

# Washington State Freight Truck Origin and Destination Study: San Juan County



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by

Kathleen M. Painter

in cooperation with

Kenneth L. Casavant, EWITS Project Director  
Washington State University  
Department of Agricultural Economics  
101 Hulbert Hall  
Pullman, WA 99164-6210

## **EWITS Research Report: Background and Purpose**

This is the twenty-first in a series of Research Reports prepared from the Eastern Washington Intermodal Transportation Study (EWITS). The reports prepared as a part of this study provide information to help shape the multimodal network necessary for the efficient movement of both freight and people into the next century.

EWITS is a six-year study funded jointly by the Federal government and the Washington State Department of Transportation as a part of the Intermodal Surface Transportation Efficiency Act of 1991. Dr. Ken Casavant of Washington State University is Director of the study. A state-level Steering Committee provides overall direction pertaining to the design and implementation of the project. The Steering Committee includes Jerry Lenzi, Chair and Regional Administrator (WSDOT, Eastern Region); Richard Larson, Regional Administrator (WSDOT, South Central Region); Don Senn, Regional Administrator (WSDOT, North Central Region); Charles Howard (WSDOT, Planning Manager), and Eric Berger, Executive Director, County Road Administration Board. Pat Patterson represents the Washington State Transportation Commission on the Steering Committee. An Advisory Committee with representation from a broad range of transportation interest groups also provides guidance to the study. The following are key goals and objectives for the Eastern Washington Intermodal Transportation Study:

- *Facilitate existing regional and state-wide transportation planning efforts.*
- *Forecast future freight and passenger transportation service needs for eastern Washington.*
- *Identify gaps in eastern Washington's current transportation infrastructure.*
- *Pinpoint transportation system improvement options critical to economic competitiveness and mobility within eastern Washington.*

For additional information about the Eastern Washington Intermodal Transportation Study or this report, please contact Ken Casavant at the following address:

Ken Casavant, Project Director  
Department of Agricultural Economics  
Washington State University  
Pullman, WA 99164-6210  
(509) 335-1608

## **DISCLAIMER**

The contents of this report reflect the views of the author, who is responsible for the facts and accuracy the data presented herein. The contents do not necessarily reflect the official views or policies of the Washington State Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification or regulation.

## **EWITS PREVIOUS REPORTS NOW AVAILABLE**

1. Gillis, William R. and Kenneth L. Casavant. "Linking Transportation System Improvements to New Business Development in Eastern Washington." EWITS Research Report Number 1. February 1994.
2. Gillis, William R. and Kenneth L. Casavant. "Lessons from Eastern Washington: State Route Mainstreets, Bypass Routes and Economic Development in Small Towns." EWITS Research Report Number 2. February 1994.
3. Gillis, William-R. and Kenneth L. Casavant. "Washington State Freight Truck Origin and Destination Study: Methods, Procedures, and Data Dictionary." EWITS Research Report Number 3. December 1994.
4. Gillis, William R. and Kenneth L. Casavant. "Major Generators of Traffic on U.S. 395 North of Spokane: Including Freight Trucks and Passenger Vehicles Crossing the International Border." EWITS Research Report Number 4. January 1995.
5. Newkirk, Jonathan, Ken Eriksen, and Kenneth L. Casavant. "Transportation Characteristics of Wheat and Barley Shipments on Haul Roads To and From Elevators in Eastern Washington." EWITS Research Report Number 5. March 1995.
6. Jessup, Eric and Kenneth L. Casavant. "A Quantitative Estimate of Eastern Washington Annual Haul Road Needs for Wheat and Barley Movement." EWITS Research Report Number 6. March 1995.
7. Gillis, William R., Emily Gruss Gillis, and Kenneth L. Casavant. "Transportation Needs of Eastern Washington Fruit, Vegetable and Hay Industries." EWITS Research Report Number 7. March 1995.
8. Casavant, Kenneth L. and William R. Gillis. "Importance of U.S. 395 Corridor For Local and Regional Commerce in South Central Washington." EWITS Research Report Number 8. April 1995.
9. Gillis, William R., Eric L. Jessup, and Kenneth L. Casavant. "Movement of Freight on Washington's Highways: A Statewide Origin and Destination Study." EWITS Report Number 9, November 1995.
10. Chase, Robert A. and Kenneth L. Casavant. "Eastern Washington Transport-Oriented Input Output Study: Technical Report." EWITS Research Report Number 10. March 1996.

11. Chase, Robert A. Kenneth L. Casavant. "The Economic Contribution of Transport Industries to Eastern Washington." EWITS Report Number 11. April 1996.
12. Lee, Nancy S. and Kenneth L. Casavant. "Waterborne Commerce on the Columbia-Snake." EWITS Report Number 12. October 1996.
13. Alderson, Lynn C., Kenneth L. Casavant and Eric Jessup. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part I Economic Structure of the Industry." EWITS Research Report Number 13. January 1997.
14. Eriksen, Ken and Kenneth L. Casavant. "Impact of North American Free Trade Agreement (NAFTA) on Washington Highways - Part 1: Commodity and Corridor Projections." EWITS Research Report Number 14. January 1997.
15. Alderson, Lynn C. and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part 2 Movement of Raw Logs." EWITS Research Report Number 15. May 1997.
16. Alderson, Lynn C. and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part 3 Shipment from Mills." EWITS Research Report Number 16. May 1997.
17. Alderson, Lynn C. and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part 4 Commercial Shipments." EWITS Research Report Number 17. February 1997.
18. Jessup, Eric L., John Ellis, and Kenneth L. Casavant. "A GIS Commodity Flow Model for Transportation Policy Analysis: A Case Study of the Impacts of a Snake River Drawdown." EWITS Research Report Number 18. May 1997.
19. Lee, Nancy S. and Kenneth L. Casavant. "A Commodity and Origin-Destination Analysis of Rail Traffic in Washington--1990-1995. EWITS Research Report Number 19. May 1997.
20. Edwards, Richard, Eric L. Jessup, and Kenneth L. Casavant. "Eastern Washington On-Farm and Commercial Grain Storage." EWITS Research Report Number 20. January 1998.

### **EWITS Previous Working Paper Series Now Available**

1. Lee, Nancy and Ken Casavant. "Grain Receipts at Columbia River Grain Terminals." EWITS Working Paper #1, March 1996.
2. Lenzi, Jerry, Eric Jessup, and Ken Casavant. "Prospective Estimates for Road Impacts in Eastern Washington from a Drawdown of the Lower Snake River." EWITS Working Paper #2, March 1996.
3. Ellis, John, Eric Jessup, and Ken Casavant. "Modeling Changes in Grain Transportation Flows in Response to Proposed Snake River Drawdowns: A Case Study for Eastern Washington." EWITS Working Paper #3, March, 1996.
4. Painter, Kate and Ken Casavant. "A Comparison of Canadian Versus All Truck Movements In Washington State With A Special Emphasis On Grain Truck Movements." EWITS Working Paper #4, March 1996.
5. Jessup, Eric L., John Ellis and Kenneth L. Casavant. "Estimating the Value of Rail Car Accessibility for Grain Shipments: A GIS Approach." EWITS Working Paper #5. April 1996.
6. Painter, Kathleen M. and Kenneth L. Casavant. "Truck Movement Characteristics on Selected Truck Routes in Washington State." EWITS Working Paper #6. August 1996.
7. Lee, Nancy S. and Kenneth L. Casavant. "Grain Receipts at Columbia River Grain Terminals, 1980-81 to 1995-96." EWITS Working Paper #7. January 1997.
8. Jessup, Eric L. and Ken Casavant. "Economic Evaluation of Grain Shipment Alternatives: A Case Study of the Coulee City and Palouse River Railroad." EWITS Working Paper #8, March 1997.

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## Introduction

A large statewide survey of truck traffic origination, destination, and freight characteristics provided the data for in-depth county level reports of freight truck movement in Washington State. Considerable detail on road usage, truck weight, truck configuration, commodity type, and seasonal traffic variation is available in this survey. We were able to examine a rich set of characteristics for trucks whose freight was either destined for or originating from a particular county. It is important to note the survey does not capture truck movement that did not pass through one of 20 survey sites located on major routes throughout the state (see Table 1A for survey sites). For this reason, considerable intra- and intercounty traffic will not be included for some counties depending on their proximity to a survey site. Again, these truck characteristics reflect only the truck movements as reported at the statewide survey locations.

**Table 1A--Survey Sites and Traffic Direction**

Weigh Station	Site Number	Direction of Traffic	Road Designation
Brady West, WA	1	West	SR12
Brady East, WA	2	East	SR12
Cle Elum East, WA	3	East	I90
Cle Elum West, WA	4	West	I90
Deer Park South, WA	6	South	SR395
Douglas POE (BC Border	7	North	I5
Everett North, WA	8	North	I5
Everett South, WA	9	South	I5
Goldendale, WA	10	North/South	SR97
Kelso South, WA	11	South	I5
Othello, WA	12	All Four	SR17
Pasco, WA	13	South	SR395
Peshastin West, WA	15	West	SR2
Plymouth POE, WA	16	North	SR395
East Port Angeles Westbound, WA	17	West	SR101
Sea Tac South, WA	19	South	I5
Sea Tac North, WA	20	North	I5
East Spokane POE, WA	21	West	I90
Tokio East, WA	22	East	I90
Tokio West, WA	23	West	I90
Umatilla POE, WA	24	South	SR395
Vancouver North, WA	25	North	I5
Wallula POE, WA	26	All Four	SR12, SR395, & SR 370
Osoyoos, BC (BC Border	28	North	SR97
Oroville, WA (US Border	29	South	SR97

Information for this report was provided by an extensive study of freight truck movements on major Washington State highways conducted under the Eastern Washington Intermodal Transportation Study (EWITS). This study was the first in the United States to collect statewide freight truck origination and destination data through direct interviews of truck drivers at weigh stations. Over 300 persons conducted these personal interviews of a total of 30,000 truck drivers, providing an extensive database on freight and goods movements in Washington State.

## **Method of Analysis**

Truck traffic characteristics at the county level were analyzed for trucks whose trips either originated or ended in a particular county. Given the survey data, there was no feasible method for analyzing truck traffic that was simply passing through the county. Detailed truck traffic characteristics for each of Washington's 39 counties by season included number of trucks with freight destined for that county per day, their payload weight and commodity type; road usage, including number of trucks per day, freight weight and commodity type; and number of trucks per day, freight weight and commodity type by city of cargo origin and destination. Truck traffic was analyzed on an annual basis for the following characteristics: county road usage, average and total truck tonnage, and number of trucks by commodity; distribution of freight weight by commodity and by road; type of commodity hauled by truck configuration; and truck carriers' home base for truck trips originating or ending in that county. Truck traffic data is likely to be more accurate in terms of relative differences by road, season, etc., than actual magnitude for any one characteristic due to the nature of the survey approach.



## Presentation of Results

Detailed truck traffic characteristics are presented for Washington's 39 counties in a set of nine tables for each county. Table 1 presents information by road for truck traffic either originating or ending in that county for each season. Characteristics include total number of trucks, number of trucks with freight, average payload, and total tonnage. In addition, the percentage of loads by commodity on each road is calculated.

Tables 2 and 3 present seasonal truck traffic characteristics by city of cargo origin and city of cargo destination, respectively. For each city, the daily number of trucks, trucks with freight, their average payload weight, and total truck traffic weight are presented. Again, there is a breakdown by commodity type for each city.

Table 4 summarizes truck traffic characteristics for trucks whose trips end in that county by season. Total daily truck traffic, number of trucks with freight, average payload weight, and the total tonnage per day as well as the percentage of truckloads by commodity are presented.

Table 5 analyzes truck traffic originating or ending in that county by commodity. The number of trucks per day as well as the average and total payload by commodity is presented. In addition, truck traffic usage by road is detailed for each commodity.

Table 6 shows distribution of payload weight by commodity for truck traffic originating or ending in that county. Five weight categories in five-ton increments are used. Table 7 presents distribution of payload weight by road for truck traffic originating or ending in that county. Weight characteristics by commodity and by road are easily identified from these two tables.

Table 8 shows truck configuration by commodity for truck traffic originating or ending in that county. The percentage of trucks with freight by configuration is presented for each commodity. Table 9 presents truckers' home base by city and the number of Washington-based carriers for truck traffic originating or ending in the county.

Overall, this county-by-county disaggregation of truck movements shows the powerful impact of particular commodity movements on certain roads and during certain seasons. Farm commodities are hauled from the field to the processor or market on a seasonal basis. Lumber harvest has considerable seasonal variation as well. Construction or closures on major roads used for these purposes will need to be planned accordingly. As different industries grow or shrink, they create specific demands on the transportation infrastructure that may need to be accommodated in future transportation planning.

These results represent a summary of truck traffic origin and destination information at the county level. This information should be useful for state and county planning with respect to traffic sources, either origin or destination, and the characteristics of this traffic. It should also be valuable for planning road maintenance and construction at the county and regional level.

## San Juan County Results

There are no major truck routes in San Juan County; the small islands making up this county are accessible by ferry only. The majority of truck traffic originating from San Juan County leaves from the towns of Roche Harbor, Lopez Island, Friday Harbor, and Orcas Island (some survey respondents gave the name of the island rather than the specific town on the island). From 9 to 11 trucks per day leave from these towns in fall, winter, and spring, with no entries for summer (Table 1). (Due to the small number of trucks in the survey originating from San Juan County, these numbers may not be representative of actual truck traffic.) All trucks originating from San Juan County were empty.

Incoming truck traffic for San Juan County is destined for the towns of Friday Harbor and Deer Harbor (Table 2). Incoming trucks for Friday Harbor range from a high of 12 per day in summer to seven per day in winter, with no surveyed trucks for spring. Freight consists of general freight, machinery, and food, with an average payload weight ranging from one and a half to two tons. For Deer Harbor, incoming truck traffic ranges from an average of seven per day in winter to three per day in summer, with no surveyed trucks for fall or spring. Freight consists of food, electrical equipment, and general freight, with an average payload ranging from six to 15 tons. (There were no outgoing trucks from San Juan County in the survey, so the table that normally follows describing this data in the other county reports is not included for this county. For this reason, Table 3 as described in the Methods section is missing and we have renamed the tables to maintain numerical sequence.)

Total truck traffic heading for or leaving from San Juan County ranges from 15 trucks per day in summer to 34 trucks per day in winter (Table 3). The predominant freight types are general freight, food, and machinery. Average payload weights range from 2 to 10 tons across the seasons with the lightest payloads occurring in fall. All of the trucks headed to or leaving from San Juan County in spring were empty.

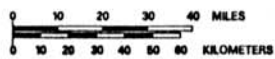
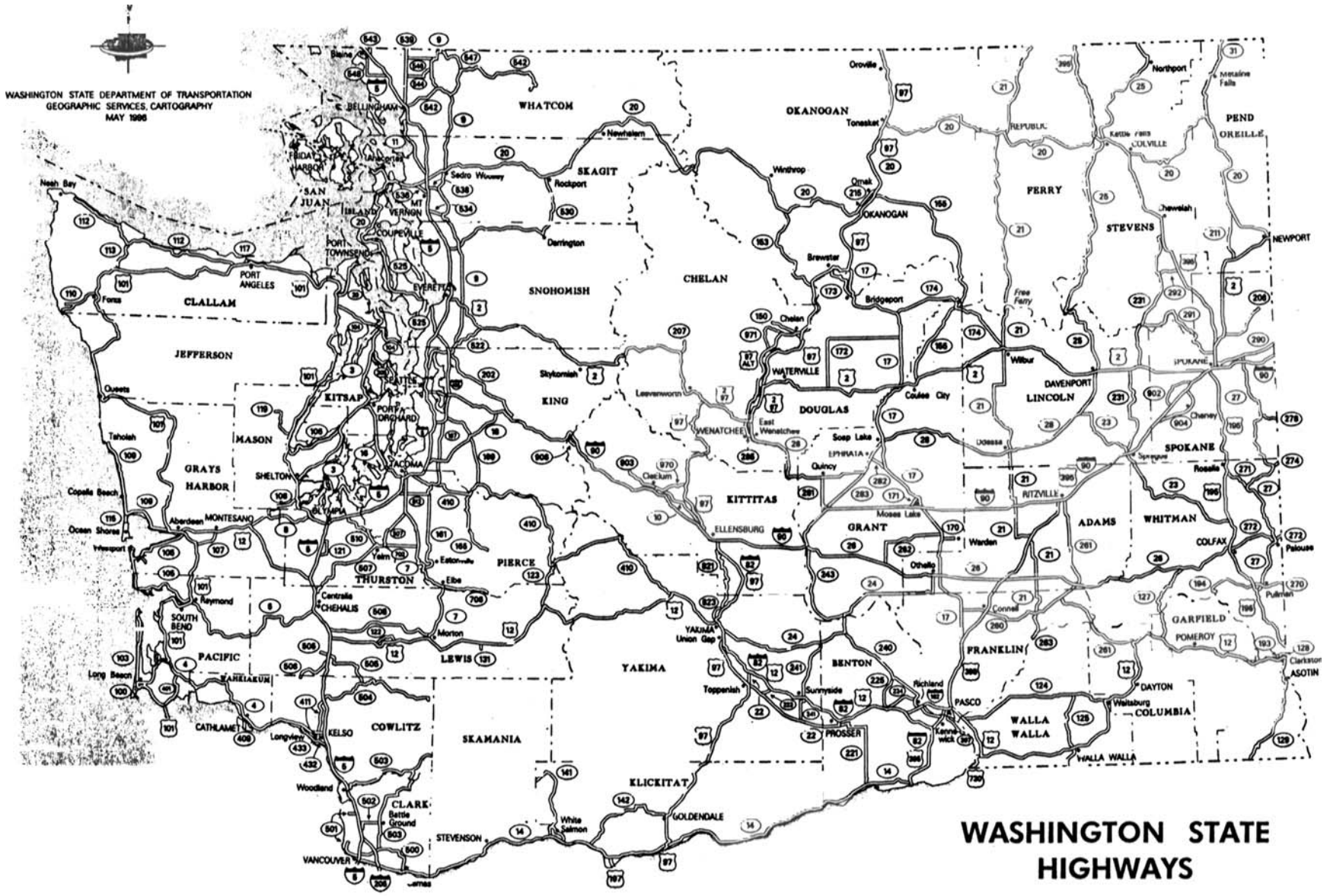
Table 4 shows road usage by type of freight for the major commodities hauled into or out of San Juan County over the entire year. While the results of this table are fairly obvious, in that all freight hauled by trucks must use the ferry (surveyed truckers gave no other major truck routes for roads in this county), the table does reveal the composition and tonnage by freight type. Food is the predominant commodity hauled both into and out of San Juan County, accounting for 49% of trucks with loads and 35% of total tonnage. General freight is the next most common category of freight, accounting for 29% of the trucks with loads and 48% of total tonnage. The average payload weight is highest for general freight at 8.5 tons.

Weight category by commodity for trucks hauling freight into or out of San Juan County is presented in Table 5. For trucks carrying food products, 63% have loads weighing less than 5 tons with the remainder falling in the 5- to 10-ton category. Nearly all trucks carrying general freight have payloads under 5 tons. None of the trucks in the survey carried freight weighing 20 tons or more.

Table 6 shows weight category by roadway for truckloads originating or ending in San Juan County. Eighty-six percent of all trucks with loads have payloads weighing less than 5 tons. An additional 10% have loads in the 5- to 10-ton category, while just 4% fall in the 15- to 20-ton category. A total of 40 trucks with loads were surveyed over the one-year period.

Two-thirds of the trucks carrying loads into or out of San Juan County are straight trucks (Table 7). Another 29% are tractor-trailer configurations and 4% are truck and trailer configurations.

Over the four-day survey period (one day in each season), a total of 96 trucks, loaded and empty, were either heading for or leaving San Juan County (Table 8). Of these trucks, 80% were Washington-based carriers. Seattle serves as home base for 39% of the surveyed carriers. Another 21% are based in Friday Harbor.



**Table 1--Daily Truck Traffic by Road for Each Season, San Juan County**

Season/ Road	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage <sup>1</sup>	Commodity	
					Category	Percent
<b>Fall:</b>						
Roche Harbor	9	0	0	0	Empty	100
Lopez	9	0	0	0	Empty	100
<b>Winter:</b>						
Friday Harbor	11	0	0	0	Empty	100
Orcas Island	9	0	0	0	Empty	100
<b>Spring:</b>						
Friday Harbor	10	0	0	0	Empty	100
Orcas Island	10	0	0	0	Empty	100
<b>Summer:</b>						
No entries in survey.						

<sup>1</sup>Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

**Table 2--Daily Truck Traffic by City of Cargo Origin for Each Season, San Juan County**

Season/ Town	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage <sup>1</sup>	Commodity	
					Category	Percent
<b>Fall:</b>						
Friday Harbor	10	10	2.0	20	Gen. freight	100
<b>Winter:</b>						
Friday Harbor	7	7	1.7	12	Machinery	100
Deer Harbor	7	7	6.0	42	Food	100
<b>Spring:</b>						
No entries in survey.						
<b>Summer:</b>						
Friday Harbor	12	12	1.5	18	Food	100
Deer Harbor	3	3	15.0	45	Electrical	50
					Gen. freight	50

<sup>1</sup>Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

**Table 3--Daily Truck Traffic by City of Cargo Destination for Each Season, San Juan County**

Season/ Town	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage <sup>1</sup>	Commodity	
					Category	Percent
Fall:	27	10	2	20	General freight	100
Winter:	34	15	4	56	Food	50
					Machinery	50
Spring:	20	0	0	0	Empty	100
Summer:	15	15	10	158	Food	80
					Electrical	10
					General freight	10

<sup>1</sup>Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

**Table 4--Truck Trips by Commodity for Truck Traffic Originating or Ending in San Juan County**

Commodity	Truck Trips Per Year (%)	Total Weight		Avg. Payload (Tons)	County Roads Used	
		Tons	% of Total		Road	% of Trips
Food	49	73	35	3.7	FERRY	100
General freight	29	99	48	8.5	FERRY	100
Other	22	34	17	8.3	FERRY	100

<sup>1</sup>Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

**Table 5--Weight Category by Commodity for Truck Loads Originating or Ending in San Juan County**

Weight Category (tons)	Food		Commodity General Freight		Other	
	No.	%	No.	%	No.	%
<5	12	63	10	91	7	88
5 - <10	7	37	0	0	0	0
10 - <15	0	0	0	0	0	0
15 - <20	0	0	1	9	1	12
20 - <25	0	0	0	0	0	0
25 - <30	0	0	0	0	0	0
>30	0	0	0	0	0	0
<b>Total</b>	<b>19</b>	<b>100</b>	<b>11</b>	<b>100</b>	<b>8</b>	<b>100</b>

**Table 6--Weight Category by Road for Truck Loads Originating or Ending in San Juan County**

Weight Category (tons)	Road FERRY	
	Number	Percent
<5	30	86
5 - <10	7	10
10 - <15	0	0
15 - <20	3	4
20 - <25	0	0
25 - <30	0	0
>=30	0	0
<b>Total</b>	<b>40</b>	<b>100</b>

**Table 7--Truck Configuration by Type of Commodity Hauled, San Juan County (%)**

Commodity	Truck Configuration				No. of Loads
	1	2	4	5	
Food	100	0	0	0	19
Machinery	100	0	0	0	7
Electrical equipment	0	0	100	0	1
General freight	0	13	87	0	12
<b>Total</b>	<b>67%</b>	<b>4%</b>	<b>29%</b>	<b>0%</b>	<b>40</b>

Legend: 1 = straight truck, 2 = truck and trailer,  
4 = tractor and trailer, 5 = tractor and two trailers

**Table 8--Truckers' Home Base for Truck Trips Originating or Ending in San Juan County**

	<b>Location</b>	<b>Number</b>	<b>Percent</b>
<b>By Town:</b>			
	Friday Harbor	20	21
	Lopez	9	9
	Seattle	38	39
	Hillsboro, OR	11	11
	Other	18	20
	<b>Total</b>	<b>96</b>	<b>100</b>
<b>Wash. State carriers:</b>		<b>77</b>	<b>80</b>