

PSRC Transportation Panel

Wave 7

Volume 1

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INTRODUCTION

This is the seventh phase of a general purpose transportation study. The information collected in this study will show how travel behavior changes and with time will be used to analyze travel patterns and needs. The Puget Sound Transportation Panel was initiated in the fall of 1989. A total of 1,713 households successfully completed a phone survey and returned completed travel diaries for household members age 15 and older. In the fall of 1990, each of the households was re-surveyed for the second wave of this panel. In the fall of 1991, no travel diaries were collected, but all households previously participating in the study were asked to complete a questionnaire concerning choice of mode by trip purpose. Fourth and fifth waves of household travel diaries were collected in the Fall of 1992 and 1993, respectively. Wave six was conducted in the spring of 1996. Waves II— IV were conducted by Decision Data Inc.

For the travel diary portion of the study, all household members age fifteen and older are asked to record all local trips they make for two days. In addition to arrival and departure times and addresses, participants also chronicle the purpose of the trip, mode of transportation used, whether they were a driver or rider, the number of individuals travelling together, and the relationship of the people traveling with them.

Participants in Wave 7 were also asked to fill out a new Personal Daily Travel Choices Survey to evaluate the effect of advanced transportation system management and traveler information systems. This questionnaire is part of an effort to determine the impact of using high technology and advanced telecommunications systems on mobility for major metropolitan areas.

The Puget Sound Regional Council contracted Decision Data Inc to conduct data collection and data entry of travel diaries and surveys in the fall of 1997. The primary responsibilities of Decision Data Inc were:

- 1) Prepare mailout materials.
- 2) Recruit households to replace households from Wave 6 that have left the region or that chose not to continue in Wave 7.
- 3) Contact households from Wave 6 and identify household and personal changes that occurred in the last year.
- 4) Collect 2-day trip diaries and travel choices surveys for all continuing and new panel members.
- 5) Recontact, up to six times, panel members who have not returned diaries and surveys.
- 6) Correct errors in respondent data of all diaries.
- 7) Correct diary data using in-house sources (placename databases, maps, reverse directories etc.).
- 8) Recontact panel members to correct diary data.
- 9) Enter and verify diary data.
- 10) Enter and verify survey data.

METHODOLOGY

The Puget Sound Transportation Panel, Wave 7 consisted of the preparation of mailout materials, two field components, and three data preparation components. The field components consisted of recruiting new participants to replace Wave 6 participants who fell out for various reasons, and recontacting Wave 6 participants in order to include them in Wave 7. The data preparation components included checking and correcting of respondent diary data, data entry and verification of diaries collected from new and continuing panel members, and data entry and verification of attitude surveys for each individual in the panel.

Preparation of Mailout Materials

The mailout used virtually identical materials to those used in Wave 6. Changes include the new Travel Choices Survey, an updated cover letter, and a new question on the travel diary. The sample diaries were also updated to show how to handle certain type of trips, such as ferry trips for residents of Kitsap county. Samples of these materials are included in the Appendix. The packet mailed to each household consisted of the following:

1. Cover letter
2. Example diary for specific county
3. Instruction sheet
4. Postage paid return envelope
5. A crisp new two dollar bill for each member of the household filling out a diary
6. Two travel diaries for each household member with “right/wrong” examples on the back
7. A Travel Choices Survey for each member of the household

The packet was mailed in an oversized envelope addressed to the household contact. Large, colorful stamps were used for postage. The cover letter was on PSRC letterhead and personalized with the household contact’s name in the salutation and with the current date. The signature was PSRC Associate Planner Neil Kilgren’s (scanned onto the letter).

The sample diary was printed on colored paper with “SAMPLE” screened across it. For each of the four counties, a separate diary was printed with examples specific to that county, and each county was color coded for easier assembly of the mailout packet.

The instruction sheet was printed as a double sided piece with instructions broken out in categories corresponding to the sections of the diaries. Boxes were used to enclose the major sections just as in the diaries, and graphical elements were used to add interest to the instructions. The instructions were printed on yellow paper to attract attention.

The Personal Daily travel Choices Survey was printed as an eight-page booklet. A short letter on the cover page of the survey explains its purpose. The signature was PSRC Project Manager Robert Sicko's (scanned onto the survey). An extra page was attached to the form for one person in the household because it asks about the household as a whole.

Each household member participating in the panel received 2 diaries, 1 survey, and a crisp \$2 bill. A paperclip fastened the 4 items together. Each diary was personalized with the member's name, the date the diary was to be filled out, their identification numbers (household-id, sub-id, person-id) and telephone number. Each survey was personalized with the member's name, their identification numbers (household-id, sub-id, person-id) and telephone number.

Replacement Panel Members for Wave 7

Recruitment of new panel members included the following steps:

1. Telephone surveys and recruitment were conducted from sample of randomly generated numbers.
2. Additional numbers of bus riders, car-poolers and newcomers to the 4 county area were recruited using specific lists (as described below).
3. Diary packets were mailed.

Randomly generated sample

Recruits were selected from the 4 county area using computer generated random telephone numbers. Of those individuals actually contacted, 57% agreed to be interviewed. Of those who were asked to participate in the panel, 61% agreed to participate. Of these, 70% returned diaries.

Bus rider list

The Puget Sound Regional Council collected names and phone numbers of bus riders who volunteered to participate in the study. Of those actually contacted, 90% agreed to be interviewed. Of those who were asked to participate in the panel, 77% agreed to participate. Of these, 79% returned diaries.

Newcomers

This wave was more successful than previous waves in recruiting households that are new to the four-county Puget Sound area. A total of 148 newcomer households were recruited. Of

these, 14 were recruited from the random sample and 134 were recruited from a list of newcomers and their phone numbers supplied by Metromedia. Eighty-three newcomer households returned diaries.

Contact of Wave 6 Panel Members for Wave 7

Continuing panel members were contacted by the following steps:

1. Wave 6 panel members were first contacted by mail to determine interest in continuing (This was completed by PSRC prior to the contract start date).
2. Diary packets were mailed to Wave 6 members in 4 groups.
3. Contacted panel members by telephone after packet was received but before diary dates.
4. From telephone interviews, determined which households had additions and determined if packet was received.
5. Mailed new diaries to additions to the panel and mailed replacements diaries to households that did not receive the packet.

The Wave 6 panel members were contacted by telephone to reinforce the impact of the mailed materials and to use personal contact as an additional motivating force for continued participation in the panel. The mailings were orchestrated such that the assigned diary dates were 6 days after the mailing date, or about 4 days after the household's receipt of the diaries. Two days following the mailout, telephone calls were made to each household. (See schedule below.) The panel members were separated into four groups in order to spread out the effort and make this close timing possible.

Since not all households could be contacted immediately, telephone calls were made after the diary dates and even after diaries were received, in order to update the household information.

These first contacts were fruitful in determining who had not received packets due to address changes, who had not even opened their mail yet, who had already lost the packets and who needed extra diaries (and \$2 bills) for additional panel members in the household. To reduce unnecessary second mailings, households that had not received their packet by the time of the update interview were called again two or three days later to give the mail extra time to be delivered. If the packet had not arrived by this time, a new packet was sent. The majority of the second mailings were a result of these phone contacts to update the household information. (The rest were because panel members called in and asked for new sets or they were asked to re-do their diaries because they returned them blank, because they had been on vacation, out of the 4 county area, or said that they "don't drive anywhere.")

Former panel participants who were members of a household in Wave 6 but moved out of that household and remained in the four-county area were included in the panel as "Split" households. These splits retained their household-id number but were assigned new sub-id numbers. They were sent packets and contacted by telephone. Often the participants at the original address did not know the phone number or address of the person who had moved out.

The following table shows the schedule for all of the above activities.

SCHEDULE FOR CONTINUING HOUSEHOLDS

Group Number	1	2	3	4
Mailout Date	10/11	10/7	10/15	10/9
Diary Date 1	10/20	10/14	10/22	10/16
Diary Date 2	10/21	10/15	10/23	10/17
Diary Weekday 1	Mon	Tues	Wed	Thurs
Diary Weekday 2	Tues	Wed	Thurs	Fri
Telephone Update Begins	10/15	10/9	10/17	10/11
Postcard Mail Date	10/27	10/21	10/29	10/23
Telephone Follow-up Begins	11/15	11/15	11/15	11/15
Telephone Follow-up Ends	12/10	12/10	12/10	12/10

Maximizing Response Rate

A single mailing has been found to produce an inadequate response rate in previous waves. In order to obtain the greatest possible response, the initial mailings were followed by a reminder postcard and up to six telephone calls. Replacement items were sent to 234 households as a result of these contacts.

Reminder postcard

For both continuing and replacement households, postcards were sent to increase the number of returned diaries.

A bright yellow post-card was mailed to all households who had not returned their diaries within one week following the first diary date. These postcards were personalized with the household contact's name. The postcard was intended to remind people who had completed their diaries and survey to put them in the mail and to remind others to finish filling out the diaries and survey and put them in the mail. The postcard also asked people who had not filled out the diaries on the assigned days to complete them the following week for the same two days. It also asked people to call Decision Data if they needed to be sent replacement diaries and/or surveys.

Follow-up telephone contact

For both continuing and replacements households additional telephone contact was needed to motivate participation and to identify replacement needs.

No Diaries or Surveys Returned

If no diaries or surveys had been received, the interviewer called to determine the reason. Often it was because the diaries had been lost or misplaced, so the household was sent a new package. Sometimes the diaries had been completed and just not mailed, so the respondent simply needed to be reminded to put them in the mail. Other households had forgotten to complete them or had procrastinated and needed to be urged to complete them on a different date. In some households where this had happened, the respondent thought that it was too late (because of the printed date on the diaries). These follow-up calls were repeated up to six times for households which did not respond by sending in their diaries.

Partial Diaries Returned

When the diaries were returned, they were logged in. Households which returned only part of their diaries or were out of town on both days were contacted by telephone. For a variety of reasons, many household members requested replacement diaries. Other household members needed to be reminded that all diaries were to be returned and instructed that they could still participate although they had missed the dates printed on the diaries.

Partial Surveys Returned

Households which returned all the diaries but not all the surveys were also contacted and sent replacement surveys as needed. In many cases, only one survey was originally returned for the household although all household members completed the diaries.

Preparation of Diary Data

Typically, survey data collection and data entry are sequential rather than simultaneous tasks. Following data collection, it is usual to have a trained employee review the completed interview data for completeness and clarity and correct the data as required. The verified surveys are then submitted for data entry when fielding is complete. This procedure was found not to work well for travel diaries.

The procedure for the preparation of diary data for this project requires three components:

- 1) Correction of respondent data
- 2) Data entry (“keypunching”)
- 3) Verification (correction of “keypunching” errors)

The travel diary is characterized by a high level of erroneous data. Approximately 1/2 of the diaries had errors of one sort or another. Of these, approximately 1/3, or 1/6 of the total of all diaries, required that the respondents be called back to provide, correct or clarify information.

The remaining diaries were corrected in-house (addresses looked up, time of a trip added based upon record in another diary, trip added that was on spouses diary, etc.).

The reasons for the high error rate can be attributed to the nature of the data (addresses themselves are complex), to the difficulty of the task being asked of respondents (i.e., asking respondents to carry the diaries with them and conscientiously record all trips) and to the respondents often not knowing the information being sought (i.e., addresses).

The need to correct so much of the diary data forces the data entry process to be an interactive one. Our procedure was as follows.

- 1) As the diaries were received, they were sorted and logged in. This information was used to recontact individuals who had not returned diaries.
- 2) Diaries were reviewed, checking for completeness of all answers, especially addresses, by a full time project supervisor. There was also some attempt to see if the overall diary “made sense” and if the household’s diaries were consistent, although previous experience had shown that many of the more subtle mistakes are missed by this review of the diaries.
- 3) Diaries were then separated into four batches:
 - a) those which looked valid,
 - b) those with problems which could be solved in-house (a diary with a missing location which might be found in the database, such as the name of a restaurant in a small town),
 - c) those which required a call back, and
 - d) those requiring a new set of diaries.
- 4) Corrections were attempted with those diaries from the second batch. Those which could not be corrected were put into batch C while those which were corrected were added to batch A.
- 5) The apparently valid diaries were given to other personnel for immediate data entry. This data entry step occurred during the fielding period. The reason for this is that previous experience had shown a significant number of “logic” errors were discovered only during the detailed data entry process. Thus, problem diaries were identified quickly and re-contact was made with the panel member as soon as possible after receiving the diary.

Correction of Respondent Data

Problems that the panel members had in filling out the diaries could be classified into four categories:

1. trips do not make sense
2. incomplete location information
3. inclusion of inappropriate trips
4. inclusion of out of area trips

Trips do not make sense

Quite a variety of errors were detected simply because they were internally inconsistent or illogical. These ranged from simple to complex. Some simple problems included circling both “driver” and “rider”, forgetting to include a starting location or putting the starting location on line 2, and forgetting to add the final return home. The more complex problems involved the relationships between distance and time, relationships between trips and so on. For example, sometimes the respondent would enter the time spent at a location (i.e., the arrival and departure time at the destination). This could be detected if the time was significantly too long for the trip. Another common problem was circling the wrong time of day (am/pm). This could generally be figured out from the times of other trips.

Occasionally, respondents would list trips in the wrong order (many of these diaries are apparently filled out at the end of the day rather than when the trips are actually made) so that the sequence of trips did not make sense. In many instances missing trips or trips out of order were detected because of the inconsistency in the number of passengers or the relationships of passengers from trip to trip or the mode of transportation used on successive trips. For example, diaries implying that a car was abandoned, that an individual walked home from a very long distance, or that a child reappeared at an inappropriate time or place, all gave rise to suspect trip sequences. Other problems were detected by comparison of the diaries of different persons within the household. This usually involved trips recorded by one individual and not by another although sometimes it was more complicated than this.

Respondents were called in order to make corrections to the diaries if necessary although in many cases (about 2/3 of the diaries with problems) the diaries could be corrected without calling the respondents.

The following table summarizes the major problems of trips not making sense and their solutions.

PROBLEM	SOLUTION
Forgot trip home at the end of the day.	Added with as much information as possible only if it was obviously correct.
One member neglects to enter trip that other members included.	Used information from other members. Called if necessary.
Entered time spent at place rather than time in transit.	Attempted to figure out times. Called if necessary.
Sequence of trips doesn't make sense.	Called person to straighten out.
Number of individuals on trip doesn't make sense.	Tried to figure out from other information. Called if necessary.
Circled both D and R (driver and rider).	Tried to figure out from other information. Called if necessary.
Neglected to enter “Why?”	Tried to figure out from other information. Called if necessary.

Incomplete location information

Many problems were found in the diaries when the trip information was being entered, and these problems were usually solved. If there was a non-distinctive place listed, such as “Mercer Island” or “friend’s house,” the panel member who filled out the diary was called to obtain a more complete location. In the case of a non-distinctive place and one street name (“McDonald’s on Bellevue Way”), the address was looked up in the telephone number database¹. If a place name and city, such as “Azteca Restaurant, Kirkland” were given, the address was also looked up in the database. When the “Address where started” box was left blank, other trips were checked to see if the person started at home and if there was a home address on the diary. Occasionally, times started and/or arrived were missing from some trips data and were reconstructed if possible. Otherwise, the person was called to get the missing times which were then entered if they were remembered or left blank if the person could not remember.

Locations were considered acceptable if they were unique. For example, we accepted place names of schools, colleges, shopping centers or malls, post offices in small towns and names of large buildings. If the trip was to a location outside of the 4 county area, the name of the city, without an address, was accepted.

The following table summarizes the major incomplete location information problems and their solutions.

PROBLEM	SOLUTION
Non-distinctive place and incomplete address or absence of address.	Called person to get address or intersection.
Place name and incomplete address or absence of address.	Looked up in the telephone database.
“Address Where Started” left blank.	Checked other trips to see if they started at home.
Neglected to enter times.	Reconstructed if possible. Otherwise, called person to get times. If they could not remember, times were left blank.

Inclusion of inappropriate trips

In some cases trips listed on the diaries were deleted. Trips for walking for exercise or walking the dog were excluded. A walk to the nearest bus stop that was 5 minutes or less was also excluded. Where bus transfers were listed as separate trips, those trips were condensed into one trip with the appropriate total time spent in transit. Individual trips to different stores within one mall were entered as one trip. If the home address was entered as the first trip, the diary was straightened out so that all information for one trip was on the same line.

¹ This database contained the addresses for all businesses and government agencies in King, Kitsap, Pierce and Snohomish counties. The listings were drawn from ProCD telephone CD-ROM.

The following table summarizes the major inappropriate trips problems and their solutions.

PROBLEM	SOLUTION
Walk to the nearest bus stop (5 minutes or less).	Did not record as a trip.
Walk for exercise I walk the dog.	Did not record as a trip.
Transfers on bus listed as separate trips.	Recorded all transfers to one destination as one trip.
Entered home as entry of first trip, causing aspects of one trip to be on two lines.	Straightened out trips.
Individual trips to different stores in one mall listed as separate trips.	Entered as only one trip.

Out of area trips

At the beginning of the project, if a person returned diaries for only one day or left them blank because they were out of town, they were asked to complete another two days on their assigned days of the week. Replacement packets were then sent out immediately. Near the end of the project, due to time constraints, panel members were only asked to do more diaries if they were out of town on both of the original days assigned to them (the one out of town day was accepted). In all cases, respondents who were out of the 4 county area for both assigned days were asked to redo both diaries. When trips were listed on a diary that were out of the 4 county area, only the trip that took the person out of the area and the trip that brought the person back into the 4 county area were recorded. The trips that started from and ended within counties other than King, Pierce, Snohomish and Kitsap were excluded.

The following table summarizes the major out of area problems and their solutions.

PROBLEM	SOLUTION
Out of 4 county area on two days.	Asked to redo on two days within the area.
Out of 4 county area on one day.	Asked to redo 2 days within area. (At end of project one day in area was accepted.)
Trips outside the 4 county area.	Only recorded the trips that took them out of the area and then back into the area. Only required the name of city or county outside of the 4 county area.

Data Entry of Diaries

Catching inconsistencies between trips or diaries requires that the researcher read and understand the whole day's diary and the whole household's set of diaries. This is necessarily done as a part of the data entry. It would not be cost effective to duplicate this effort at the check-in stage, even though check in was done by experienced individuals. Because the "data entry" step includes the correcting of respondent data, it must be done immediately so that panel members can be recontacted to clarify and/or provide missing data before too much time passes since the event.

Diary data were entered directly from the diary forms rather than from a “coding sheet.” Not only would transcription be extremely inefficient, but one would lose the context which was very important in finding errors.

Verification of Diary Data

After all diaries had been entered, the diaries were verified for correctness and consistency. Each diary was checked against the information that had previously been entered into the computer. This step was primarily to correct “keying” errors rather than data recording errors made by the respondents. Most of the errors in the original data entry were incorrect spellings due to the poor handwriting on the diaries.

This verification step also ensured that information from the diaries was interpreted consistently into the appropriate codes. For example, a panel member may have put “School” in the “Why?” column, so the information was originally coded as “3 - School.” However, by reviewing the diary more closely, it could be seen that this person was not really going to school, but dropping off children at school and the coding should really be “6 - Personal.”

Final Checks

Logic checks were run on the verified diary data to check for erroneous data. When inconsistencies were discovered, corrections were made after examining the original diary. Times of trips were checked so all arrival times were later than their departures. Times were also checked between trips so that later trips had later times. Most time problems were a result of mistakes regarding am/pm fields. Corrections were made to D/R (driver/rider) and group total fields if the mode was car and group total was more than one, yet D/R was rider. Group total and relationship fields were checked so there was at least one relationship code when group total was more than one. The first day’s last address was compared to the second day’s “start at” address. When these addresses were different, the address was verified using the original diary and the appropriate corrections were made. One household filled out the diaries on the correct days but for different weeks. A final logic check confirmed all modes between ferry terminals were passenger or car ferries.

Travel Choices Survey Data Entry

The data entry for the travel choices survey was standard keypunching. No corrections were made to the survey data. All data that the respondent recorded was entered.

Travel Choices Survey Data Verification

After all surveys had been entered, the surveys were verified. Each survey was re-entered and checked against the information that had previously been entered into the computer.

RESULTS

Wave 7 Total

A total of 2008 households participated fully in Wave 7. Of these, 1348 were continuing panel households and 660 households were recruited this year. Full participation in the panel means household information was collected and all household members returned diaries. Four households returned diaries but were out of the four-county area for both diary days. The mode classification and county of the Wave 7 households are shown below. The proportion of households classified as SOV, bus riders, car-poolers and bus/car-poolers was 66.4%, 13.7%, 14.4% and 5.5% respectively. The county distribution of the households 47.9%, 10.8%, 21.5% and 19.9% for King, Kitsap, Pierce and Snohomish counties, respectively.

Returned Diaries	KING	KITSAP	PIERCE	SNOHOMISH	TOTAL
SOV	597	128	334	275	1334
BUS	187	33	18	37	275
CARPOOL	121	40	64	64	289
BUS & CARPOOL	57	15	15	23	110
TOTAL	962	216	431	399	2008

The lifecycle classification of the households is shown below.

Lifecycle	Continuing	New Recruits	Total
Any child under 6	132	106	238
All children 6-17	257	116	373
One adult, under 35	34	28	62
One adult, 35-64	149	77	226
One adult, 65 and older	119	48	167
Two adults, under 35	51	53	104
Two adults, 35-64	411	162	573
Two adults, 65 and older	195	70	265
Total	1348	660	2008

Continuing Households

A total of 1518 households were updated. Of these, 1348 returned diaries. The mode classification and county of the households are shown below. The proportion of households classified as SOV, bus riders, car-poolers and bus/car-poolers was 66.8%, 10.9%, 15.6% and 6.8%, respectively, among those returning diaries. The county distribution of the households returning diaries was 47%, 10.2%, 20%, 22.8% for King, Kitsap, Pierce and Snohomish counties, respectively.

Returned Diaries	KING	KITSAP	PIERCE	SNOHOMISH	TOTAL
SOV	414	78	204	204	900
BUS	90	17	13	27	147
CARPOOL	87	30	37	56	210
BUS& CARPOOL	42	13	15	21	91
TOTAL	633	138	269	308	1348

Recruits

A total of 1456 new households were interviewed. Of these, 953 agreed to have the household participate in the panel. From the 953, 660 returned diaries sufficiently complete to use.

Households interviewed	1456
Households agreeing to participate	953
Households returning diaries	660

The mode and county distributions of these groups is shown in the tables below. In the final sample of those who returned diaries, 65.8% of the households were classified as SOV, 19.4% bus riders, 12% as car-poolers and 2.9% as both bus and car-poolers. The county distribution of the households returning diaries was 49.8%, 11.8%, 24.5%, 13.8% for King, Kitsap, Pierce and Snohomish counties, respectively.

Returned Diaries	KING	KITSAP	PIERCE	SNOHOMISH	TOTAL
SOV	183	50	130	71	434
BUS	97	16	5	10	128
CARPOOL	34	10	27	8	79
BUS&CARPOOL	15	2	0	2	19
TOTAL	329	78	162	91	660

A total of 134 newcomers (individuals who had lived in the 4 county area for less than 1 year) were recruited. Of these, 83 returned the diaries.

Newcomer households agreeing to participate	134
Newcomer households returning diaries	83

Not Participating in Wave 7

The mode and county distributions for updated continuing households who did not return diaries was 57.1%, 11.8%, 25.3% and 5.9% respectively.

Updated but did not return diaries	KING	KITSAP	PIERCE	SNOHOMISH	TOTAL
SOV	45	6	25	21	97
BUS	12	1	3	4	20
CARPOOL	12	5	11	15	43
BUS&CARPOOL	6	0	0	4	10
TOTAL	75	12	39	44	170

The mode and county distribution for new recruit households who agreed to participate but who did not return diaries is shown in the following table. The mode percentages were 49.1%, 23.9%, 21.2% and 5.8% for households classified as SOV, bus riders, car-poolers and bus & carpool, respectively.

Recruited but did not return diaries	KING	KITSAP	PIERCE	SNOHOMISH	TOTAL
SOV	56	15	39	34	144
BUS	46	5	10	9	70
CARPOOL	26	10	19	7	62
BUS&CARPOOL	8	2	5	2	17
TOTAL	136	32	73	52	293