation Agreement | | 4.66 |

b) This system would accurately indicate when high winds are present

| | Count | Percent | Valid Percent | Cumulative Percent |
|-------------------------|-------|--------------------------|---------------|--------------------|
| Valid Strongly disagree | 7 | 1.6 | 1.7 | 1.7 |
| Disagree | 14 | 3.2 | 3.3 | 5.0 |
| Neutral | 66 | 15.2 | 15.6 | 20.6 |
| Agree | 187 | 43.1 | 44.2 | 64.8 |
| Strongly agree | 149 | 34.3 | 35.2 | 100.0 |
| Total | 423 | 97.5 | 100.0 | |
| Missing System | 11 | 2.5 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 84.60 | Mean Agreement | | 4 |
| Median Count | 66.00 | Median Agreement | | 0.47 |
| Std. Deviation Count | 80.60 | Std. Deviation Agreement | | 4.10 |

c) I would feel safer driving this road knowing the system is in place

| | Count | Percent | Valid Percent | Cumulative Percent |
|-------------------------|-------|--------------------------|---------------|--------------------|
| Valid Strongly disagree | 11 | 2.5 | 2.6 | 2.6 |
| Disagree | 17 | 3.9 | 4.0 | 6.6 |
| Neutral | 86 | 19.8 | 20.3 | 26.9 |
| Agree | 161 | 37.1 | 38.0 | 64.9 |
| Strongly agree | 149 | 34.3 | 35.1 | 100.0 |
| Total | 424 | 97.7 | 100.0 | |
| Missing System | 10 | 2.3 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 84.80 | Mean Agreement | | 4 |
| Median Count | 86.00 | Median Agreement | | 0.61 |
| Std. Deviation Count | 70.66 | Std. Deviation Agreement | | 3.74 |

d) This system does not sound very useful

| | Count | Percent | Valid Percent | Cumulative Percent |
|-------------------------|-------|--------------------------|---------------|--------------------|
| Valid Strongly disagree | 170 | 39.2 | 40.8 | 40.8 |
| Disagree | 160 | 36.9 | 38.4 | 79.1 |
| Neutral | 53 | 12.2 | 12.7 | 91.8 |
| Agree | 18 | 4.1 | 4.3 | 96.2 |
| Strongly agree | 16 | 3.7 | 3.8 | 100.0 |
| Total | 417 | 96.1 | 100.0 | |
| Missing System | 17 | 3.9 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 83.40 | Mean Agreement | | 2 |
| Median Count | 53.00 | Median Agreement | | 0.38 |
| Std. Deviation Count | 76.01 | Std. Deviation Agreement | | 1.09 |

*Technical Memorandum 1***10. Are there other locations that you travel in Oregon where this system might be beneficial? If so, please list them in the space below.**

| | | | |
|---|----|--|----|
| 101 - Otter Crest and Yachats to Florence. | 1 | I-5 South of Portland - down Wilamette Valley | 3 |
| 101 at Beverly Beach, I've had more problems with wind gusts (45 MPH+) than the bridge | 1 | I-82 Bridge OR, WA border and Columbia River Gorge I-84 | 1 |
| 101 North of Newport just beyond Cape Foulweather | 1 | I-84, MP-164 and MP-12 | 11 |
| All coastal bridges. | 2 | Ice warning signs for black ice! | 1 |
| Alsea River in Waldport | 19 | Junction 18 & 22 to McMinnville | 1 |
| Any open space (valley), Cape Foul Weather (Hwy 101), Hwy 18 Grande Rhode to McMinnville Bridges. | 4 | Megler/Astoria, Marquam/Portland | 1 |
| Approaching top of Cape Foul Weather | 1 | North & South directions on Cape Foul Weather on Hwy 101. | 1 |
| Astoria Bridge, Freemont Bridge, Bridge of the Gods | 7 | North 101 to Tillamook | 1 |
| at Nighttime, Travel to Depoe Bay North of Newport about 3 or 4 miles after Newport and 2 miles before Depoe Bay. Roads are very dangerous! | 1 | North Bend Bridge | 1 |
| Bandon | 1 | North end of Walport bridge Cape Foulweather | 1 |
| Bay Bridge, Waldport | 1 | North of Florence up the hill until after Hecta Head | 1 |
| Between Bend and Burns | 1 | Northern Oregon Coast i.e. Astoria, Seaside | 1 |
| Between Lincoln City and Florence | 1 | Other Coastal Bridge Sights Like in Astoria | 1 |
| Between Yachats and Florence | 3 | Otter Crest | 2 |
| Beverly Beach - alongy beach on Hwy 101-Road always on the move and I believe a bridge span needs to be put in to stop movement. | 1 | Parts of the Columbia Gorge | 1 |
| Beverly Beach Hwy 101 | 2 | Passihy Cape | 1 |
| Boardmay to Pendleton I-84; LADD Canyon, I-84 | 1 | Pendleton, Dallels | 1 |
| Cape Foulweather North of Newport | 17 | Red Bridge, Otis OR | 1 |
| Columiba River Gorge | 18 | Siletz Bridge on Hwy 101 | 1 |
| Coos Bay area | 1 | South of Yachats | 1 |
| Driving along the ocean cliffs between Florence and Newport and on the bridge going into North Bend, Oregon | 1 | Southern Oregon by Henby Park at the slide area. | 1 |
| East County of Portland and throughout the gorge | 1 | Temperature indicators more of a concern | 1 |
| Florence Org; Coos Bay; Astoria | 2 | The Columbia River Gorge, any bridge | 1 |
| Fremont Bridge in Portland and Sam Jackson | 1 | The Gorge! I-84 | 1 |
| Generally the coastline & the Columbia Gorge | 1 | The interstate bridge on I-5 from Portland to Vancouver | 1 |
| Glen Jackson Bridge I-205 | 1 | There is a sign system on 126 from Springfield Oregon heading up to the McKenzie Pass/Santian Pass. It is helpful. It is 60 miles to pass and easier to chose alternate route. | 1 |
| Going to Seal Lion Cave rt. | 1 | Top of Cape Foul Weather Hwy 101 | 1 |
| High was 20 Ice Warnings | 1 | US 30 along the Columbia, the groge, all high wind areas. | 1 |
| Hood River Gorge | 1 | Vandozer corridor *Hwy 18 East, Cascade Head *Hwy 101 N. | 2 |
| Humbug Creek just south of Port Orford, OR on Hwy 101 | 1 | VanHusen Corridor, Tillamook, Pacific City area | 1 |
| Hwy 101 at base of Otter Crest where road keeps caving away. | 1 | Walport Oregon | 9 |
| Hwy 18, 20, I-5 etc. | 1 | | |
| Hwy 20 near Toledo coming from Newport | 2 | | |
| Hwy 31, Silver Lake Area | 1 | | |
| Hwy-84 Columbia River Route | 3 | | |

11. The following information is needed to ensure that your travel needs are properly represented in this survey. It will be used for the purposes of this survey only.
(Check ONE box per question)

a) What is your home zip code? Zip _____

b) What is your age?

15 – 24 years

25 – 44 years

45 – 64 years

65 + years

c) What is your gender?

Male

Female

d) What type of vehicle do you normally drive when you go over Yaquina Bay Bridge?

Passenger car / pickup / Sport-utility vehicle / minivan

Recreational vehicle / camper

Semi Truck

Bus

Motorcycle

Other _____

a) What is your home zip code?

| | | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|-------|-------|---------|---------------|--------------------|
| Valid | 77973 | 1 | 0.2 | 0.2 | 0.2 |
| | 94368 | 1 | 0.2 | 0.2 | 0.5 |
| | 97034 | 1 | 0.2 | 0.2 | 0.7 |
| | 97055 | 1 | 0.2 | 0.2 | 1.0 |
| | 97060 | 1 | 0.2 | 0.2 | 1.2 |
| | 97071 | 1 | 0.2 | 0.2 | 1.4 |
| | 97112 | 1 | 0.2 | 0.2 | 1.7 |
| | 97127 | 1 | 0.2 | 0.2 | 1.9 |
| | 97141 | 1 | 0.2 | 0.2 | 2.2 |
| | 97233 | 1 | 0.2 | 0.2 | 2.4 |
| | 97266 | 1 | 0.2 | 0.2 | 2.6 |
| | 97301 | 1 | 0.2 | 0.2 | 2.9 |
| | 97326 | 1 | 0.2 | 0.2 | 3.1 |
| | 97330 | 1 | 0.2 | 0.2 | 3.4 |
| | 97341 | 8 | 1.8 | 1.9 | 5.3 |
| | 97343 | 3 | 0.7 | 0.7 | 6.0 |
| | 97357 | 5 | 1.2 | 1.2 | 7.2 |
| | 97364 | 3 | 0.7 | 0.7 | 7.9 |
| | 97365 | 143 | 32.9 | 34.4 | 42.3 |
| | 97366 | 21 | 4.8 | 5.0 | 47.4 |
| | 97367 | 68 | 15.7 | 16.3 | 63.7 |
| | 97368 | 26 | 6.0 | 6.3 | 70.0 |
| | 97376 | 5 | 1.2 | 1.2 | 71.2 |
| | 97388 | 2 | 0.5 | 0.5 | 71.6 |
| | 97391 | 58 | 13.4 | 13.9 | 85.6 |
| | 97394 | 42 | 9.7 | 10.1 | 95.7 |
| | 97396 | 1 | 0.2 | 0.2 | 95.9 |
| | 97397 | 1 | 0.2 | 0.2 | 96.2 |
| | 97402 | 1 | 0.2 | 0.2 | 96.4 |
| | 97415 | 1 | 0.2 | 0.2 | 96.6 |
| | 97420 | 5 | 1.2 | 1.2 | 97.8 |
| | 97431 | 1 | 0.2 | 0.2 | 98.1 |
| | 97444 | 1 | 0.2 | 0.2 | 98.3 |
| | 97459 | 1 | 0.2 | 0.2 | 98.6 |
| | 97477 | 1 | 0.2 | 0.2 | 98.8 |
| | 97603 | 1 | 0.2 | 0.2 | 99.0 |
| | 97701 | 1 | 0.2 | 0.2 | 99.3 |
| | 97756 | 1 | 0.2 | 0.2 | 99.5 |
| | 98564 | 1 | 0.2 | 0.2 | 99.8 |
| | 98632 | 1 | 0.2 | 0.2 | 100.0 |
| Total | | 416 | 95.9 | 100.0 | |
| Missing System | | 18 | 4.1 | | |
| Total | | 434 | 100.0 | | |
| Mean Count | | 10.40 | | | |
| Median Count | | 1.00 | | | |
| Std. Deviation Count | | 26.40 | | | |

b) What is your age?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------|--------------------|---------------|--------------------|
| Valid 15 - 24 years | 10 | 2.3 | 2.3 | 2.3 |
| 25 - 44 years | 72 | 16.6 | 16.9 | 19.2 |
| 45 - 64 years | 220 | 50.7 | 51.5 | 70.7 |
| 65 + years | 125 | 28.8 | 29.3 | 100.0 |
| Total | 427 | 98.4 | 100.0 | |
| Missing System | 7 | 1.6 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 106.75 | Mean Age | | 54 |
| Median Count | 98.50 | Median Age | | 12.79 |
| Std. Deviation Count | 88.93 | Std. Deviation Age | | 60.79 |

c) What is your gender?

| | Count | Percent | Valid Percent | Cumulative Percent |
|----------------------|--------|---------|---------------|--------------------|
| Valid Male | 266 | 61.3 | 62.6 | 62.6 |
| Female | 159 | 36.6 | 37.4 | 100.0 |
| Total | 425 | 97.9 | 100.0 | |
| Missing System | 9 | 2.1 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 212.50 | | | |
| Median Count | 212.50 | | | |
| Std. Deviation Count | 75.66 | | | |

d) What type of vehicle do you normally drive when you go over Yaquina Bay Bridge?

Vehicle Type

| | Count | Percent | Valid Percent | Cumulative Percent |
|--|--------|---------|---------------|--------------------|
| Valid Passenger car/pickup/sport-utility vehicle/minivan | 388 | 89.4 | 91.3 | 91.3 |
| Recreational Vehicle/camper | 4 | 0.9 | 0.9 | 92.2 |
| Semi Truck | 22 | 5.1 | 5.2 | 97.4 |
| Bus | 1 | 0.2 | 0.2 | 97.6 |
| Other | 10 | 2.3 | 2.4 | 100.0 |
| Total | 425 | 97.9 | 100.0 | |
| Missing System | 9 | 2.1 | | |
| Total | 434 | 100.0 | | |
| Mean Count | 85.00 | | | |
| Median Count | 10.00 | | | |
| Std. Deviation Count | 169.57 | | | |

Please provide any comments that you think would help us in this study.

| Comments | Count |
|--|-------|
| No Comments | 330 |
| Limit large truck and RV travel over bridge during high winds. Motor home & campers should not be crossing the bridge when its real gusty because they come in your lane & can not control the vehicle. | 21 |
| #3 other times wind can be bad and I would be concerned then. | |
| Need adequate signage at southbound bridge approach as it merges two lanes to cross bridge - tourist RV's could push car into head on accident (see survey for more comments that could not all fit in this space). Redesign for better aesthetics and find bett | 9 |
| Always close the bridge on high winds. | 2 |
| An accurate wind speed posting on the Yaquina Bay Bridge would be very helpful, especially tourists. I like the program & would like to see highest gust in last 1/2 hour on sign. Indicate whether wind speed is safe or not | 10 |
| Being retired I am in a position not to use the bridge during bad weather. | 1 |
| Build an alternate route from south beach to Toledo to provide a safe trip around bridge not only during high winds but when an accident closes bridge. Current situation closes Hwy 101 down completely. | 4 |
| Don't know, but good luck! It is hard to control mother nature when she blows. Sometimes it's best to stop and get off the road completely. | |
| Good luck and good job installing the sign.Good survey, quick, direct, easy to understand. | 2 |
| High winds are not a problem to me, but the two lane bridge is the main problem. A wider four lane bridge would help the bottle neck of vehicles & would help with winds, a stalled vehicle or death will stop traffic for hours. Repair the roads in Lincoln | 10 |
| High winds on Yaquina Bay Bridge are a joke compared to S.F. Golden Gate that I'm used to!! | 1 |
| I am pleased to see, that I am not the only one who sees that there is a high wind problme on the bridge. | 1 |
| I believe that it would be good for the sign flash on the accuracy of the high winds that are present. | 1 |
| I can really see where a sign like that would be beneficial | 1 |
| I go very many places but when traveling to work I am afraid of the high winds just on the roads and any bridges I cross. | 1 |
| I have driven the Oregon coast for 25 years, the weather has never caused me to change my travels. But the tourist would probably greatly find this system beneficial. | 6 |
| I have never been at the bridge during a high wind warning but if I had, I would not drive across it at that time, I'd turn around and go home. | 1 |
| I really agree with what you're doing, keep up the good work! | 1 |
| I think early warning systems should be used whenever possible. | 1 |
| I think the fundamental concept missed her is that "high winds" has not been defined. To some high winds are 25 knots & to others, high winds are 50 knots or greater. I have driven the Yaquina Bay Bridge with the warning lights flashing at 30-35 knots... | 1 |
| I use to drive a semi over the bridge daily, I have since retired and do not have to use it daily. I have seen 3 trucks over turn on this in about 35 years. | 1 |
| I work for the Newport Fire Dept. and have to use best judgement about crossing bridge in stormy weather. I dont know at what point warning lights come on, & haven't yet seen them work. | |
| Ice signs on I-84 are very helpful. | 1 |
| If they really put a convention center in South Beach the problems will really come our way. | 1 |
| If you are going over the bridge in high winds (80 MPH +) slow down and keep a firm grip on your steering wheel | 1 |

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| Comments | Count |
|---|-------|
| I'll pay more attention to the warning sign & lights. I don't do much travel over the bridge lately, I haven't had a vehicle full time since Aug. 2003. And usually I'm the passenger looking at the ocean & bay so I don't always look at the sign. | 1 |
| I'm glad the signs are there. | 1 |
| In 35 years of going over the bridge I "never been a real problem" when winds gust over 70 MPH "we don't go" It's good to know someone actually cares enough about transportation SAFETY to do a useful survey. Good Job! | 1 |
| I've noticed the high wind warning in locations where the topography funnels it like in the Gorge. Also think I saw this notice in Salem: where! Sorry!. In future I will be more observant. | 1 |
| I've seen or heard of enough accidents on this bridge to think it warrants this survey. I've never had to walk or bike over this bridge before but that must be pretty scary when its' windy with no protection. | 1 |
| Looks like this covers most. | 1 |
| No Yellow Card | 1 |
| Noticed sign in March 2004 | 1 |
| Open windows such as a school bus | 1 |
| I would like to see improved survey questions | 3 |
| Since it is not necessary for me to travel south, I stay home or in Newport during storms. | 1 |
| Speed limit on the Yaquina Bay bridge could be dropped down when winds are strong. I think tendency is to go faster to get off the bridge faster & although I am not an engineer, doesn't that increase friction etc & wind sheer? to make it more hazardous. | 1 |
| Thank you for doing this study! | 1 |
| Thank you for doing this survey. | 1 |
| The caution sign and flashing lights work best! | 1 |
| The high wind warnings are sufficient as is. | 1 |
| Warning systems are effective. Our medical office is a block from the warning sign and our staff take it very seriously. The word spreads quickly through the office when weather turns bad. | 1 |
| We thank you for trying to make our world a safer place. | 1 |
| Weather forecast do not affect by travel, I drive the appropriate vehicles for the various conditions. | 1 |
| Total N | 434 |

APPENDIX C: CHI SQUARED TEST RESULTS

As most of the answers to the questions are not expected to be normally distributed, Chi-Squared Test, a non-descriptive statistical test for dependency was chosen to be performed on all responses against demographic variables. Chi Square Test requires the expected frequency of the cells (i.e. the calculated expected frequency of a given number of responses for each option for answering) should be at least 5. The accepted tolerance for the expected frequencies being less than 5 is that the percentage of these cells should not be more than 20 percent of the total cells.

The following demographic variables were tested against all the other variables answered in this survey.

1. Grouped Zip Code (zip codes were grouped into sets with a minimum of five respondents each)
2. Age
3. Grouped Vehicle Type (vehicle types were grouped into three types for South Coast system and two types for Yaquina Bay Bridge system)
4. Gender
5. Grouped Travel Frequency (three groups for each system)
6. Experience Driving in High Winds

Only about 53 percent of the possible test scenarios had twenty percent or fewer numbers of cells with expected frequencies less than five. The results of these 53 percent of these tests are shown in Table C-1.

Table C-1: Summary Results of Test of Dependency on Demographic Variables

| Variable Grouping | Question No. | Independent Variable | South Coast System | | | | | | Yaquina Bay Bridge | | | | | |
|--------------------------------------|--------------|-----------------------|--------------------|-----|--------|--------------|--------------|-----------|--------------------|-----|--------|--------------|--------------|-----------|
| | | | Zip Code | Age | Gender | Vehicle Type | Travel Freq. | Wind Exp. | Zip Code | Age | Gender | Vehicle Type | Travel Freq. | Wind Exp. |
| General | 3 | Wind Concerns | P | - | F | F | F | F | P | P | F | - | P | P |
| | 4 | Weather Info. Sources | F | - | P | - | F | P | P | - | P | F | P | P |
| High Winds Concerns | 5a | Leaving Lane | P | - | F | - | P | F | P | - | P | - | P | P |
| | 5b | Overturn | P | - | F | P | P | P | P | - | P | F | P | P |
| | 5c | Other Vehicle | - | - | P | - | - | - | - | - | P | - | F | P |
| | 5d | Cargo | P | - | P | - | P | P | P | - | P | P | P | P |
| | 5e | Wind With Rain | - | - | F | - | - | - | - | - | P | P | P | P |
| | 5f | Wind When Icy | - | - | P | - | - | - | - | - | F | - | - | - |
| | 5g | No Concern | - | - | F | - | P | F | - | - | P | P | - | P |
| Response to Wind Forecast (Pre-Trip) | 6a | Extra Time | - | - | F | - | P | P | P | - | P | P | P | P |
| | 6b | Another Route | - | - | F | - | - | - | - | - | F | - | P | - |
| | 6c | Cancel | F | - | F | P | F | P | P | - | F | F | P | P |
| | 6d | Make the Trip | P | - | F | - | P | P | P | - | F | P | P | P |
| System Awareness | 7a | Seen Sign | F | - | P | P | F | F | F | P | P | P | F | F |
| | 7b | Seen Flashing | F | - | P | - | F | F | P | - | P | P | F | F |
| | 7c | Wind Present | - | - | P | - | - | - | - | - | P | - | - | - |
| | 7d | Wind Speeds | P | - | F | P | P | P | P | - | P | - | P | P |
| Response to Wind Warning System | 8a | Drive Slow | - | - | - | - | - | - | - | - | - | - | - | - |
| | 8b | Pull Over | P | - | F | - | F | P | P | - | P | P | P | P |
| | 8c | Stop at a Rest Area | P | - | F | - | F | P | P | - | F | P | P | P |
| | 8d | Alternate Route | - | - | P | - | - | - | - | - | F | - | F | F |
| | 8e | No Changes | F | - | F | - | P | P | P | - | P | P | P | P |
| System usefulness | 9a | Useful Information | - | - | - | - | - | - | - | - | P | - | - | - |
| | 9b | Accurate Information | - | - | - | - | - | - | - | - | P | P | - | - |
| | 9c | Feel Safer | - | - | F | - | - | - | - | - | P | P | - | P |
| | 9d | Not Useful | - | - | P | - | - | - | - | - | P | - | P | P |

Legends: P = Passed (no statistically significant dependency); F = Failed (there is a statistically significant dependency); - = Not applicable (more than 20 percent of cells had expected frequency fewer than 5)

REFERENCES

1. Strong, C. and M. Kumar, "Comparative Evaluation of Automated Wind Warning Systems: Draft Motorist Survey Data Collection Plan." Western Transportation Institute, Montana State University, Bozeman [MT]: December 2003.
2. ODOT ITS Unit, no reference available.