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COMPARING WASHTO TRANSPORTATION SYSTEMS
AND AGENCIES

FINAL REPORT

by

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and
Dock Burke

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College Station, Texas 77843-3135
November 1991

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	2.54	centimetres	cm
ft	feet	0.3048	metres	m
yd	yards	0.914	metres	m
mi	miles	1.61	kilometres	km

AREA				
in ²	square inches	645.2	centimetres squared	cm ²
ft ²	square feet	0.0929	metres squared	m ²
yd ²	square yards	0.836	metres squared	m ²
mi ²	square miles	2.59	kilometres squared	km ²
ac	acres	0.395	hectares	ha

MASS (weight)				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg

VOLUME				
fl oz	fluid ounces	29.57	millilitres	mL
gal	gallons	3.785	litres	L
ft ³	cubic feet	0.0328	metres cubed	m ³
yd ³	cubic yards	0.0765	metres cubed	m ³

NOTE: Volumes greater than 1000 L shall be shown in m³.

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimetres	0.039	inches	in
m	metres	3.28	feet	ft
m	metres	1.09	yards	yd
km	kilometres	0.621	miles	mi

AREA				
mm ²	millimetres squared	0.0016	square inches	in ²
m ²	metres squared	10.764	square feet	ft ²
km ²	kilometres squared	0.39	square miles	mi ²
ha	hectares (10 000 m ²)	2.53	acres	ac

MASS (weight)				
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1 000 kg)	1.103	short tons	T

VOLUME				
mL	millilitres	0.034	fluid ounces	fl oz
L	litres	0.264	gallons	gal
m ³	metres cubed	35.315	cubic feet	ft ³
m ³	metres cubed	1.308	cubic yards	yd ³

TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
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* SI is the symbol for the International System of Measurements

ABSTRACT

This research has constructed and analyzed a regional database composed of information about the states and the Departments of Transportation represented in the Western Association of State Highway and Transportation Officials (WASHTO). Grounds for conflict and cooperation between member departments may be found in similarities and differences in state economies, demographics, and politics or in the structure of the state transportation departments themselves and the character of the transportation systems they build and manage. One way to illuminate sources of conflict and cooperation between members of transportation groups like WASHTO is to construct and analyze databases that capture the most important characteristics of the states and their transportation departments. This analytical strategy reveals several areas of interest and issues of mutual concern in transportation policy common to all of the members of the organization and to particular groups of state DOTs within the region. Several recommendations are made about ways in which WASHTO member agencies could cooperate and coordinate their transportation policy efforts.

IMPLEMENTATION STATEMENT

The findings of this investigation are that the state transportation agencies represented in the Western Association of State Highway and Transportation Officials (WASHTO) resemble and differ from each other principally along economic, demographic, and regional dimensions. Some of the characteristics of these states' transportation systems and the policies and missions of the transportation agencies that are members of WASHTO are correlated with these similarities and differences. A set of recommendations is proposed to assist WASHTO members in identifying mutually beneficial projects for interstate cooperation around areas of common policy concerns.

DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the accuracy of the data and the facts presented herein. The contents do not necessarily reflect the official view or policies of the Texas Department of Transportation. This report does not constitute a standard, specification, or regulation. This report is not intended for construction, bidding, or permit purposes.

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1.0 EXECUTIVE SUMMARY

1.1 Differences and Similarities Found Among and Between WASHTO States

Several major similarities and differences among and between WASHTO states were uncovered in this study. First, the similarities.

Regardless of declines in manufacturing and mining employment, compared to the rest of the U.S., WASHTO state economies are becoming slightly more manufacturing-oriented and are increasing their historic dependence on the extraction of non-renewable raw resources. All regions and growth categories posted increases in mining output as a percent of GSP. On average, WASHTO state population growth during the last two decades was almost double that of the U.S., and there appears to be a strong positive relationship between economic growth, population growth, and net migration in WASHTO states. All WASHTO regions experienced large increases in the percent of their residents living in metropolitan areas.

WASHTO states witnessed a 2.2 percent decline in their tax revenue collections from 1970 through 1987. By 1988, WASHTO states had reached a level of taxation that, on average, had met or exceeded their tax capacities (1.01). Data on tax effort-to-capacity ratios and rates of economic growth for WASHTO states also reveals evidence of a strong negative relationship between the two.

WASHTO states saw highway mileage per 1000 vehicles registered decline by an average of almost 20 percent during the last decade. As a group, WASHTO transportation agencies have the greatest degree of responsibility toward highways and intra-urban roads and streets and the least amount of responsibility for water transport. There appears to be no relationship between a given state's economic growth rates and the degree to which its transportation agency has multimodal responsibility.

WASHTO state transportation agencies provide a great deal of environmental due process, with an average state score of 94 percent. There is no apparent relationship between economic growth rates nor the geographic region to which a given WASHTO state belongs and the amount of environmental due

process provided, however. On the other hand, WASHTO states initiate comparatively little pro-active environmental policy. The degree to which WASHTO transportation agencies carry out pro-active environmental policies, and their overall ranking with respect to all environmental policies, appears to be independent of the economic growth category to which their state belongs.

Almost 90 percent of the WASHTO transportation agencies had their mission statements changed in recent years. Of these agencies, all had their statements broadened, and over 90 percent of these had new transportation roles added to their organizational responsibilities. Almost two-thirds were given explicit roles pertaining to the environment, economic development, or community and regional planning.

All WASHTO agencies included in this analysis have a research program in place. Only about one-half are carrying out joint research with their state universities on so-called "high-tech" projects (e.g., automated vehicle systems and other new transportation technologies). Only one-third of the agencies responding positively had a written procedure--implying a formal process--for transferring newly developed technology.

Almost two-thirds of WASHTO transportation agencies are contemplating new sources of revenue for highways and public transportation. All of the net "donor" states to the Federal Highway Trust Fund are studying new revenue sources. Slightly less than half of the states that are net recipients of Highway Trust Fund monies are contemplating new revenue sources. Finally, over 83 percent of the states with international borders are undertaking some form of cooperative transportation project with Canada or Mexico, while slightly less than half of all WASHTO states are conducting interstate cooperative projects.

In terms of the important differences found between WASHTO states, we begin first with those states classified as having high growth rates of per capita Gross State Product (GSP), per capita income (PCI), and employment growth (EMP)--Texas, Arizona, Colorado, and Nevada.

High-growth WASHTO states lost only one-half as much manufacturing employment as low-growth states and only about one-half as much mining employment. With respect to all natural resource categories of output (agriculture, forestry, mining, and energy), high growth states decreased the share of their GSPs accounted for by natural resource industries by almost 22 percent from 1972 to 1986. High-growth states had the fastest rates of population increase, almost double the average net migration of their medium-growth neighbors, and 8.4 times that of low-growth states. High-growth states had the largest population shifts toward metro areas, almost double that of medium-growth states. High-growth WASHTO states also had the lowest tax effort-to-tax capacity ratios in both 1975 and 1988, giving them greater flexibility with respect to raising revenues for increased demand for public services and infrastructure.

High-growth states witnessed a 21 percent decline in the ratio of highway mileage to vehicle registrations from 1978 to 1988, and were the only states in WASHTO to actually increase their expenditures on highways as a percent of all state and local government expenditures during this period. They were also more likely to be considering new revenue sources, independent of their status vis-a-vis the highway trust fund: half of the high growth states were donors, and half were net recipients. Last, transportation agencies in high growth states were apparently more likely than those in other categories and regions to believe that theirs was an innovative transportation department. High-growth states also had the most highly developed research programs, with joint university research and some technology transfer programs in place.

Medium- and low-growth states consisted of Washington, Wyoming, New Mexico, California, North Dakota, and Idaho, and Utah, Oklahoma, South Dakota, and Montana, respectively. With respect to all natural resource categories of output (agriculture, forestry, mining, and energy), medium- and low-growth states increased their economies' relative dependence on natural resource industries over the period examined in this study. Medium- and low-growth states had the second and third highest rates of population increase, and actually decreased their highway spending as a percent of all state and local government spending. Low-growth states had the highest tax effort-to-tax capacity ratios.

Differences between WASHTO states were also found along regional lines. WASHTO states were divided into regions according to a scheme popularized by the Bureau of Economic Analysis, U.S. Department of Commerce. These are as follows:

Far West: California, Nevada, Oregon, Washington;

Rocky Mountain: Idaho, Montana, Wyoming, Utah, Colorado;

Plains: N. Dakota, S. Dakota (Not in WASHTO: Nebraska, Kansas, Minnesota, Missouri, Iowa)

Southwest: Arizona, New Mexico, Oklahoma, Texas

1. The Far West

WASHTO states in the Far West lost manufacturing, mining, and government employment, and gained jobs in the FIRE and services sectors. The Far West region had the highest rates of population increase, and the highest net migration totals. Probably as a result, highway systems in the Far West states are under the most stress, with an almost 30 percent decline in highway mileage per vehicle registrations during the last decade. All of the Far Western state transportation departments were contemplating new ways to raise revenues for highways and transportation.

With respect to their transportation departments, the Far West states have the highest overall scores for multimodal transportation responsibility, and outperform by a large margin all other WASHTO states in their implementation of pro-active environmental policy. The Far West also leads all regions in terms of overall environmental policy scores. Agencies in the Far West were the most likely to think of themselves as policy innovators, and, along with states in the Southwest, had the most highly developed research programs, with all states conducting research jointly with their state universities.

2. The Southwest

The Southwest was the only BEA region among WASHTO states that had an average decrease in its natural resource share of GSP during the period examined in the study. This region also had the highest rates of GSP and per capita income growth and the second-highest rate of employment growth. The Southwest states

had the second-highest average and total net migration, and were the only WASHTO states to see an increase in highway spending as a percent of state and local government expenditures.

WASHTO state transportation agencies in the Southwest had the second-highest overall average scores for multimodal transportation responsibility, and were second only to the Far West in their belief that theirs were innovative transportation departments. Along with the Far West, transportation departments in the Southwest also have more highly developed research programs and R&D initiatives than agencies in other regions and growth categories. All Southwestern states were net donors to the Federal Highway Trust Fund, and all were contemplating new ways to raise revenue.

3. The Rocky Mountains

The Rocky Mountain region lost manufacturing, mining, and government employment, and gained jobs in the FIRE and services sectors. Rocky Mountain states had the best revenue performance, with an approximately 4 percent increase in tax revenues per \$100 of personal income over the last decade, while they decreased their spending on highways by almost 20 percent.

The Rocky Mountain states had the third-highest scores for multimodal responsibility. All of the states in the Rocky Mountains region were net recipients of money from the Federal Highway Trust Fund, and only one out of these five states was actively studying new ways to raise revenue.

4. The Plains

The two Plains states included in WASHTO (North and South Dakota) went against both WASHTO and national trends by posting employment increases in manufacturing, mining, and government employment. When WASHTO states were grouped into BEA regions, the Plains states stood apart by having a 45 percent increase in manufacturing output as a percent of GSP. The Plains states had by far the largest increase in mining output as a percent of GSP, 118 percent. The two WASHTO Plains states had population growth of only one-seventh that of the two leading regions, witnessed a net outmigration, and had the smallest increases in the

percent of their populations moving into metropolitan areas. The Plains states had the worst fiscal climates, with a 22 percent decline in tax revenues, and the highest tax effort-to-tax capacity ratios.

Regarding their transportation agencies, the Plains states have the lowest multimodality scores, the lowest pro-active environmental policy scores, and the lowest overall environmental policy scores.

1.2 Correlations Between WASHTO State Similarities and Differences and the Characteristics of WASHTO Transportation Agencies

As discussed previously, the size of the sub-samples into which WASHTO states were divided precludes rigorous statistical testing of the relationships observed between WASHTO economic growth categories and BEA regions, state and transportation system characteristics, and transportation department policies and responsibilities. Nevertheless, the analysis carried out using the WASHTO database and survey responses provides evidence of two important correlations.

First, high-growth WASHTO states are concentrated in the Far Western and Southwestern BEA regions. Probably not as the result of coincidence, these states, and the two regions in which they were concentrated, had the highest rates of population increase, the highest average and total levels of net migration, and the largest internal population shifts to metropolitan areas. High-growth states, and the Far West and Southwest states, also had the lowest ratios of tax effort to tax capacity, indicating that they have greater degrees of flexibility in the raising of revenues for public services and infrastructure. High-growth states had the only increase in highway expenditures, and when the Far West and the Southwest were combined, had the largest average decrease in the highway mileage per 1000 vehicles registered. This indicates that highway systems in the Far West and Southwest are under more stress than any other areas in WASHTO.

While high-growth states ranked third in their average multimodality scores, the Far West and Southwest ranked first and second, respectively, in this measure of transportation department policies and responsibilities. High growth states, and the Far West and Southwest, had the highest overall average scores vis-a-vis transportation department environmental policies. More transportation

departments in states in the high-growth category, and in the Far West and Southwest, regarded themselves as policy innovators. In the area of research, development, and technical initiatives, high-growth states and states in the Far West and Southwest appeared to have more highly developed research programs, links with state university researchers, and technology transfer programs. All transportation departments in high-growth states and the Far West and Southwest were studying new ways to raise additional revenue for transportation projects.

Second, just as there appears to be a high correlation between characteristics of high-growth, Far West, and Southwest states, and high scores on a broad range of transportation department policy and responsibility measures, there is also evidence of a relationship between characteristics of low growth, Plains region states, and low scores on transportation department policy and responsibility measures. The two Plains states included in WASHTO (North and South Dakota) belonged to the medium- and low-economic growth categories, respectively. The economic development paths both states were following were markedly different than either those of the U.S. at large or the WASHTO states as a group. The WASHTO Plains states had population growth of only one-seventh that of the two leading regions, witnessed a net outmigration, and had the smallest increases in the percent of their populations moving into metropolitan areas. The Plains states had the worst fiscal climates, with a 22 percent decline in tax revenues, and the highest tax effort-to-tax capacity ratios. Regarding their transportation agencies, the Plains states had the lowest multimodality scores, the lowest pro-active environmental policy scores, the lowest overall environmental policy scores, and neither of the states was contemplating new ways of raising transportation revenue.

1.3 Recommendations for WASHTO: Transportation Policy Concerns and Cooperative Projects

Several major areas of mutual concern in transportation policy emerge from this study, all of which are also subjects that might serve as mutually beneficial, cooperative projects for coalitions of WASHTO states.

First, since all states save two saw highway mileage per 1000 vehicle registrations drop over the last decade, and only four WASHTO states (those in the high-growth category) were able to increase their expenditures for highways, it

might benefit WASHTO states to carry out studies on whether to follow demand-side or supply-side approaches to the problem of accommodating increasing volumes of vehicles and vehicle miles traveled (VMT). Throughout this century in the U.S., the traditional approach has been to accommodate steadily increasing VMT through a supply-side strategy, i.e., by simply building more, and more capacious, roads. As urban rights-of-way are becoming more scarce, environmental constraints on the use of internal combustion engines begin to take hold, and highway construction and maintenance funds become subject to a wide array of competing demands, transportation economists and engineers are beginning to examine the possibilities inherent in demand-management strategies as a means to deal with increasing VMT, urban congestion, and the escalating costs of new highway construction and maintenance. Some of these methods include toll roads, congestion pricing, and new urban planning and land-use management techniques designed to emphasize multimodal approaches to transportation planning and system management.

Alternative revenue sources for highways and other transportation modes is a second issue that directly concerns high-growth states, those in the Southwest and Far West, and WASHTO states that are net donors to the Federal Highway Trust Fund. Since many of these WASHTO agencies are already studying ways to raise revenue outside of traditional sources such as the gasoline tax, it might be beneficial for those agencies to share their information and findings, especially if shared results are products of pilot projects.

A third area of common concern is, of course, the environment and the environmental policies of WASHTO transportation departments. As noted in Section V, WASHTO agencies provide a great deal of environmental due process but little in the way of pro-active, mitigative environmental policy. This is an area of potential concern for WASHTO member agencies. Merely following environmental due processes may not be a sufficient condition for fulfilling overall environmental responsibilities. In this connection, WASHTO states with particularly good pro-active and ameliorative environmental policies and strategies--i.e., those in the Far West and Rocky Mountain states--could provide emulative leadership for the rest of WASHTO by formally sharing their experience in this area.

The last concern raised by this study relates to the basic way in which WASHTO itself is organized. Clearly, high-growth states, their transportation departments, and their transportation systems share a number of important characteristics, not the least of which is that they are geographically proximate, if not contiguous to one another. On the other hand, the Plains states share similar characteristics but have very different kinds of problems than the high-growth states of the Far West and Southwest. The findings suggest that economic and geographically based sub-groups of WASHTO states might be able to conduct joint research and mount other cooperative projects on all or some of the issues discussed in this section, as well as others that may concern them in the future. These sub-groups could consist of WASHTO states divided into their respective BEA regions or WASHTO states in economic growth categories.

2.0 DESCRIPTION OF THE PROJECT AND REVIEW OF RESEARCH OBJECTIVES

The Departments of Transportation (DOTs) represented in organizations such as the Western Association of State Highway and Transportation Officials (WASHTO) often come from very different types of states. Grounds for conflict and cooperation between member departments may be found in similarities and differences in state economies, demographics, and politics, or in the structure of the state transportation departments themselves and the character of the transportation systems they build and manage. One way to illuminate sources of conflict and cooperation between members of transportation groups like WASHTO is to construct and analyze databases that capture the most important characteristics of the states and their transportation departments. Among other things, this strategy can help reveal areas of interest in transportation policy common to all of the members of the organization and to particular groups of state DOTs within the region and help predict the composition of coalitions that may form around areas of common concern.

The objectives of this research, then, are to

(1) construct a database containing information on state economic, demographic, fiscal-political, and transportation system conditions and characteristics; and the organizational responsibilities and policy concerns of state transportation departments in the 17 WASHTO states;

and

(2) analyze this database for

(a) sources of similarities and differences among and between WASHTO states and the characteristics of their transportation systems;

(b) possible correlations between those aspects of WASHTO and the responsibilities and policy priorities of WASHTO transportation agencies;

(c) mutually beneficial projects on which WASHTO members might wish to cooperate; and

(d) areas of interest in transportation policy common to the whole organization and to potential coalitions of states within it.

3.0 CONSTRUCTING THE WASHTO DATABASE

3.1 Regionalization Criteria

As outlined above, the WASHTO database was constructed so that three main analytical tasks could be accomplished. First, similarities and differences among and between WASHTO states were to be uncovered by comparing them across a range of economic, demographic, fiscal-political (relating to state economic policies and fiscal conditions, e.g., a state's tax "capacity" versus its tax "effort"), and transportation system dimensions. Second, information from a survey of WASHTO member agencies was to be analyzed to see whether correlations existed between WASHTO state and transportation system characteristics and the responsibilities and policy priorities of WASHTO members. Finally, areas of interest in transportation policy common to the whole organization and to potential coalitions of states within it were to be identified.

These tasks are more difficult than they first appear. With respect to the first, there are no ready-made criteria for making interstate comparisons. Political scientists, for example, have measured differences among American states over the last three decades with the assumption that studying how they differ will lead to an understanding of why they differ (Tucker, 1988). These researchers* have used measures of state economic performance, socio-demographic characteristics, and political activity to see whether these account for differences in state policies and policy-making processes. However, no consensus has emerged on what the determinants of state policy are, on which categories of variables--socioeconomic or political--are the most important (Lewis-Beck, 1977), or on which specific variables within a given category are the most influential. (Tucker and Herzik, 1987)

On the other hand, regional science--an interdisciplinary amalgam comprising urban and regional economics, development economics, transportation economics, economic history and cliometrics, economic geography, theoretical and applied industrial organization theory, and urban and regional planning and design--supplies operationally superior insights into making the interstate

*For comprehensive reviews, see Fenton and Chamberlayne, 1969; Hofferbert, 1966; Jones, 1973; and Savage, 1980.

comparisons for which the WASHTO database was constructed. First, and perhaps most important, regional science points out that while WASHTO calls itself a “regional” grouping because it is composed of transportation agencies from states in the Western half of the U.S., its members are representatives of very different types of states. These range from the most to some of the least populous in the union, from those with vigorously growing economies to those considered stagnant, and from states whose geographies are dominated by resource-rich, Federally owned lands to those where the percentage of Federally owned land is quite small.

This broad range of differences means that to construct a database through which meaningful comparisons can be made, WASHTO states must be divided into sub-groups. One type of subgroup is most commonly defined as a region. There are two criteria most often used by regional scientists to divide groups of contiguous but economically or geophysically heterogeneous areas into regions: homogeneity and functional integration. Two prominent regionalists explain the distinction:

A homogeneous region is demarcated on the basis of internal uniformity . . . Some external change . . . will affect all of the region in a similar way; what is true of one part of the region is true of the other parts, and the various parts resemble one another more than they resemble areas outside the region . . . The alternative principle of regionalization is based on functional integration rather than on homogeneity. Here, the region is composed of areas that exhibit more interaction with one another than with outside areas: it is the extent of economic interdependence that serves as a criterion for regional demarcation. (Hoover and Giarratani, 1984, p. 244)

The winter wheat belt in the central part of the United States is a homogeneous region because all its parts grow the same main crop in the same way. New farm price supports or loan programs, or a series of drought years, will have similar effects on all of the states in that region. Functional regions, on the other hand, are exemplified by areas such as the New York Metropolitan Statistical Area (MSA), where economic interactions between the cities that make up the area are greater than the interactions between those cities and others outside the region.

Except for cases such as the rather obvious one cited above, functional regions are generally more difficult to demarcate than homogeneous ones. In the abstract, the definition of a functional region is relatively straightforward, but extensive--and quite expensive--empirical work is often required to determine the extent and direction of the economic linkages between particular cities and towns. In the final analysis, this is often a matter of judgment on the researcher's part.

On the other hand, the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce has used the homogeneity criterion to decompose the continental United States into eight regions of contiguous states. This system is widely used by regional scientists as a convenient way to demarcate homogeneous regions within the U.S. Since the states within each of the eight BEA regions are similar in the economic-geographic sense described above, the system is particularly useful for making inter- and intraregional comparisons based on state characteristics like economic and population growth, levels of economic and social development, and fiscal climates. For these reasons, this study uses the BEA regional designations as one means of making comparisons of WASHTO transportation agencies and the states they represent. These are as follows (WASHTO members are designated with an asterisk):

Far West: California*, Nevada*, Oregon*, Washington*;

Rocky Mountain: Idaho*, Montana*, Wyoming*, Utah*, Colorado*;

Plains: N. Dakota*, S. Dakota*, Nebraska, Kansas, Minnesota, Iowa, Missouri;

Southwest: Arizona*, New Mexico*, Oklahoma*, Texas*

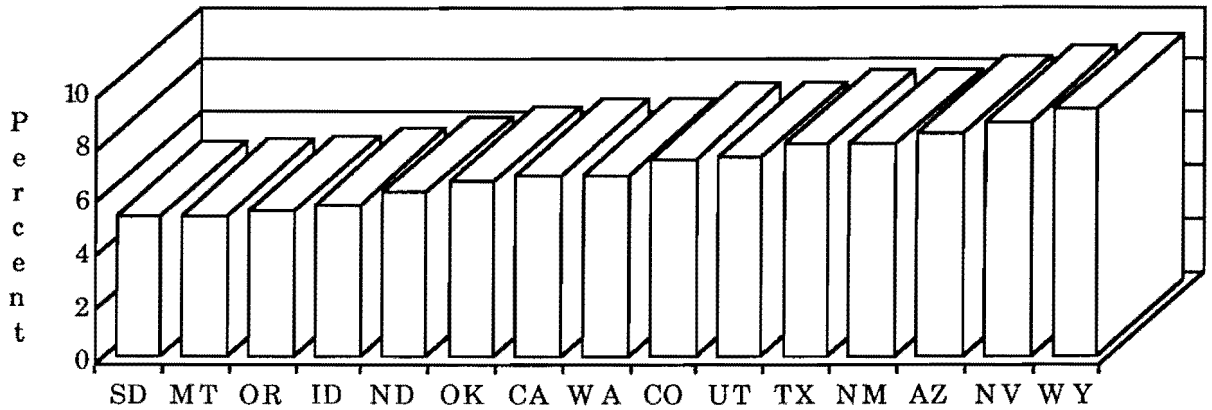
It should be noted at this juncture that Alaska and Hawaii, both members of WASHTO, are not included in the BEA Far West region. Until 1988, both states were included in this region but were assigned to a new "Alaska-Hawaii" region because their physical locations precluded their inclusion in a regionalization scheme based on geographic or economic homogeneity. Because of the extreme difficulty of comparing these WASHTO states with their cousins in the continental U.S., they have therefore been systematically excluded from the analyses contained in this report.

This study employs a second means of subdividing WASHTO states into comparable categories. In dozens, if not hundreds of research efforts, regionalists have also based interstate comparisons on rates of economic growth or levels of economic development. Economic growth, in its most general formulation, is simply an increase in the overall volume of economic activity. It is usually considered a necessary but not sufficient condition for economic development. Economic development, on the other hand, is one outcome of growth. It implies, among many other things, that a society is making possible higher standards of living and enhanced levels of well-being for all of its members. Because of this, measuring economic development is a somewhat subjective process. We therefore chose as our second criterion for categorizing WASHTO states the more simple standard of economic growth.

In the vast majority of studies in which economic growth was used as the basis for comparing states (e.g., Wheat, 1986; Plaut and Pluta, 1983; Carlton, 1983; Cushman, 1987; Bartik, 1983, 1989; Helms, 1985), it is measured in one of three different ways: (1) annual percent change in per capita Gross State Product (GSP); (2) annual percent change in Per Capita Income (PCI); and (3) annual percent change in nonagricultural or manufacturing sector employment. We used all three of these measures. The longest time period where data was available was chosen (from 1973 to 1986), and annual percentage changes in each variable were averaged over that time period to produce an average annual percent change as an index of performance. All of these calculations were made in terms of inflation-adjusted 1982 dollars.

The state-level analogue to Gross National Product (GNP), GSP is the dollar value of all goods and services produced within the borders of a state in any given year, and measures the overall volume of state economic activity. In our study, it was calculated in per capita terms so that comparisons could be made about the volume of economic activity between states with different populations. Figure 3.1, below, displays the average annual percent growth in per capita GSP for all WASHTO states (excluding Alaska and Hawaii) from 1973 to 1986.

Figure 3.1--Average Annual Per Capita GSP Growth, WASHTO States, 1973-1986

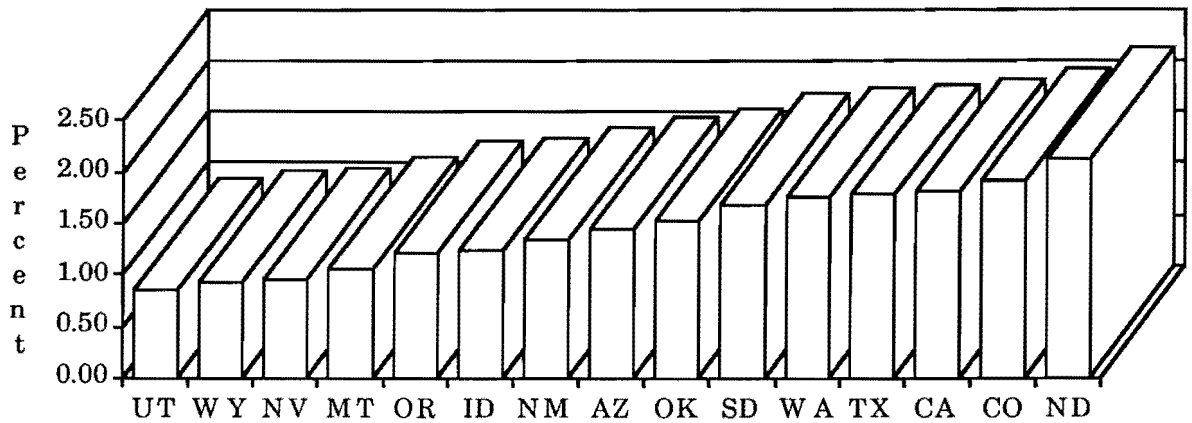


Source: U.S. Department of Commerce

The average annual growth rate of per capita GSP for WASHTO states from 1973 to 1986 was approximately 7 percent. This was more than four times the U.S. average of 1.4 percent during the same period. (Baumol and Blinder, 1987) All of the WASHTO state economies, including the slowest-growing (South Dakota, at 5.2 percent) exceeded this growth rate. Three of the five states in the Rocky Mountain Region--Colorado (7.41), Utah (7.46), and Wyoming (9.26)--and three of the four states in the Southwest Region--Texas (7.95), New Mexico (7.96), and Arizona (8.4)--all exceeded this average. The only other state in WASHTO to have GSP growth better than the WASHTO average was Nevada (8.82) of the Far West Region.

Per Capita Income (PCI) is generally regarded by regional economists as a good measure of the "effective demand" or purchasing power of consumers. If PCI is growing faster than inflation, it indicates that an economy is growing fast enough so that *real* family and individual income, after adjusting for inflation, can also improve. Figure 3.2, below, ranks WASHTO states in terms of average annual growth rates of PCI.

Figure 3.2--Average Annual Growth in Per Capita Income, WASHTO States, 1973-1986

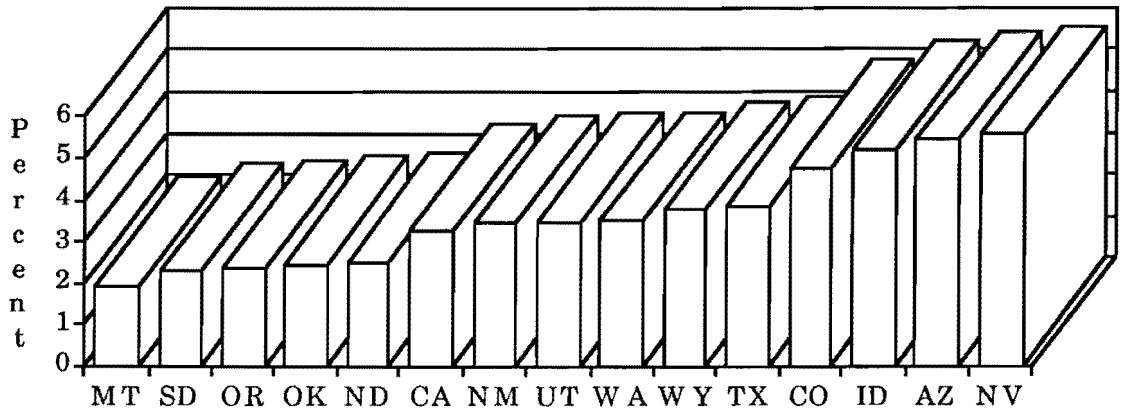


Source: Florida State University, U.S. Department of Commerce

Overall, per capita income in WASHTO states grew at an annual average rate of 1.4 percent from 1973 to 1986. This was slightly lower than the national average of 1.6 percent. Arizona (1.45), Oklahoma, (1.52), and Texas (1.77) of the BEA's Southwest Region all exceeded the WASHTO average, with Texas growing faster than the nation. North Dakota and South Dakota of the Plains Region both exceeded the annual rate of PCI growth for the nation and WASHTO (2.12 and 1.7 percent, respectively). Similarly, Colorado (Rocky Mountain Region, 1.9 percent), California and Washington (both of the Far West, 1.82 and 1.75 percent) outperformed both WASHTO and national PCI growth averages.

Finally, the average annual growth rate of nonagricultural employment--i.e., the rate at which a state economy is producing new jobs--is regarded by many economists as the best indication of state economic health. If employment growth is high, it means that new enterprises are forming and existing ones are expanding in response to strong demand both in-state and out-of-state for a state's goods and services. Figure 3.3 ranks WASHTO state performances in this crucial dimension of economic growth.

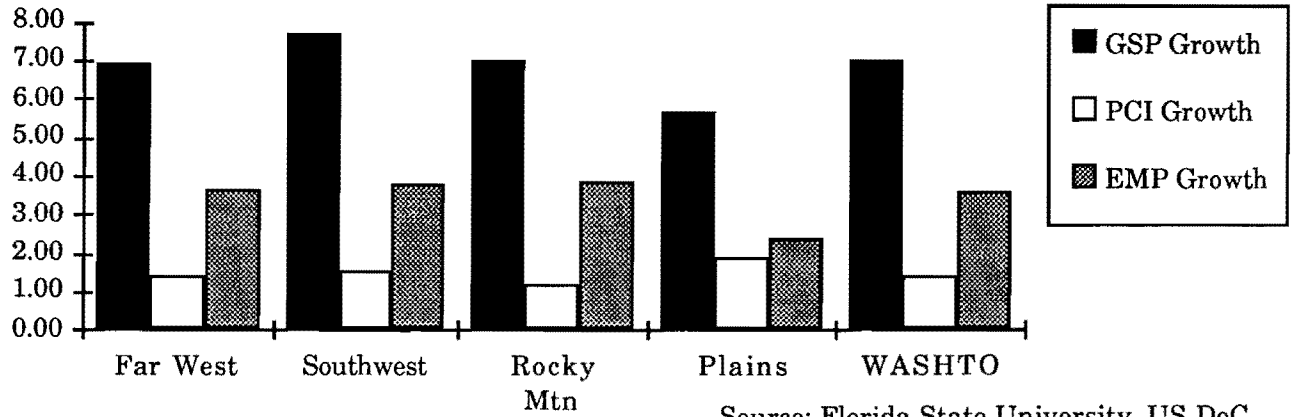
Figure 3.3--Annual Average Growth in Nonagricultural Employment, WASHTO States, 1973-1986



Source: Florida State University, U.S. Department of Commerce

The average annual growth rate of WASHTO state employment (EMP) over this period was 3.6 percent. Over a comparable period (1970-1988), annual employment growth averaged 2.15 percent in the U.S. (Statistical Abstract of the United States, 1990, p.395), which was exceeded by all WASHTO states save Montana (1.9 percent). Arizona and Texas (3.9 and 5.4) of the Southwest; Colorado, Idaho, and Wyoming of the Rocky Mountains (4.7, 5.2, and 3.8); and Nevada—of the Far West (5.5)—all exceeded the WASHTO average.

Figure 3.4--Annual Percent Changes in State GSP, PCI, and EMP, WASHTO States in BEA Regions, 1973-1986



Source: Florida State University, US DoC

Finally, in Figure 3.4, we compare the average annual growth rates of GSP, PCI, and EMP for all WASHTO states grouped into BEA regions. The Southwestern and Rocky Mountain states led the WASHTO regions in rates of GSP and employment growth (EMP), while the two plains states represented in WASHTO, North and South Dakota, had the highest rate of growth in per capita income (PCI). It is not graphically apparent, however, which WASHTO state or group of states actually had the best overall economic growth performances. Each of the three measures of economic growth produced three very different sets of state rankings. Nevada, for example, ranked first and second in employment and per capita GSP growth, but only thirteenth in personal income growth. It is also not clear--without an *a priori* scheme that weights each of the three measures of growth according to its relative importance in portraying a true picture of economic performance--how to use these data to construct a criterion for regionalizing WASHTO states into economic growth categories.

In order to combine the three categories of economic growth data into a meaningful categorization of WASHTO states, we adopted the approach of scoring the state rankings for each growth measure in order to group WASHTO states into high, medium, and low economic growth categories. The performance of each WASHTO state was ranked in each of the three categories, i.e., GSP, PCI, and EMP, and was scored according to its ranking. A first place ranking received 15 points,

while a last place ranking received one point, and so on. Table 3.1 displays the rankings that result from this procedure and, parenthetically, the scores received by each state.

Table 3.1--Economic Growth Rankings, WASHTO States, 1973-1986						
Growth Category	State	GSP Rank	PCI Rank	EMP Rank	Overall Score	Overall Rank
High	AZ	3 (13)	8 (8)	2 (14)	35	1
	CO	7 (9)	2 (14)	4 (12)	35	1
	TX	5 (11)	4 (12)	5 (11)	34	2
	NV	2 (14)	13 (3)	1 (15)	32	3
Medium	WA	8 (8)	5 (11)	7 (9)	28	4
	WY	1 (15)	14 (2)	6 (10)	27	5
	NM	4 (12)	9 (7)	9 (7)	26	6
	CA	9 (7)	3 (13)	10 (6)	26	6
	ND	11 (5)	1 (15)	11 (5)	25	7
	ID	12 (4)	10 (6)	3 (13)	23	8
Low	UT	6 (10)	15 (1)	8 (8)	19	9
	OK	10 (6)	7 (9)	12 (4)	19	9
	SD	15 (1)	6 (10)	14 (2)	13	10
	OR	13 (2)	11 (5)	13 (3)	10	11
	MT	14 (2)	12 (4)	15 (1)	7	12

Using this scheme, Arizona, Colorado, Texas, and Nevada had the highest overall economic growth scores and rankings, and were consequently grouped into the "High Growth" category. Additionally, both Arizona and Texas are located in the Southwest, which as a region had the highest rates of GSP growth, and the second-highest rates of employment growth. The second, or "Medium Growth" category, consisted of the states of Washington, Wyoming, New Mexico, California, North Dakota, and Idaho. The third, or "Low Growth" category, consisted of Utah, Oklahoma, Oregon, South Dakota, and Montana. The Low Growth category is

perhaps the least controversial of the three: in only two instances did a state in this category rank as high as sixth on any of the three measures, and there were three instances of a last-place ranking (15th), two instances of a next-to-last (14th), and two instances of a 13th-place finish.

BEA regions and economic growth categories thus constitute the two ways in which WASHTO member transportation agencies are grouped into subsets of states appropriate for comparative analysis. These two groupings will be used throughout the remainder of this report to help uncover the most important dimensions of similarity and difference between WASHTO states and their transportation systems (Section 4). They will also be used in finding possible correlations between those characteristics and the responses to a questionnaire on WASHTO transportation agency roles and responsibilities (Section 5).

3.2 Categories of Data in the WASHTO Database

In addition to finding criteria for regionalizing and categorizing WASHTO states, the other major task in constructing the WASHTO database was to choose which categories of data--hereafter referred to as descriptive dimensions--would be used to uncover similarities and differences between WASHTO states. The first descriptive dimension chosen was dictated by the subject matter of the study itself: the characteristics of state transportation systems. As discussed in Section 3a, economic growth was chosen as the second descriptive dimension and was used for making initial interstate comparisons and to subdivide WASHTO states to facilitate comparisons based on other factors. Because of the seemingly universal desire by public officials to promote economic development in their home states, we chose levels of economic development as a third descriptive dimension around which WASHTO states would be compared.

Because empirical studies in regional science often employ state demographic characteristics as a way to make interstate and interregional comparisons (see Greenwood, 1981), the dynamics of a state's demography (i.e., changes in population size and composition) was chosen as the fourth descriptive dimension. Data on conditions related to taxation and public revenues—i.e., fiscal policies and conditions—in WASHTO states were included as a fifth descriptive dimension. Finally, again guided by considerations from regional science, measures that

describe a given state's geophysical features and its base of natural resources were included. These data on geophysical were supplemented with indicators of the degree to which industry in a given state pollutes the natural environment.

4.0 THE WASHTO STATES: A GRAPHICAL AND STATISTICAL COMPARISON

We turn now to one of the principal objectives of this study: to report on the results of the comparative analysis of WASHTO states.

4.1 Method

Data was collected for 200 variables in the five descriptive dimensions outlined above. A complete list of these variables and their sources is contained in Appendix 1. In cases where there was unambiguous theoretical or *ad hoc* intuitive justification for doing so, particular sets of variables were used in the comparative analysis and others excluded. In cases where there was no definitive guidance either from scholarly literature or intuition, factor analysis was used to assess whether a variable or set of variables was essential or superfluous in portraying a particular descriptive dimension. Only those variables which loaded at .8 or higher on any factor within a given descriptive dimension were retained for the comparative analysis and other subsequent analyses.

4.2 Economic Development

Because they require more than a simple aggregation of quantities of goods and services or jobs produced, levels of economic development are much more difficult to measure than rates of economic growth. One theorist's development is another's underdevelopment, and value judgements implicitly underlie any assessment of whether a state or region is attaining (or stagnating in) a certain level of one or the other. It is indisputable, however, that economic development implies not just an increase in the volume of economic activity but a change in its overall character (Meier, 1989).

The measures of economic development included in the WASHTO database thus reflect changes in the structure of a given state's economy, over periods of time parallel with those chosen for the measures of economic growth. These are: (1) changes in the composition of state nonagricultural employment and (2) changes in the composition of GSP. As with economic growth, annual percentage changes in each variable were averaged over each time period to produce one number suitable for interstate comparison.

Changes in the composition of state nonagricultural employment are gauged as the average annual percent change in manufacturing, mining, FIRE (finance, insurance, and real estate), services, and government employment per 1000 civilian employees. These sectors provide excellent indicators of the way in which the economic structure of states is evolving over time. For example, over the past three decades in the United States, the composition of civilian employment has been steadily changing. Manufacturing workers once dominated the overall employment mix, but workers in the FIRE and services sectors of the economy are now in the majority. Their principal tasks are not to extract raw resources or produce goods but to manipulate symbols, carry out financial transactions, and disseminate information and services. This has led some observers to speculate that the United States has entered a "deindustrialized" era (Bluestone and Harrison, 1982). Table 4.1 compares the changes that WASHTO states have undergone in their employment structures over the 1973 to 1987 period with those experienced nationally.

Table 4.1--Percent Changes in Employment by Industry (As a Share of Total Nonagricultural Employment), WASHTO States and the U.S., 1973-1987

	Manufac- turing	Mining	FIRE	Services	Govern- ment
WASHTO Average	-16	-11.6	19.7	24.7	-9.9
U.S. Average	-31.8	-20.1	24.5	45.5	-6

Source: Florida State University and U.S. Department of Commerce

In three important sectors, changes in the structure of WASHTO state employment have deviated in a significant way from national trends. The first is manufacturing. Manufacturing workers as a share of total nonagricultural employment in the U.S. declined by 31.8 percent and, in absolute terms as well, from 19.4 million to about 19 million. This decline was roughly twice that of the

WASHTO states, where manufacturing employment declined by only about 16 percent. It is important to note that the Western United States has historically been much less dependent on manufacturing than the Northeast, the Midwest, or even the South. This is still true. As of 1988, employment in goods-producing industries as a share of total employment was almost 50 percent less in WASHTO states--an average of 12.3 versus 18.3 percent--than in the nation as a whole. (Statistical Abstract of the United States, 1990, p. 401) In absolute terms, however, WASHTO state employment structures are becoming slightly more manufacturing-oriented. Perhaps due to the continuing migration of manufacturing enterprises out of the Great Lakes and Middle Atlantic states into the South and West, WASHTO states exclusive of Texas and Oklahoma actually gained 70 thousand manufacturing jobs from 1980 to 1986, while the rest of the nation lost almost 1.5 million.

Mining is the second sector in which WASHTO employment trends deviated from national norms. Again, from a historical viewpoint, many of the WASHTO state economies have depended on the extraction of non-renewable raw resources as much as their neighbors in the Midwest and Northeast have depended on manufacturing. As of 1988, the percentage of mining employment as a share of the civilian workforce in WASHTO states was three times that of the national average: 3.9 versus 1.3 percent. (Bureau of the Census, 1990) Not surprisingly, mining employment declined in the WASHTO states by only about half as much as it did in the rest of the U.S.--11.6 versus 20.1 percent. In seven of the fifteen WASHTO states included in this analysis, the share of mining employment as a percent of their total civilian workforces increased by an average of 19 percent from 1973 to 1987.

Services were the third sector in which trends in WASHTO state employment composition did not match those of the U.S. From 1970 to 1987, a period closely comparable with that for which data was collected in the WASHTO states, total service sector employees in the U.S. grew from 11.5 million to 24.3 million, a jump of 209 percent. (SAUS, 1990, p. 401) As a percent of total employment, the number of service jobs increased by 45.5 percent. In WASHTO states, however, the number of service jobs as a share of total employment increased by only 25 percent, roughly half that of the national average.

In Table 4.2, we compare changes in employment composition within WASHTO itself, using the economic growth categories and BEA regions described in Section III.

Table 4.2--Percent Changes in Employment by Industry (As a Share of Total Nonagricultural Employment), WASHTO States in Economic Growth Categories and BEA Regions, 1973-1987					
Category and Region	Manufacturing	Mining	FIRE	Services	Government
High Growth	-11.8	-7.3	15.5	26	-13.8
Medium Growth	-14.3	-7.6	30	27	-9
Low Growth	-21.5	-13.8	15.5	20	-9.2
Far West	-14	-9.4	15.4	27.4	-14.2
Southwest	-18.6	-24.6	8.3	27	-10.1
Rocky Mountains	-25.5	-23.2	29.6	21.2	-5.7
Plains	9	38.9	26.7	23.3	-11

Source: Florida State University and U.S. Department of Commerce

With respect to changes in FIRE employment, there are no obvious employment gains or losses that appear to be related to the economic growth categories into which WASHTO states were organized. In the manufacturing, mining, services, and government employment sectors, however, there are interesting patterns. High-growth WASHTO states saw employment in their manufacturing and mining sectors decline about half as much as in low-growth states, and medium-growth states lost only about two-thirds and one-half as much manufacturing and mining employment, respectively, as low-growth states. The share of total employment in services increased by 30 and 35 percent more, respectively, in high- and medium-growth states than in low-growth ones. Finally, government employment as a share of total employment decreased by approximately 50 percent more in high-growth WASHTO states than in their medium- and low-growth counterparts.

When we look at WASHTO states in their BEA regional settings, we see that all regions lost employment--albeit by differing amounts--in the government sector, and all regions saw increases in their shares of employment in FIRE and services. What stands out most from this perspective, however, is that the two Plains states included in WASHTO, North and South Dakota, went against both WASHTO and national trends by posting employment increases of 9 percent in manufacturing and 39 percent in mining.

The second element of the descriptive dimension of WASHTO economic development is to examine changes in the composition of GSP. These are examined from two angles: changes in the percent of GSP from manufacturing, services, FIRE, and government expenditures; and changes in the degree to which a state's economy is dependent on primary resources--e.g., energy-related products as a percent of GSP, agriculturally-related products as a percent of GSP, and natural resources as a percent of GSP.

Table 4.3--Percentage Changes in Output as a Share of Total Output, Selected Sectors, WASHTO States and the U.S., 1972-1986					
	Manufac- turing	FIRE	Services	Govern- ment (1)	Govern- ment (2)
WASHTO Average (GSP)	-0.31	13.73	29.69	0.92	-12.75
U.S. Average (GNP)	-19.59	13.41	38.11	-1.85	-6.10

Source: U.S. Department of Commerce

Table 4.3 compares the percent change in output as a percent of GNP and GSP for manufacturing, FIRE, services, state and local government expenditures (Government 1) and state, local, and Federal government expenditures (Government 2) for WASHTO states and the U.S. These are evaluated in constant 1982 dollars. Overall, as was the case with employment shares, the manufacturing sector shows the most striking difference: while in the U.S. the share of GNP

provided by manufacturing industries fell by almost 20 percent, the average share of GSP accounted for by the manufacturing sector in WASHTO states stayed virtually constant from 1972 to 1986 by falling only three-tenths of one percent. The share of total GSP provided by industries in the FIRE sector in WASHTO states increased by almost exactly the same percentage as they did at the national level (in terms of GNP). Similarly, state and local government expenditures as a percent of WASHTO state and national output changed by virtually identical amounts. Service sector industries in WASHTO states increased their share of GSP by approximately 30 percent, while they increased their share of GNP by 38 percent.

Table 4.4--Percentage Changes in Output as a Share of GSP, Selected Sectors, WASHTO States in Economic Growth Categories and BEA Regions, 1972-1986					
Category and Region	Manufacturing	FIRE	Services	Government (1)	Government (2)
High Growth	-1.24	1.3	28.4	2.01	-15.9
Medium Growth	-0.4	16.7	26.4	-1.04	-13.2
Low Growth	0.6	20.1	34.7	2.4	-9.7
Far West	-6.4	10	30	-9.7	-15.6
South-west	5.5	5.4	27.1	6.8	-12
Rocky Mountain	-18.3	15.9	27.9	4.1	-10
Plains	45.3	32.5	38.6	2.6	-16

Source: U.S. Department of Commerce

Table 4.4 compares changes in the composition of state output within WASHTO, decomposed into economic growth categories and BEA regions. With respect to the economic growth categories, there are no significant differences between categories in the manufacturing, services, and government 1 and 2 sectors (state and local and state, local, and Federal government), although low growth states had the largest increases in output shares from these sectors among the WASHTO states. Low growth states also had the largest increase in the share of their GSPs accounted for by industries in the FIRE sector, almost 20 times that of the increase in high growth states. When WASHTO states are examined within their BEA regional groupings, the most outstanding feature of this comparison is, once again, the exceptionally high increase in the share of GSP accounted for by manufacturing (over 66 percentage points higher than the national average), FIRE (over twice the national average), and services (slightly exceeding the nation's average performance).

Tables 4.5 and 4.6 examine another facet of changes in the composition of WASHTO GSPs: the extent to which these states' economies have moved away from or toward dependence upon the extraction of renewable and non-renewable natural resources. These measures are an important normative gauge of development because they help assess whether a state has developed beyond merely resource-extractive modes of economic activity to those that engage in the processing of raw materials into higher value-added goods and services. This is particularly relevant for states in the Western U.S., which historically have relied upon their natural endowments of raw materials (timber, minerals, etc.) as their base for economic development. Some observers (e.g., Schmidt, 1989) have noted that this reliance has often proved detrimental to both economic growth and economic development in these states, because it subjects state economic fortunes to the caprice of price fluctuations in raw commodities markets.

**Table 4.5--Percentage Change in Mining Output as a Share of GSP,
WASHTO States in Economic Growth Categories and BEA Regions,
1972-1986**

High Growth	18.5
Medium Growth	82.5
Low Growth	7
Far West	36.7
Southwest	2
Rocky Mountain	43
Plains	118
WASHTO Average	40.2
US Average	1.4

Source: U.S. Department of Commerce

Mining output as a share of GSP in WASHTO states increased by 280 percent more than the national average from 1972 to 1986. It increased in all WASHTO growth categories and BEA regions, particularly so in medium growth states (double the WASHTO average) and the Plains states (triple the WASHTO average). Interestingly, the Southwest--home to Texas, one of the largest energy-producing states in the Union--had the smallest increase of any growth category or BEA region.

High Growth	-22
Medium Growth	17.4
Low Growth	8
Far West	30
Southwest	-33.1
Rocky Mountain	5.2
Plains	22.3
WASHTO Average	4
US Average	-25

*Agriculture, forestry, mining, and energy

Source: Ronald Schmidt, "Natural Resources and Regional Growth", *Economic Review*, Fall, 1989, No. 4, Federal Reserve Bank of San Francisco; U.S. Department of Commerce

With respect to all natural resource categories of output (agriculture, forestry, mining, and energy), Table 4.6 shows a more coherent pattern of change within the WASHTO states. High growth states decreased the share of their GSPs accounted for by natural resource industries by almost 22 percent from 1963 to 1986. This is an average difference of about 35 percentage points from either medium- or low-growth states, which increased their economies' relative dependence on natural resource industries over this period. In this context, it is also noteworthy that the only BEA region that had an average decrease in its natural resource share of GSP was the Southwest, which also had the highest rates of GSP and per capita income growth, and the second-highest rate of employment growth among all WASHTO states (see Figure 3.4, above).

4.3 Demographic Change

The most commonly used indicators of demographic change are the natural rate of population increase (births minus deaths), and annual net migration rates. These were averaged over the period 1970 to 1986. Of the two, net migration is probably the most closely tied to economic growth in a given state (Greenwood, 1981): individuals and their families between the ages of 18 and 30 tend to migrate toward areas with high rates of employment and output growth. High rates of in-migration, in turn, strengthen local and state markets for goods and services, and this feedback effect stimulates continued high rates of economic growth. High rates of in-migration also create increased demand for public infrastructure, particularly highways and other transportation services, and thus provide an important impetus for economic development, if by development we mean improvements in the quality of life through such things as lowered levels of traffic congestion. In addition to these measures, we also included changes in the percent of population residing in SMSA counties, 1973-1987. This statistic, which indicates whether a given state's population became more urbanized over the period in question, is also thought to be highly correlated with increases in demand for highways and other public infrastructure.

Figures 4.1 and 4.2 provide a graphic presentation of data on population growth in WASHTO states decomposed into economic growth categories and BEA regions.

Figure 4.1--Percent Change in Population, WASHTO States by Economic Growth Category, 1970-1988

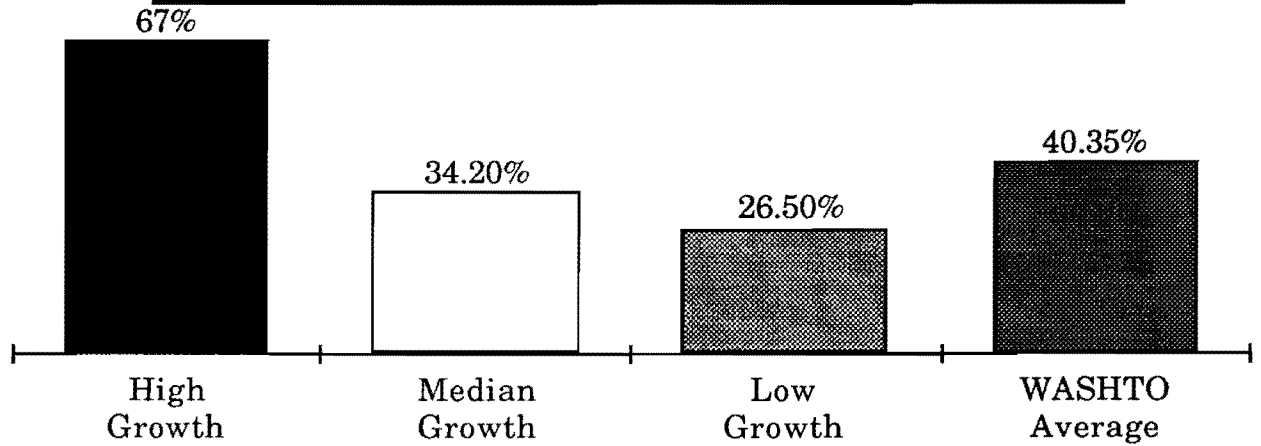
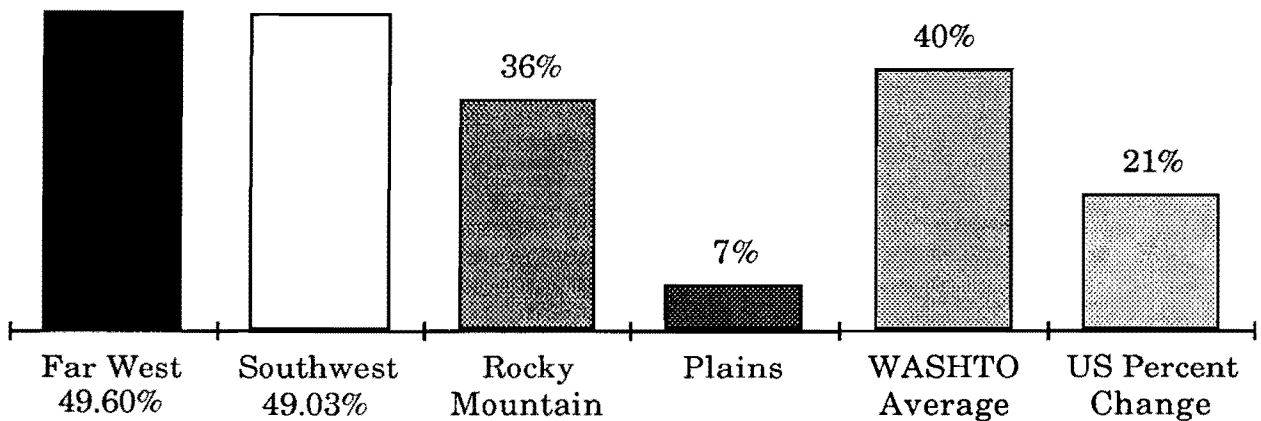


Figure 4.2--Percent Change in Population, WASHTO States in BEA Regions, 1970-1988



Source: Bureau of the Census, U.S. Department of Commerce

Three features of WASHTO demography are clearly displayed. First, WASHTO state population growth between 1970 and 1988 was on the average almost double that of the nation at large. Second, there appears to be a positive relationship between economic growth and population growth, with high growth states having the fastest rates of population increase, medium growth states the next-to-fastest, and low growth states the slowest. Third, in terms of BEA regions,

the Southwest and Far West had the highest rates of population increase, and the two WASHTO Plains states had population growth of only one-seventh that of the two leading regions. The Southwest and Far West also contain three of the four high growth states--Arizona, Nevada, and Texas--and two of the five medium growth states, while North Dakota and South Dakota belong to the medium and low growth categories, respectively. These last two features of the WASHTO demographic data appear to confirm the strong positive relationship found by demographers and regional economists between regional economic growth and population growth.

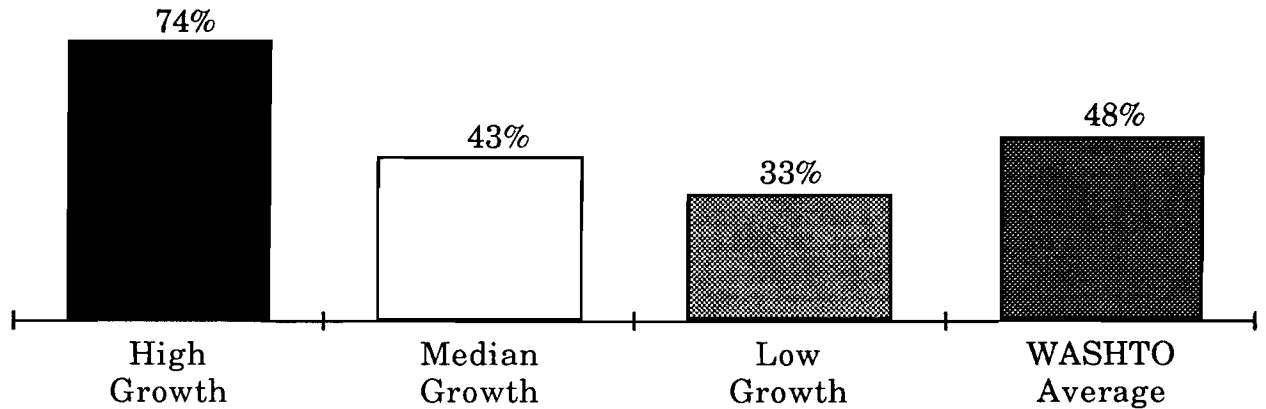
Table 4.7--Average and Total Net Migration (in 000s), WASHTO States in Economic Growth Categories and BEA Regions, 1970-1988		
Region and Category	Average	Total
High Growth	1195	4779
Medium Growth	692	4152
Low Growth	142	712
BEA Regions		
Far West	1123	4492
Southwest	1101	4403
Rocky Mountain	182	855
Plains	-53	-107
WASHTO	643	9643

Source: Bureau of the Census

Table 4.7 displays net migration figures for WASHTO states in their growth categories and regions, and these statistics follow the patterns seen in Figures 4.1 and 4.2. Again, a positive relationship appears to exist between net migration and economic growth. High growth states have almost twice the average net migration of their medium growth neighbors and 8.4 times that of low growth states. The Far West and Southwest again lead all WASHTO regions in average and total net migration, as new migrants poured into the three high growth states and two medium growth states in these two regions looking for jobs and housing. Overall,

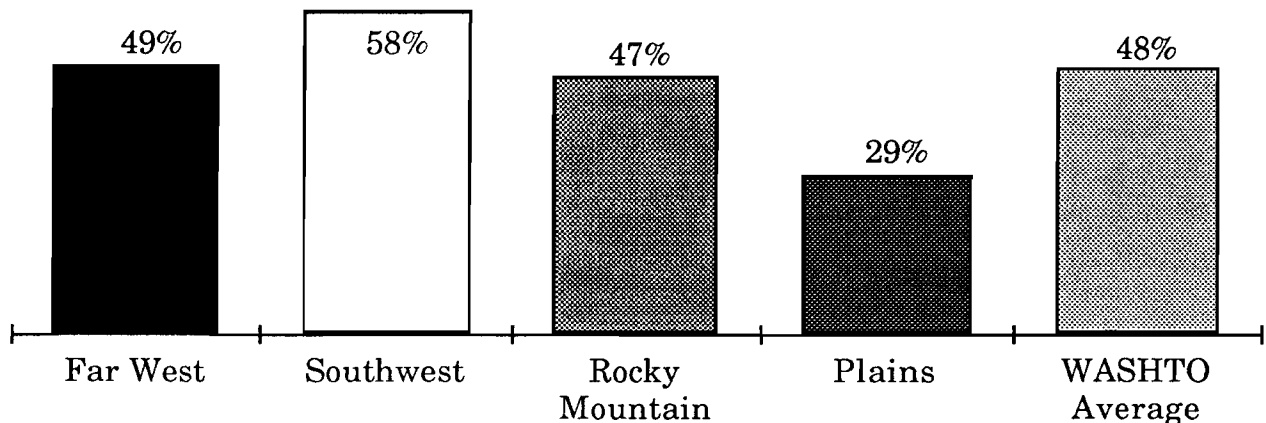
North and South Dakota of the Plains region witnessed a net outmigration, a datum consistent with their low rates of growth.

Figure 4.3--Percent Change in Share of Population Living in Metropolitan Areas, WASHTO States by Economic Growth Category, 1970-1988



Source: Bureau of the Census

Figure 4.4--Percent Change in Share of Population Living in Metropolitan Areas, WASHTO States in BEA Regions, 1970-1988



Source: Bureau of the Census

Finally, Figures 4.3 and 4.4 show the changes occurring in the spatial distribution of population as internal migration in WASHTO states shifts people

from rural to metropolitan areas. There is evidence of a positive relationship between high economic growth and high rates of population shift toward metropolitan areas (Figure 4.3), and all WASHTO regions experienced large increases in the percent of their residents living in metropolitan areas, with the Plains states showing the smallest increase.

4.4 State Fiscal Policies and Conditions

Included in this descriptive dimension were data on state fiscal and tax policies and conditions. These can sometimes facilitate and in other instances may hinder economic growth and development. A great deal of controversy has surrounded the issue of whether state fiscal policies can positively or negatively affect the performance of state economies (Luker, 1991). Many economists have argued for decades that government spending actually stimulates economic growth, while in more recent years the view has become that large amounts of government spending and taxation can actually hinder economic growth. Most early studies (e.g., Due, 1961) showed that, contrary to the claims of some industrial location specialists, there was little or no relationship between state tax levels and new plants locating in a particular state or between general tax levels and employment or GSP growth (Wheat, 1986). Recent studies (Carlson, *op. cit.*; Bartik, *op. cit.*), however, have provided evidence that there is a strong negative correlation between state taxes and economic growth rates.

What is perhaps more important to WASHTO members in high-growth states, however, is that as population grows, there will be greater demand for higher capacity and more efficient transportation infrastructure. If transportation agencies are to keep in step with increased transportation demand, they will have to count on steadily increasing amounts of public revenue to fund infrastructure improvements. Intuition suggests that the faster a state's economic growth rate, the faster will its base of taxable income and wealth grow. Do high-growth, medium-growth, and low-growth states show increases in public revenues commensurate with their growth rates? In order to determine whether this was the case, and how WASHTO states performed overall in terms of their tax revenue collections, the first fiscal measure chosen from our factor analysis of the fiscal policy variables included in the WASHTO database was the percent changes in state and local tax

revenue per \$100 of personal income from 1970 through 1987. Table 4.8 displays the results of this comparison.

High Growth	-4
Median Growth	0.8
Low Growth	-4.5
Far West	-0.2
Southwest	-1.7
Rocky Mountain	3.6
Plains	-22
WASHTO Average	-2.2

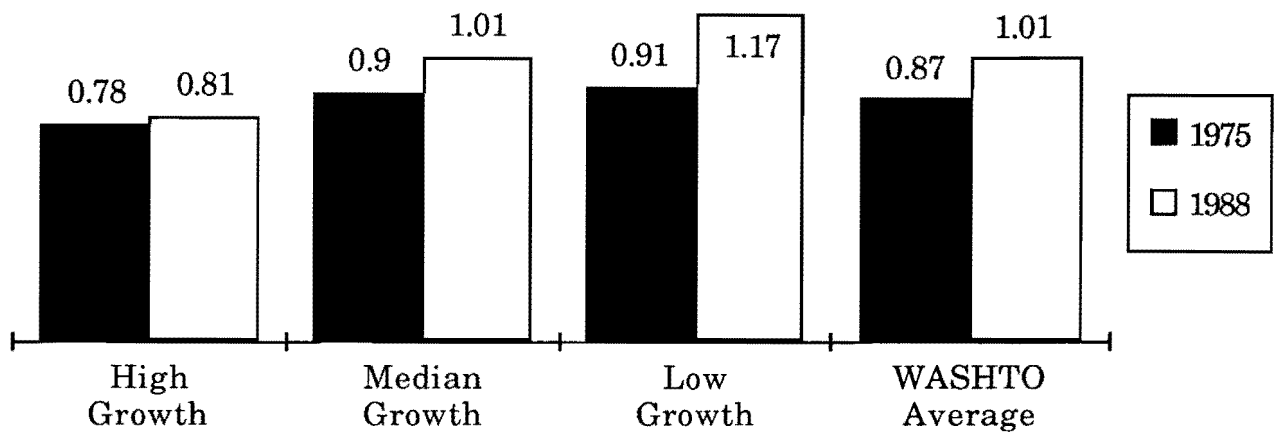
Source: Advisory Commission on Intergovernmental Relations, 1990

We see from Table 4.8 that there is no immediately apparent relationship between WASHTO state economic growth rates and changes in state and local tax revenues over the period in question. High- and low-growth states experienced roughly equivalent declines in their overall revenue collections, while medium-growth states saw an average increase of about one percent. Much more striking results are obtained, however, when we group WASHTO states into BEA regions. On average, all WASHTO states witnessed a 2.2 percent decline in their tax revenue collections from 1970 through 1987. The Rocky Mountain states demonstrated the best overall revenue performance, with an approximately 4 percent increase. Again, as they did in several of the other descriptive dimensions, the Plains states performed the worst, with a 22 percent decline in tax revenues.

The second measure, the ratios of "tax effort" to "tax capacity" for 1975 and 1988 (ACIR, 1990), measures the relationship between a given state's base of taxable income and wealth (tax capacity) and the policies enacted by that state to exploit the revenue potential inherent in that tax base (tax effort). Figures 4.5 and 4.6 display

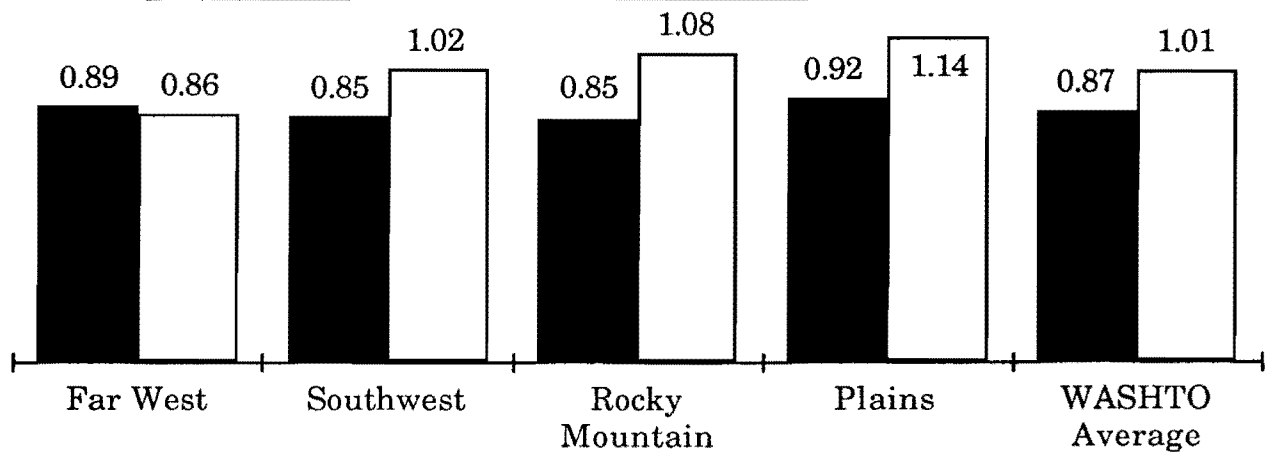
data on this measure. A ratio of less than unity indicates that a state is not fully exploiting its taxable base of wealth and income, and that it could effectively increase its tax rates and generate more public revenue without negative consequences. A score of unity indicates that there is a rough equivalence between tax rates and tax capacity, i.e., that tax rates could not be increased without potentially negative side-effects such as falling tax revenues and a shrinking tax base as households and firms migrate to states with lower taxes. A score of greater than unity often points to a state fiscal climate in which low economic growth rates result in falling public revenues, forcing public officials to raise tax rates to provide necessary public services and infrastructure. High tax rates, in turn, further depress private economic activity. Tax effort thus outstrips tax capacity, with the long-run effect of reducing tax capacity as elements of the tax base migrate to states with what are perceived to be less oppressive tax climates. In any event, this measure was included to gauge the extent to which WASHTO states' effort-to-capacity ratios changed over time and in what direction. This is important as an overall indicator of the fiscal capacity of WASHTO states, i.e., their ability and willingness to pay for necessary improvements in public services and infrastructure, especially transportation infrastructure.

Figure 4.5--Ratios of Tax Effort to Tax Capacity, WASHTO States by Economic Growth Category, 1975 and 1988



Source: Advisory Commission on Intergovernmental Relations, 1990

Figure 4.6--Ratio of Tax Effort To Tax Capacity, WASHTO States in BEA Regions, 1975 and 1988

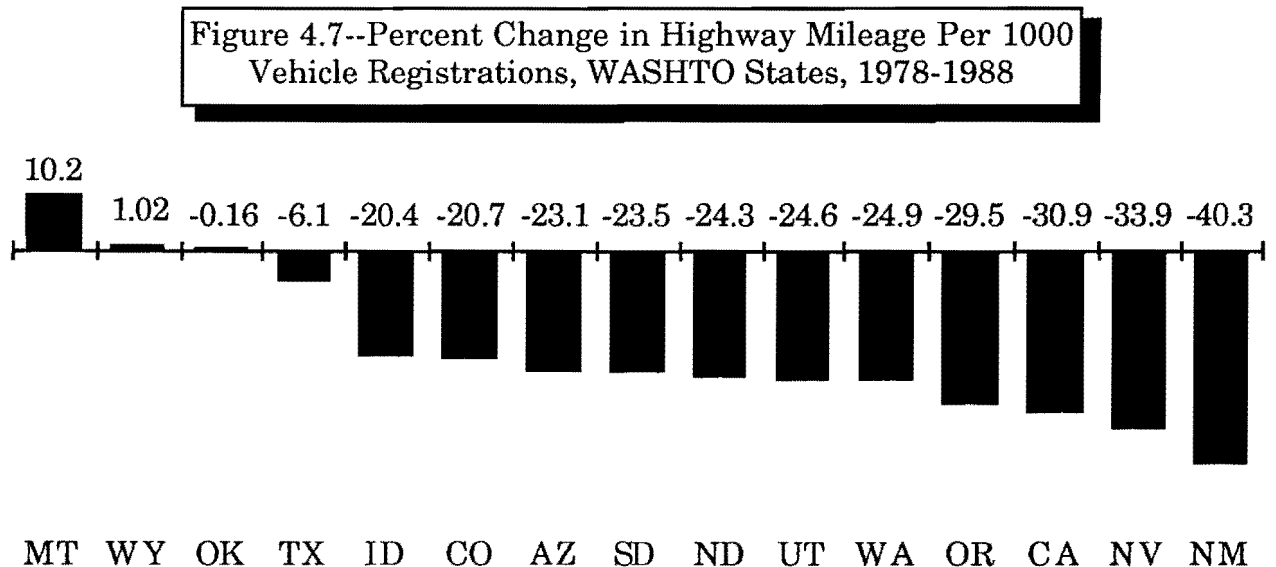


Source: Advisory Commission on Intergovernmental Relations, 1990

Figure 4.5 portrays what has come to be regarded by many students of state and local public finance as a classic relationship between tax effort-to-capacity ratios and rates of economic growth. It has generally been the case that fast-growing states have not shown as high a ratio of effort to capacity as more slowly growing ones. This is because lower tax rates (i.e., lower tax efforts) on the higher volumes of economic activity found in high-growth states generate as much or more public revenue than do higher rates on lower volumes of economic activity in medium- and low-growth states. High-growth WASHTO states—Arizona, Texas, Colorado, and Nevada—have the lowest effort-to-capacity ratios in both periods and thus have the ability to increase taxes to pay for the increased demand for public services and infrastructure that high economic and demographic growth rates foster. Low-growth states, on the other hand, have the highest effort-to-capacity ratios as they attempt to squeeze additional amounts of revenue out of a static or declining base of taxable wealth and income. On average, by 1988 WASHTO states had reached a level of taxation that had met or exceeded their tax capacities (1.01). Looked at in their respective BEA regions (Figure 4.6), the WASHTO states in the Plains region are experiencing difficult fiscal conditions. They have the highest effort-to-capacity ratios among all the BEA regions, and are, of course, among the most slowly growing states. Overall, this reflects a declining fiscal capacity on the part of these states.

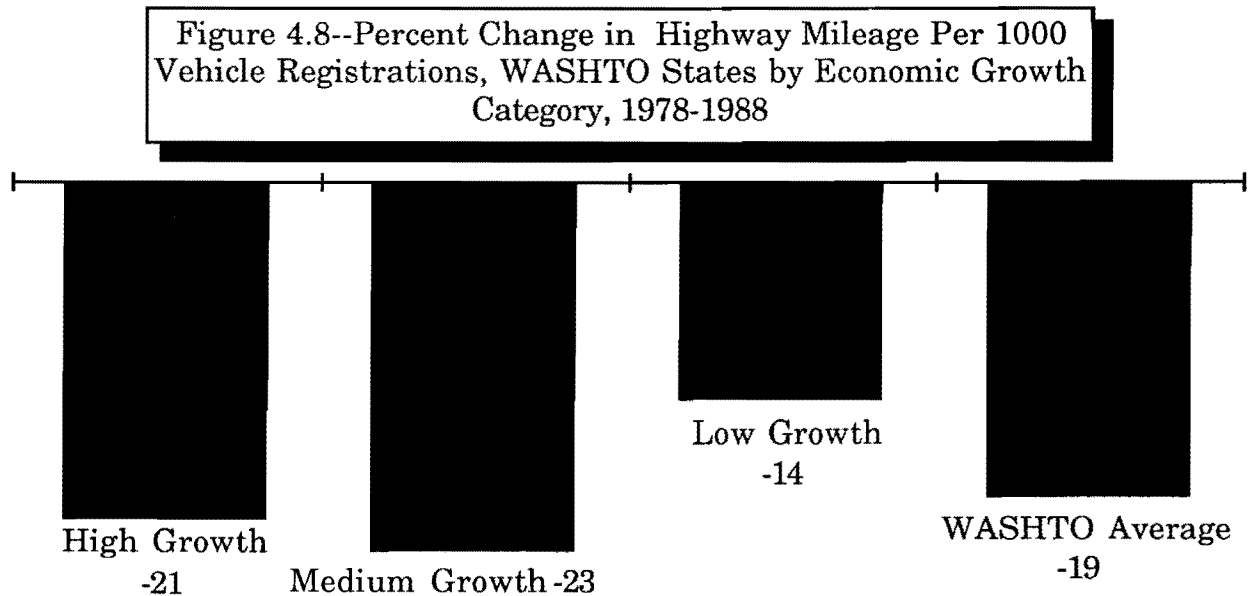
4.5 Transportation Systems

The transportation system measures included in the WASHTO database encompassed over 50 variables documenting various dimensions of change in waterborne, railroad, aeronautical, mass transit, and highway traffic from 1978 to 1988. As might be expected, there were more variables--36--related to highway transportation than any of the other transportation modes. They range from per capita measures of Federal, state and local highway receipts and expenditures to total vehicle miles traveled, number of highway miles, and changes in those measures across decades. A factor analysis was performed on these variables to determine which were the most important in accurately describing the status of WASHTO state transportation systems. Figures 4.7 through 4.11 display comparative data on the two most important variables that emerged from the factor analysis: percent change in highway mileage per 1000 vehicle registrations, and percent change in highway expenditures as a percent of all state and local government expenditures. Viewed as a set, these measures provide important gauges of the amount of stress under which highway systems in WASHTO states are being placed. The first is a measure of the actual physical carrying capacity of state highway systems, and how well this capacity is standing up to increasing vehicle registrations. The second one measures the degree to which state and local highway expenditures are providing for increasing volumes of traffic.



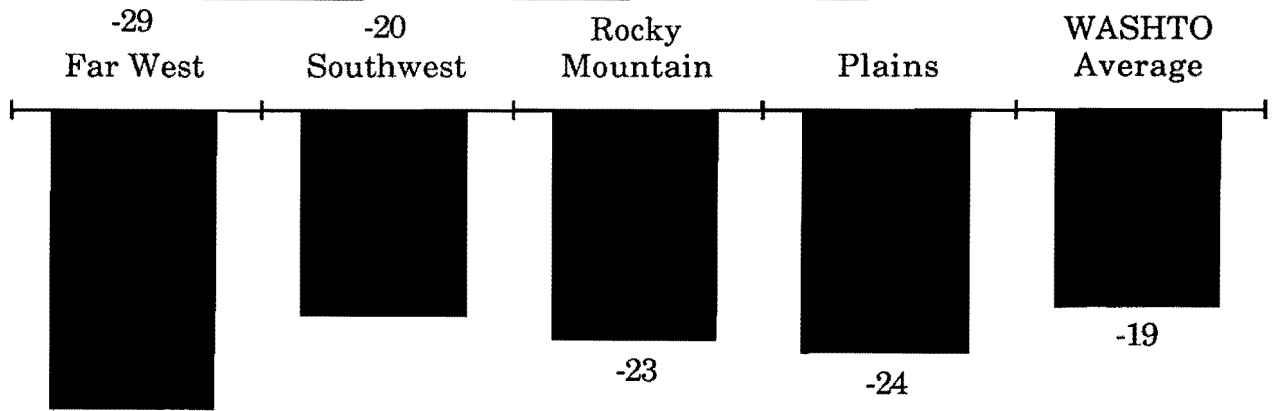
Source: Federal Highway Administration

Figure 4.7 shows that only Montana and Wyoming saw increases in their highway system mileage relative to vehicle registrations. All other WASHTO states saw their highway mileage decline relative to vehicle registrations. Figure 4.8 groups WASHTO states into economic growth categories vis-a-vis this statistic. Overall, WASHTO states saw their highway mileage per 1000 vehicles decline by almost 20 percent, and high- and medium-growth states witnessed 21 and 23 percent declines, respectively. On Figure 4.9, we see that the highway systems of states in the Far West are under the most stress--at least according to this measure--with an almost 30 percent decline in highway mileage per vehicles. Probably not coincidentally, these states also had the highest rates of population growth and net migration of any of the WASHTO states.



Source: Federal Highway Administration

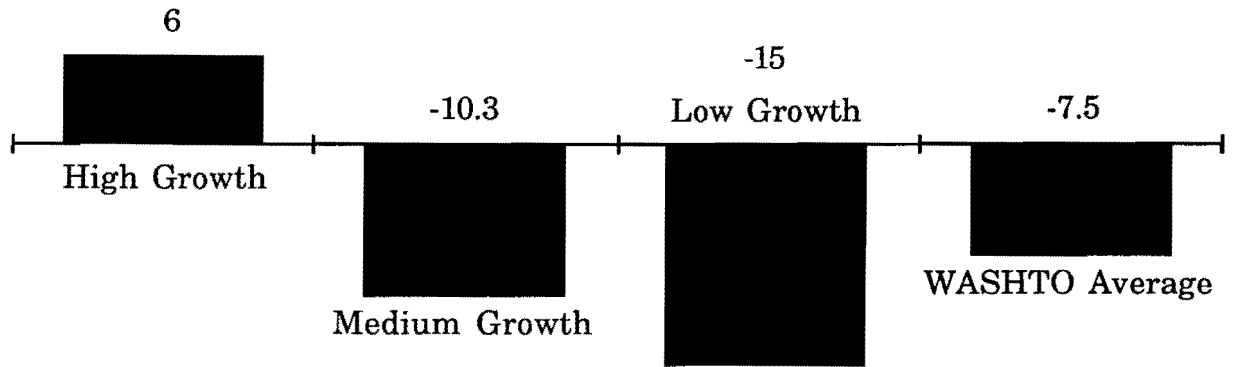
Figure 4.9--Percent Change in Highway Mileage Per 1000 Vehicle Registrations, WASHTO States in BEA Regions, 1978-1988



Source: Federal Highway Administration

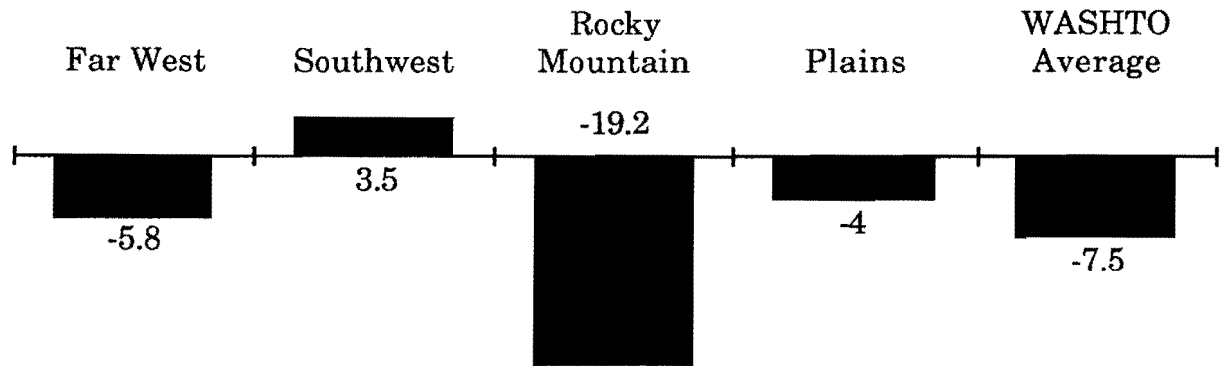
Figures 4.10 and 4.11 show data on the highway expenditures variable. As might be expected, high-growth states increased their expenditures on highways as a percent of all state and local government expenditures, while medium- and low-growth states actually decreased their highway spending (Figure 4.10). States in the Southwest region (Figure 4.11) increased highway spending by almost 4 percent, while the Rocky Mountain states decreased their spending by almost 20 percent.

Figure 4.10--Percent Change in Highway Expenditures as a Share of All State and Local Government Expenditures, WASHTO States by Economic Growth Category, 1977-1987



Source: Federal Highway Administration

Figure 4.11--Percent Change in Highway Expenditures as a Share of All State and Local Government Expenditures, WASHTO States in BEA Regions, 1977-1987



Source: Federal Highway Administration

4.6 Summary of Findings and Overall Conclusions from the Comparative Analysis of WASHTO States

The following section summarizes the principal findings of the comparative analysis of WASHTO states. It should be noted explicitly, however, that the method by which WASHTO states were compared, i.e., grouping them into regions and economic growth categories, leads to conclusions that cannot be verified by rigorous statistical tests and that are primarily qualitative in nature. In all cases, the sizes of the WASHTO sub-samples—e.g., n=4, 6, and 5 for high-, medium-, and low-growth states and n=4, 4, 5, and 2 for the BEA regions—were too small to test whether the differences between the mean scores of the various groups were statistically significant from zero. Nevertheless, in spite of their lack of statistical rigor, the conclusions presented provide useful and meaningful insights into the ways in which WASHTO states resemble and differ from each other.

1. Economic Development

What can we conclude about economic development in WASHTO states from the examination of changes in employment structures and the composition of GSP? Before stating any conclusions, an accounting of the most important empirical findings is in order. These can be listed under two sub-headings: findings about WASHTO states as a group compared to the U.S. as a whole, and findings about WASHTO states when compared to each other in economic growth categories and BEA regions.

First, from the early 1970s to the mid-1980s, manufacturing workers as a share of total nonagricultural employment in WASHTO states declined by about 16 percent, roughly half that of the national decline of 32 percent. In the U.S., the share of GNP provided by manufacturing industries fell by almost 20 percent, while the average share of GSP accounted for by manufacturing in WASHTO states fell by only three-tenths of one percent. Employment in the mining sectors of WASHTO states declined by only about half as much as it did in the rest of the U.S.—11.6 versus 20.1 percent—and the share of mining employment as a percent of their total civilian workforces actually increased in almost half of the WASHTO states. Moreover, mining output as a share of GSP in all WASHTO states increased by an average of 40 percent as opposed to only 1 percent in the nation at large.

Second, when changes in employment structure and GSP composition within WASHTO are examined, high-growth WASHTO states lost only one-half as much manufacturing employment as low-growth states, and only about one-half as much mining employment. The Far West, the Southwest, and the Rocky Mountain states all lost manufacturing, mining, and government employment, and had increases in FIRE and services employment. The two Plains states included in WASHTO (North and South Dakota) went against both WASHTO and national trends by posting employment increases of 9 percent in manufacturing, 39 percent in mining, and 3 percent in government employment. Differences in the percentage changes of manufacturing output as a percent of GSP were negligible between economic growth categories, but when WASHTO states were grouped into BEA regions, the Plains states stood apart by having a 45 percent increase in manufacturing output as a percent of GSP. All regions and growth categories posted increases in mining output as a percent of GSP, but the Plains states had by far the largest increase, 118 percent.

Third, with respect to all natural resource categories of output (agriculture, forestry, mining, and energy), high growth states decreased the share of their GSPs accounted for by natural resource industries by almost 22 percent from 1972 to 1986, while medium- and low-growth states increased their economies' relative dependence on natural resource industries over this period. The Southwest was the only BEA region that had an average decrease in its natural resource share of GSP. This region also had the highest rates of GSP and per capita income growth and the second-highest rate of employment growth among all WASHTO states.

While some of these findings appear to conflict, several important conclusions can nevertheless be drawn. Regardless of the declines in manufacturing and mining employment, compared to the rest of the U.S. WASHTO state economies are becoming more manufacturing-oriented, and are increasing their historic dependence on the extraction of non-renewable raw resources. Within WASHTO, high-growth states have had slower relative declines in manufacturing and mining employment than either the nation at large or the rest of WASHTO. Their superior economic growth performances are apparently associated with--among many other factors--the new-found strength of their manufacturing sectors, and a relative decline in their dependence on the extraction

of renewable and non-renewable natural resources. Finally, the trends in the manufacturing and mining sectors seen in many WASHTO state economies are being magnified in the Plains region, and this is leading to economic structures in those states that are significantly different than those in the rest of WASHTO and the nation.

2. Demographic Change

Conclusions about demographic changes in WASHTO states are somewhat more easily stated than those related to economic development. First, WASHTO state population growth between 1970 and 1988 was on the average almost double that of the U.S. Second, there appears to be a strong positive relationship between economic growth, population growth, and net migration in WASHTO states. High-growth states had the fastest rates of population increase, followed by medium-growth and low-growth states. The Southwest and Far West regions--containing three of the four high-growth states--had the highest rates of population increase, and the two WASHTO Plains states had population growth of only one-seventh that of the two leading regions. High-growth states had almost double the average net migration of their medium-growth neighbors, and 8.4 times that of low-growth states. The Far West and Southwest led all WASHTO regions in average and total net migration, while North and South Dakota of the Plains region witnessed a net outmigration, a datum consistent with their low rates of growth. Third, there is evidence of a positive relationship between high economic growth rates and high rates of population shift toward metropolitan areas. High-growth states had the largest population shifts toward metro areas, almost double that of medium-growth states. All WASHTO regions experienced large increases in the percent of their residents living in metropolitan areas, with the Plains states witnessing the smallest increases.

3. Fiscal Policies and Conditions

Conclusions about fiscal policies and conditions in WASHTO states are also more visibly apparent than those related to economic development. On average, all WASHTO states witnessed a 2.2 percent decline in their tax revenue collections from 1970 through 1987. There is no immediately apparent relationship between WASHTO state economic growth rates and changes in state and local tax revenues.

The Rocky Mountain states had the best revenue performance, with an approximately 4 percent increase, while the Plains states performed the worst, with a 22 percent decline in tax revenues. By 1988, WASHTO states had reached a level of taxation that, on average, had met or exceeded their tax capacities (1.01). Data on tax effort-to-capacity ratios and rates of economic growth for WASHTO states also reveals evidence of a strong negative relationship between the two. High-growth WASHTO states--Arizona, Texas, Colorado, and Nevada--had the lowest effort-to-capacity ratios in both 1975 and 1988. This gives them greater flexibility to increase taxes to pay for the increased demand for public services and infrastructure fostered by high economic and demographic growth. Low-growth states have the highest effort-to-capacity ratios, as they squeeze additional amounts of revenue out of a static or declining base of taxable wealth and income. Finally, WASHTO Plains states have the highest effort-to-capacity ratios among all the BEA regions, and are among the most slowly growing states.

4. Transportation Systems

Overall, WASHTO states saw highway mileage per 1000 vehicles decline by an average of almost 20 percent. High- and medium-growth states witnessed 21 and 23 percent declines, respectively. Highway systems in the Far West states are under the most stress, with an almost 30 percent decline in highway mileage per vehicle registrations. These states also had the highest rates of population growth and net migration within WASHTO. High-growth states increased their expenditures on highways as a percent of all state and local government expenditures, while medium- and low-growth states actually decreased their highway spending. States in the Southwest region increased highway spending by almost 4 percent, while the Rocky Mountain states decreased their spending by almost 20 percent.

5.0 THE SURVEY OF WASHTO MEMBER AGENCIES: FINDINGS AND DISCUSSION

The survey instrument used in this study was designed to elicit information from WASHTO member organizations in six areas: (a) modal responsibilities; (b) environmental management, planning, and policy issues; (c) organizational missions and policy initiatives; (d) R&D and technological initiatives; (e) the fiscal environment of the state in which the organization operates; and (f) areas of interstate and international cooperation between transportation agencies. The following is a summary and discussion of the responses.

5.1 Modal Responsibilities

Multi-modalism is apparently the order of the day in WASHTO transportation agencies. Of the 16 responses received (out of 17 WASHTO member organizations), all but one of the agencies reported that they had some type of responsibility toward modes of transportation other than highways and automobiles. Colorado's new Department of Transportation was the last WASHTO agency to have responsibility solely for highways.

Despite the universally multimodal character of the WASHTO transportation agencies, there was wide variation with respect to the degree of responsibility that each agency had toward a given transportation mode. Four categories of responsibility were delineated, and each was given a score according to a pre-determined hierarchy: funding (= 4), facilities construction and maintenance (= 3), planning (= 2), and research and technical assistance (= 1). The degrees of responsibility were then summed across WASHTO states, and grouped into BEA regions and by economic growth categories as in Section IV. Mean scores for the level of responsibility of the states in each region and growth category for each of the six transportation modes, and for all of the regions and categories vis-a-vis each individual transportation mode are summarized on Tables 5.1 and 5.2. Individual state scores and rankings are displayed in Appendix 2.

Table 5.1--Average Degrees of Responsibility Toward Selected Transportation Modes, WASHTO Transportation Agencies in Economic Growth Categories

Category	Air	Rail	Water	High-ways	Transit	Streets	MEAN
High Growth	5.7	3.8	2.5	10	8.7	6.3	6.2
Medium Growth	7.3	5.5	2.3	10	6.8	7.6	6.6
Low Growth	8.4	6.8	1.4	10	6.2	6.6	6.6
MEAN	7.06	6.14	1.94	10	6.5	6.48	---

Table 5.2--Average Degrees of Responsibility Toward Selected Transportation Modes, WASHTO Transportation Agencies in BEA Regions

Region	Air	Rail	Water	High-ways	Transit	Streets	MEAN
Far West*	8	7	3	10	7.5	8	7.25
South-west	8	4.8	2.5	10	8.25	6	6.6
Rocky Mtn**	7.25	4.75	2.25	10	3.75	5.4	5.56
Plains	5	8	0	10	6.5	6.5	6
MEAN	7.06	6.14	1.94	10	6.5	6.48	---

*Excluding Alaska and Hawaii.

**Mean scores for the Rocky Mountain region did not include the air, rail, water, and mass transit modes for the Colorado Department of Transportation (CDOT). The degree to which CDOT will bear responsibility for these is currently being studied.

Table 5.3--Overall Modal Responsibility Scores, WASHTO States	
MODE	SCORE
Highways	160
Air Transportation	112
Intra-Urban Roads/Streets	105
Urban/Interurban Mass Transit	97
Rail Transportation	84
Water Transportation	32

Table 5.3 gives the combined scores of all WASHTO transportation agencies with respect to the six modal categories. The highest possible score on this scale is 160, attained where all 16 states responding to the questionnaire were responsible in all four ways for a given transportation mode, i.e., that each state scores a 10. The scores used for the rankings are derived by taking the raw combined scores and subtracting one point for each state that has no responsibility at all (i.e., scores a 0) for a particular mode.

Clearly, WASHTO transportation agencies as a group have the greatest degree of responsibility toward highways and intra-urban roads and streets. It is important to note in this context, however, that most of the funding of intraurban roads and streets reported by WASHTO member agencies is with Federal "pass-through" monies. As would be expected for a group of states of which the majority are landlocked, WASHTO agencies have little responsibility for water transport.

Tables 5.4a and b give the average scores achieved by states in each economic growth category and BEA region, and ranks each group with respect to their scores in the six categories of modal responsibility. This gives a cardinal measure of "multimodality" for the WASHTO transportation agencies as grouped into regions

and economic growth categories. The highest score that a state could achieve on this scale is a 60, i.e., 10 points--indicating maximum responsibility--for each of the six modal categories.

Table 5.4a--"Multimodality" Scores and Rankings of State Transportation Agencies, WASHTO States by Economic Growth Category	
STATE	AVERAGE SCORE AND RANK
HIGH GROWTH	33.3 (3)
MEDIUM GROWTH	37.2 (2)
LOW GROWTH	39.4 (1)
MEAN	37.7
MEDIAN	39.5

Table 5.4b--"Multimodality" Scores and Rankings of State Transportation Agencies, WASHTO States in BEA Regions	
REGION	AVERAGE SCORE AND RANK
FAR WEST	43.5 (1)
SOUTHWEST	39.5 (2)
ROCKY MOUNTAIN	37.3 (3)
PLAINS	36 (4)
MEAN	37.7
MEDIAN	39.5

*As noted previously, the Colorado Department of Highways has recently become the Colorado Department of Transportation and is currently studying several additional modal responsibilities.

Looking first at Table 5.4a, there appears to be no relationship between a given state's economic growth rates and the degree to which its transportation agency has multimodal responsibility. This finding is somewhat unexpected, because it was

assumed that with high economic growth rates would come high population growth, and greater demand for multimodalism in transportation planning and construction. Apparently, however, transportation demand in the high growth states--Texas, Arizona, Colorado, and Nevada--is dominated by the need to provide new and better highways to service the private automobile. On Table 5.4b, the Far West states (California, Nevada, Oregon, and Washington) have the highest multimodality scores, followed by the Southwest, the Rocky Mountain states, and the Plains states.

5.2 Environmental Policies

The survey instrument asked several questions about the environmental policies of WASHTO transportation agencies. Two groups of questions were focused on in our summary. For WASHTO states in economic growth categories and BEA regions, Tables 5.5 and 5.6 summarize four questions that asked whether a transportation agency has a set of environmental "due process" provisions. These are the procedures that a transportation agency uses to evaluate the impact upon the natural environment of its policies and projects, and insure that the general public is able to give its input into that process. Similarly, Tables 5.7 and 5.8 summarize responses to questions about "pro-active" environmental policies. These are not merely "due process" provisions to insure an agency's accountability to the general public for its environmental impacts, but are elements in a positive program of environmental improvement and mitigation of negative impacts. On both tables, each growth category or region is given an overall score for each set of four questions, with a "yes" response scored as one and a "no" as zero. Individual state scores are summarized and ranked in Appendix 2.

**Table 5.5--Provisions for Environmental "Due Process",
WASHTO Transportation Agencies in Economic Growth Categories**

CATE- GORY	Impact Assess- ments?	Written Proce- dures?	Public State- ments?	Public Hearings?	Average Percent "YES"
	P E R C E N T "Y E S"				
High Growth	100	100	100	100	100
Medium Growth	100	66	100	83.3	87.3
Low Growth	100	80	100	100	95
WASHTO %YES	100	81.3	100	93.8	---

**Table 5.6--Provisions for Environmental "Due Process",
WASHTO Transportation Agencies in BEA Regions**

REGION	Impact Assessments?	Written Procedures?	Public Statements ?	Public Hearings?	Average Percent "YES"
	P E R C E N T "Y E S"				
FAR WEST	100	100	100	100	100
SOUTHWEST	100	100	100	100	100
ROCKY MTN	100	60	100	80	85
PLAINS	100	50	100	100	88
WASHTO % YES	100	81.3	100	93.8	---

The responses on Tables 5.5 and 5.6 were to the following questions (moving left to right from the second column):

*Does your agency regularly (i.e., in all or nearly all cases) assess the environmental impacts of proposed transportation projects?

*Does your agency have a written set of procedures for conducting environmental impact assessments?

*Are environmental impact statements available to the public?

*Are public hearings regularly held as part of the process related to impact assessments?

**Table 5.7--Pro-active Environmental Goals and Policies, WASHTO
Transportation Agencies in Economic Growth Categories**

CATE- GORY	Written Goals?	Report Results?	Mitiga- ting proce- dures?	Alterna- tive research ?	Pave- ment recycl- ing?	Average Percent "YES"
	P E R C E N T "Y E S"					
High Growth	50	50 ¹	25	50	100	55
Medium Growth	50	83	50	33	100	63.2
Low Growth	60	80	20	20	100	56
WASHTO %YES	50	68.8	38.5	38.5	100	---

**Table 5.8--Pro-active Environmental Goals and Policies, WASHTO
Transportation Agencies in BEA Regions**

REGION	Written Goals?	Report Results?	Mitigating procedures?	Alternative research ?	Pave-ment recycling?	Average Percent "YES"
	P E R C E N T " Y E S "					
FAR WEST	75	100	100	75	100	90
SOUTHWEST	50	25	0	50	100	45
ROCKY MTN	40	100	20	0	100	52
PLAINS	50	50	0	0	100	40
WASHTO %YES	50	68.8	38.5	38.5	100	---

¹Legislation is pending that may require Arizona DOT to report results of environmental impact studies to a state clearinghouse agency.

The responses on Tables 5.7 and 5.8 were to the following questions (moving left to right from the second column):

*Does your agency have a set of written environmental goals?

*Does your agency routinely report the results of its impact assessments to any other state agencies?

*If your agency conducts environmental impact assessments, does it have a written set of procedures for mitigating negative impacts, if any are found?

*Is your agency conducting research on environmentally benign alternative transportation technologies (e.g., fuels, vehicles, etc.)?

**Table 5.9--Summary and Comparison of Responses,
Environmental Policy Questions, WASHTO States**

Response Category	"Due Process" Responses	"Pro-active" Responses
Average % Yes	93.8	59.2
Average state score	3.75	2.81

The results from Tables 5.5 through 5.9 are striking. First, there is apparently no systematic relationship between economic growth rates nor the geographic region to which a given WASHTO state belongs and the amount of environmental due process provided by WASHTO state transportation agencies. As a group, WASHTO state transportation agencies provide a great deal of environmental due process, with an average state score of 94 percent yes (Table 5.9). Economic growth rates also appear to be independent of the degree to which WASHTO state transportation agencies carry out pro-active environmental policies. Regionally, states in the Far West outperform by a large margin all other WASHTO states in their implementation of pro-active policy (Table 5.8). Overall, however, WASHTO states initiate comparatively little pro-active environmental policy. The average state score was only 2.8 for pro-active policy compared with 3.8 for environmental due process. Only half of the 16 respondents had a set of written environmental goals for their operations, and only 5 of 16 had written procedures (implying the existence of a formal, verifiable, and accountable process) for mitigating negative environmental impacts if their review processes find that they will result from a particular project. Less than a third of the respondents were engaged in research on alternative (i.e., more environmentally benign) fuels or transportation technologies. This is clearly an area of possible concern for WASHTO member agencies. It may mean that merely following environmental due processes is not a sufficient condition for fulfilling overall environmental responsibilities.

Table 5.10 ranks WASHTO regions and economic growth categories according to their overall environmental policy scores. Again, the Far West leads all regions, while no significant differences emerge from the ranking of WASHTO states vis-a-vis economic growth category.

<p align="center">Table 5.10--Environmental Policy Scores and Rankings, WASHTO States in BEA Regions and by Economic Growth Category</p>	
REGION and CATEGORY	AVERAGE PERCENT "YES" and RANK
Far West	95 (1)
Southwest	72.5 (2)
Rocky Mountains	68.5 (3)
Plains	64 (4)
High Growth	77.5 (1)
Medium Growth	75.3 (3)
Low Growth	75.5 (2)

5.3 Organizational Missions and Policy Initiatives

The survey posed several questions about organizational missions and policies. Table 5.11 summarizes the responses.

Table 5.11--Organizational Missions, WASHTO States in BEA Regions and by Economic Growth Category

REGION and CATEGORY	Mission Changed?	Broadened or Narrowed?	New Transportation Roles Added?	Other Roles Added?	Average Percent "YES"
P E R C E N T " Y E S "					
Far West	100	100	100	80	95
Southwest	75	100	100	66	60.3
Rocky Mtn	100	100	80	40	80
Plains	50	100	100	100	88
High Growth	100	100	75	50	81.3
Medium Growth	83.3	100	100	33	79
Low Growth	80	100	100	100	95
WASHTO % "YES"	88%	100% (Broaden)	92% (of broadened agencies)	62% (of broadened agencies)	---

These responses are to the following questions:

- *Has your mission statement been changed at any time during the past decade?
- *Did the change broaden or narrow the scope of your department's responsibilities and functions?
- *If your agency's responsibilities were broadened, were new transportation roles added?
- *As part of the revision of your department's mission statement, were any new environmental, economic development, or community and regional planning roles explicitly added to your agency's tasks?

Table 5.11 shows that almost 90 percent of the WASHTO member agencies responding to the survey had their mission statements changed in recent years. Of these agencies, all had their statements broadened, and over 90 percent of these had new transportation roles added to their organizational responsibilities. Almost two-thirds were given explicit roles pertaining to the environment, economic development, or community and regional planning.

Table 5.12--Organizational Policy Initiatives, WASHTO States in BEA Regions and by Economic Growth Category

REGION and CATEGORY	Innovator or Follower?	Private Contracting?	Recent Education Campaigns?	Recent Highway Safety Program?	Average Percent "YES" (cols. 3-5)
		P E R C E N T "Y E S"			
Far West	75% I	100	75	75	83.3
Southwest	75% I	100	100	100	100
Rocky Mtn	20% I	100	60	60	73.3
Plains	50% I	100	100	100	100
High Growth	75% I	100	100	100	100
Medium Growth	33% I	100	66	66	77.3
Low Growth	60% I	100	80	80	86.7
WASHTO % "YES"	I% 53 F% 47	100	80	80	---

These responses were to the following questions:

*Compared to other state Departments of Transportation, do you consider your agency an "innovator" or "follower" in state transportation policy?

*Does your agency contract to private firms for road maintenance or for engineering or design services?

*Has your agency conducted any major public information/education campaigns since 1985?

*Has your agency initiated any new highway safety programs since 1985?

Table 5.12 summarizes responses to questions relating to the types of policy initiatives that WASHTO agencies may have implemented in recent years. Agencies in high growth states and in the Far West and Southwest were apparently more likely than those in other categories and regions to believe that theirs was an innovative transportation department. High growth states and states in the Southwest and Plains also averaged 100 percent "yes" responses to these questions. There was no other consistent pattern of variation evident with respect to these questions, either in terms of BEA regions or economic growth categories. Overall, 53 percent of WASHTO agencies believed they were policy innovators, 100 percent have implemented private contracting for certain departmental functions such as

highway design or maintenance, and 80 percent of WASHTO agencies have implemented public education and highway safety campaigns in recent years.

5.4 R & D and Technical Initiatives

This section of the survey posed three questions about the research and development (R&D) and technical initiatives of WASHTO transportation agencies. First, agencies were asked whether their agency sponsored a research program, either in-house or at a state university. Second, they were asked whether they carry out joint research with state universities in "high technology" areas (e.g., automated vehicle systems, high-speed trains, etc.). Finally, did they have written procedures (again, implying the existence of a formal, verifiable, and accountable process) for transferring and applying new technologies? Responses to these questions are summarized on Table 5.13.

Table 5.13--Research and Development Initiatives, WASHTO States in BEA Regions and by Economic Growth Category				
REGION and CATEGORY	Research Program?	Joint University Research?	Technology Transfer Procedures?	Average Percent "YES"
	P E R C E N T "Y E S"			
Far West	100	100	25	75
Southwest	100	75	50	75
Rocky Mtn	100	20	20	46.7
Plains	100	0	50	50
High Growth	100	75	25	66.7
Medium Growth	100	33	33	53
Low Growth	100	20	40	53
WASHTO %YES	100	53	33	---

These responses also may represent an area of concern for WASHTO members. While all of the respondents have a research program in place, only about one-half of WASHTO members are carrying out joint research with universities in their states on so-called “high-tech” projects (e.g., automated vehicle systems and other new transportation technologies), and only one-third of the agencies responding positively to this question had a written procedure (again, implying a formal process) for transferring newly developed technology. As they did in the category of organizational missions and policy initiatives, above, the Far West, the Southwest, and states in the high growth category had the highest percent of “yes” responses to these questions, providing evidence of more highly developed research programs and R&D initiatives than agencies in other regions and growth categories.

5.5 State Fiscal Environment

This section of the survey asked two questions about the fiscal environment of the state in which the organization operates: (1) in light of the Federal Government's pre-emption of gasoline taxes as a continuing source of revenue for state transportation needs, is your agency contemplating new methods of raising revenue?; and (2) does your state contribute more to the Federal Government in highway fees/gasoline taxes, etc., than it receives back in Federal highway assistance? Tables 5.14 and 5.15 summarize the responses.

Table 5.14--State Fiscal Environments, WASHTO States in BEA Regions and by Economic Growth Category		
REGION and CATEGORY	Studying New Revenue Methods? (% "YES")	Donor or Recipient States?
Far West	100	50%-donor 50%-recipient
Southwest	100	75%-donor 25%-recipient
Rocky Mountain	20	100-recipient
Plains	0	100-recipient
High Growth	75	50%-donor 50%-recipient
Medium Growth	50	83%-donor 17%-recipient
Low Growth	60	40%-donor 60%-recipient
WASHTO %YES	60%	--

It was anticipated that agencies in net donor states--those that contribute more in Federal gasoline taxes to the Federal Highway Trust Fund than they receive back in Federal highway aid--would be more likely to be studying new revenue sources for transportation. This expectation was confirmed. Five out of eight of the Far Western and Southwestern states were net donors to the Federal Highway Trust Fund, and all of these states were contemplating new ways to raise revenues for highways and transportation. Conversely, all of the states in the Rocky Mountains and Plains regions were net recipients of money from the Federal Highway Trust Fund, and only one out of these seven states was actively studying new ways to raise revenue. High growth states were also more likely to be considering new revenue sources, apparently independent of their status vis-a-vis the highway trust fund: half of the high growth states were donors, and half were recipients. Given the stress under which highway systems in high growth states are operating--e.g., increased vehicles per highway mile, and only small net increases in state and local

expenditures for maintenance and new construction(see Tables 4.8-4.11)--this finding is not surprising.

Overall, as seen on Table 5.15, almost two-thirds of WASHTO transportation agencies are contemplating new sources of revenue for highways and public transportation. As would be expected, all of the net “donor” states to the Federal Highway Trust Fund are studying new revenue sources. Slightly less than half of the states that are net “recipients” of Highway Trust Fund monies are contemplating new revenue sources. Given that “New Federalism” implies both decentralized and declining levels of funding for public purposes at the state and local level, this finding is not remarkable.

Table 5.15--Summary of Responses, State Fiscal Environments, WASHTO States	
% WASHTO States Contemplating New Revenue Sources	60% (9 of 15)
% <u>Donor</u> States Contemplating New Revenue Sources	100% (5 of 5)
% <u>Recipient</u> States Contemplating New Revenue Sources	45% (5 of 11)

5.6 Interstate and International Cooperation

The last section of the WASHTO survey explores the involvement of WASHTO agencies with transportation agencies in other states, Canada, and Mexico. Tables 5.16 summarizes these findings on a per-state basis and ranks them using the previous criteria, with a "1" being scored for every “yes” response, and a "0" for every “no”.

Table 5.16--Interstate and International Cooperation (Projects with Other Agencies), WASHTO States

STATE	Projects with Other State Transportation Agencies?	Projects with Mexican or Canadian Agencies?
Arizona	YES	YES
California	YES	YES
Colorado	YES	NO BORDER
Idaho	NO	NO
Montana	YES	YES
Nevada	YES	NO BORDER
New Mexico	YES	YES
North Dakota	YES	YES
Oklahoma	YES	NO BORDER
Oregon	YES	NO BORDER
South Dakota	YES	NO BORDER
Texas	YES	YES
Utah	YES	NO BORDER
Washington	YES	YES
Wyoming	NO	NO BORDER
%YES	87%	88% (of border states)

These responses were to the following questions:

*Is your agency currently executing or planning any projects in cooperation with other state transportation agencies?

*If your state borders on Mexico or Canada, is your agency currently executing or planning any transportation projects in cooperation with the Mexican or Canadian governments?

The responses to this section of the survey indicate a high level of interstate and international cooperation among WASHTO members. Over 83 percent of the states with international borders are undertaking some form of cooperative transportation project with Canada or Mexico, while slightly less than half of all WASHTO states are conducting interstate cooperative projects.

5.6 Summary of Findings and Overall Conclusions from the WASHTO Survey

1. Multimodalism

WASHTO transportation agencies as a group have the greatest degree of responsibility toward highways and intra-urban roads and streets, and the least amount of responsibility for water transport. There appears to be no relationship between a given state's economic growth rates and the degree to which its transportation agency has multimodal responsibility. Apparently, transportation demand in the high growth states--Texas, Arizona, Colorado, and Nevada--is dominated by a monomodal need to provide highways for private automobiles. The Far West states have the highest overall scores for multimodal transportation responsibility, followed by the Southwest, the Rocky Mountain states, and the Plains states.

2. Environmental Policies

WASHTO state transportation agencies provide a great deal of environmental due process, with an average state score of 94 percent. There is no apparent relationship between economic growth rates nor the geographic region to which a given WASHTO state belongs and the amount of environmental due process provided, however. WASHTO states initiate comparatively little pro-active environmental policy: average state scores were only 2.8 for pro-active policy compared with 3.8 for environmental due process. Economic growth rates also appear to be independent of the degree to which WASHTO agencies carry out pro-active environmental policies. Regionally, states in the Far West outperform by a large margin all other WASHTO states in their implementation of pro-active policy, with the Plains states bringing up the rear. In terms of overall environmental policy scores, the Far West leads all regions, the Plains trail all regions, and no significant differences emerge from the ranking of WASHTO states vis-a-vis their economic growth categories.

3. Organizational Missions and Policy Initiatives

Almost 90 percent of the WASHTO respondents had their mission statements changed in recent years. Of these agencies, all had their statements broadened, and over 90 percent of these had new transportation roles added to their organizational responsibilities. Almost two-thirds were given explicit roles pertaining to the environment, economic development, or community and regional planning. Agencies in high growth states and in the Far West and Southwest were apparently more likely than those in other categories and regions to believe that theirs was an innovative transportation department. There was no other consistent pattern of variation evident with respect to these questions, either in terms of BEA regions or economic growth categories.

4. R&D and Technical Initiatives

All of the respondents have a research program in place, but only about one-half are carrying out joint research with universities in their states on so-called "high-tech" projects (e.g., automated vehicle systems and other new transportation technologies), and only one-third of the agencies responding positively had a written procedure--implying a formal process--for transferring newly developed technology. Due to the high percentage of "yes" responses to these questions, WASHTO high-growth states, and states in the Far West and the Southwest apparently have more highly developed research programs and R&D initiatives than agencies in other regions and growth categories.

5. State Fiscal Environments

Almost two-thirds of WASHTO transportation agencies are contemplating new sources of revenue for highways and public transportation. All of the net "donor" states to the Federal Highway Trust Fund are studying new revenue sources. Slightly less than half of the states that are net recipients of Highway Trust Fund monies are contemplating new revenue sources. High growth states were evidently more likely to be considering new revenue sources, independent of their status vis-a-vis the highway trust fund: half of the high growth states were donors, and half were net recipients. Five of eight of the Far Western and Southwestern states were net donors to the Federal Highway Trust Fund, and all of these states

were contemplating new ways to raise revenues for highways and transportation. Conversely, all of the states in the Rocky Mountains and Plains regions were net recipients of money from the Federal Highway Trust Fund, and only one out of these seven was actively studying new ways to raise revenue.

6. Interstate and International Cooperation

Over 83 percent of the states with international borders are undertaking some form of cooperative transportation project with Canada or Mexico, while slightly less than half of the WASHTO states are conducting interstate cooperative projects.

6.0 FINAL CONCLUSIONS AND RECOMMENDATIONS

At this juncture, it is useful to step back from the welter of accumulated empirical detail and re-examine the tasks this study was designed to complete. The first was to construct and analyze a database in order to uncover the ways in which WASHTO states and their transportation systems resemble and differ from each other; and the second was to uncover possible correlations between those similarities and differences and the responsibilities and policies of WASHTO transportation agencies. This information was then to be used to isolate areas of interest in transportation policy common to the whole organization and to sub-groups of states within it, and to recommended mutually beneficial projects on which WASHTO members might wish to cooperate.

6.1 Similarities and Differences

What are the the major similarities and differences that this study has uncovered about WASHTO states? To find out, we turn first to the descriptive data used in the comparative analysis of Section III, above.

1. Similarities

Regardless of declines in manufacturing and mining employment, compared to the rest of the U.S. WASHTO state economies are becoming slightly more manufacturing-oriented, and are increasing their historic dependence on the extraction of non-renewable raw resources. All regions and growth categories posted increases in mining output as a percent of GSP. On average, WASHTO state population growth during the last two decades was almost double that of the U.S., and there appears to be a strong positive relationship between economic growth, population growth, and net migration in WASHTO states. All WASHTO regions experienced large increases in the percent of their residents living in metropolitan areas.

WASHTO states witnessed a 2.2 percent decline in their tax revenue collections from 1970 through 1987. By 1988, WASHTO states had reached a level of taxation that, on average, had met or exceeded their tax capacities (1.01). Data on tax

effort-to-capacity ratios and rates of economic growth for WASHTO states also reveals evidence of a strong negative relationship between the two.

WASHTO states saw highway mileage per 1000 vehicles registered decline by an average of almost 20 percent during the last decade. As a group, WASHTO transportation agencies have the greatest degree of responsibility toward highways and intra-urban roads and streets, and the least amount of responsibility for water transport. There appears to be no relationship between a given state's economic growth rates and the degree to which its transportation agency has multimodal responsibility.

WASHTO state transportation agencies provide a great deal of environmental due process, with an average state score of 94 percent. There is no apparent relationship between economic growth rates nor the geographic region to which a given WASHTO state belongs and the amount of environmental due process provided, however. On the other hand, WASHTO states initiate comparatively little pro-active environmental policy. The degree to which WASHTO transportation agencies carry out pro-active environmental policies, and their overall ranking with respect to all environmental policies, appears to be independent of the economic growth category to which their state belongs.

Almost 90 percent of the WASHTO transportation agencies had their mission statements changed in recent years. Of these agencies, all had their statements broadened, and over 90 percent of these had new transportation roles added to their organizational responsibilities. Almost two-thirds were given explicit roles pertaining to the environment, economic development, or community and regional planning.

All WASHTO agencies included in this analysis have a research program in place. Only about one-half are carrying out joint research with their state universities on so-called "high-tech" projects (e.g., automated vehicle systems and other new transportation technologies). Only one-third of the agencies responding positively had a written procedure--implying a formal process--for transferring newly developed technology.

Almost two-thirds of WASHTO transportation agencies are contemplating new sources of revenue for highways and public transportation. All of the net “donor” states to the Federal Highway Trust Fund are studying new revenue sources. Slightly less than half of the states that are net recipients of Highway Trust Fund monies are contemplating new revenue sources. Finally, over 83 percent of the states with international borders are undertaking some form of cooperative transportation project with Canada or Mexico, while slightly less than half of all WASHTO states are conducting interstate cooperative projects.

2. Differences

a. High-Growth States

High-growth WASHTO states--Arizona, Texas, Colorado, and Nevada--lost only one-half as much manufacturing employment as low-growth states, and only about one-half as much mining employment. With respect to all natural resource categories of output (agriculture, forestry, mining, and energy), high growth states decreased the share of their GSPs accounted for by natural resource industries by almost 22 percent from 1972 to 1986. High-growth states had the fastest rates of population increase, almost double the average net migration of their medium-growth neighbors, and 8.4 times that of low-growth states. High-growth states had the largest population shifts toward metro areas, almost double that of medium-growth states. High-growth WASHTO states also had the lowest tax effort-to-tax capacity ratios in both 1975 and 1988, giving them greater flexibility with respect to raising revenues for increased demand for public services and infrastructure.

High-growth states witnessed a 21 percent decline in the ratio of highway mileage to vehicle registrations from 1978 to 1988, and were the only states in WASHTO to actually increase their expenditures on highways as a percent of all state and local government expenditures during this period. They were also more likely to be considering new revenue sources, independent of their status vis-a-vis the highway trust fund: half of the high growth states were donors, and half were net recipients. Last, transportation agencies in high growth states were apparently more likely than those in other categories and regions to believe that theirs was an innovative transportation department. High-growth states also had the most highly developed research programs.

b. Medium- and Low-Growth Growth States

With respect to all natural resource categories of output (agriculture, forestry, mining, and energy), medium- and low-growth states increased their economies' relative dependence on natural resource industries over the period examined in this study. Medium- and low-growth states had the second and third highest rates of population increase, and actually decreased their highway spending as a percent of all state and local government spending. Low-growth states had the highest tax effort-to-tax capacity ratios.

c. BEA Regions

1. The Far West

WASHTO states in the Far West lost manufacturing, mining, and government employment, and gained jobs in the FIRE and services sectors. The Far West region had the highest rates of population increase, and the highest net migration totals. Probably as a result, highway systems in the Far West states are under the most stress, with an almost 30 percent decline in highway mileage per vehicle registrations during the last decade. All of the Far Western state transportation departments were contemplating new ways to raise revenues for highways and transportation.

With respect to their transportation departments, the Far West states have the highest overall scores for multimodal transportation responsibility, and outperform by a large margin all other WASHTO states in their implementation of pro-active environmental policy. The Far West also leads all regions in terms of overall environmental policy scores. Agencies in the Far West were the most likely to think of themselves as policy innovators, and, along with states in the Southwest, had the most highly developed research programs, with all states conducting research jointly with their state universities.

2. The Southwest

The Southwest was the only BEA region among WASHTO states that had an average decrease in its natural resource share of GSP during the period examined in the study. This region also had the highest rates of GSP and per capita income growth and the second-highest rate of employment growth. The Southwest states had the second-highest average and total net migration, and were the only WASHTO states to see an increase in highway spending as a percent of state and local government expenditures.

WASHTO state transportation agencies in the Southwest had the second-highest overall average scores for multimodal transportation responsibility, and were second only to the Far West in their belief that theirs were innovative transportation departments. Along with the Far West, transportation departments in the Southwest also have more highly developed research programs and R&D initiatives than agencies in other regions and growth categories. All Southwestern states were net donors to the Federal Highway Trust Fund, and all were contemplating new ways to raise revenue.

3. The Rocky Mountains

The Rocky Mountain region lost manufacturing, mining, and government employment, and gained jobs in the FIRE and services sectors. Rocky Mountain states had the best revenue performance, with an approximately 4 percent increase in tax revenues per \$100 of personal income over the last decade, while they decreased their spending on highways by almost 20 percent.

The Rocky Mountain states had the third-highest scores for multimodal responsibility. All of the states in the Rocky Mountains region were net recipients of money from the Federal Highway Trust Fund, and only one out of these five states was actively studying new ways to raise revenue.

4. The Plains

The two Plains states included in WASHTO (North and South Dakota) went against both WASHTO and national trends by posting employment increases in

manufacturing, mining, and government employment. When WASHTO states were grouped into BEA regions, the Plains states stood apart by having a 45 percent increase in manufacturing output as a percent of GSP. The Plains states had by far the largest increase in mining output as a percent of GSP, 118 percent. The two WASHTO Plains states had population growth of only one-seventh that of the two leading regions, witnessed a net outmigration, and had the smallest increases in the percent of their populations moving into metropolitan areas. The Plains states had the worst fiscal climates, with a 22 percent decline in tax revenues, and the highest tax effort-to-tax capacity ratios.

Regarding their transportation agencies, the Plains states have the lowest multimodality scores, the lowest pro-active environmental policy scores, and the lowest overall environmental policy scores.

6.2 Correlations Between WASHTO State Similarities and Differences and the Characteristics of WASHTO Transportation Agencies

As discussed previously, the size of the sub-samples into which WASHTO states were divided precludes rigorous statistical testing of the relationships observed between WASHTO economic growth categories and BEA regions, state and transportation system characteristics, and transportation department policies and responsibilities. Nevertheless, the analysis carried out using the WASHTO database and survey responses provides evidence of two important correlations.

First, high-growth WASHTO states are concentrated in the Far Western and Southwestern BEA regions. Probably not as the result of coincidence, these states, and the two regions in which they were concentrated, had the highest rates of population increase, the highest average and total levels of net migration, and the largest internal population shifts to metropolitan areas. High-growth states, and the Far West and Southwest states, also had the lowest ratios of tax effort to tax capacity, indicating that they have greater degrees of flexibility in the raising of revenues for public services and infrastructure. High-growth states had the only increase in highway expenditures, and when the Far West and the Southwest were combined, had the largest average decrease in the highway mileage per 1000 vehicles registered. This indicates that highway systems in the Far West and Southwest are under more stress than any other areas in WASHTO.

While high-growth states ranked third in their average multimodality scores, the Far West and Southwest ranked first and second, respectively, in this measure of transportation department policies and responsibilities. High growth states, and the Far West and Southwest, had the highest overall average scores vis-a-vis transportation department environmental policies. More transportation departments in states in the high-growth category, and in the Far West and Southwest, regarded themselves as policy innovators. In the area of research, development, and technical initiatives, high-growth states and states in the Far West and Southwest appeared to have more highly developed research programs, links with state university researchers, and technology transfer programs. All transportation departments in high-growth states and the Far West and Southwest were studying new ways to raise additional revenue for transportation projects.

Second, just as there appears to be a high correlation between characteristics of high-growth, Far West, and Southwest states, and high scores on a broad range of transportation department policy and responsibility measures, there is also evidence of a relationship between characteristics of low growth, Plains region states, and low scores on transportation department policy and responsibility measures. The two Plains states included in WASHTO (North and South Dakota) belonged to the medium- and low-economic growth categories, respectively. The economic development paths both states were following were markedly different than either those of the U.S. at large or the WASHTO states as a group. The WASHTO Plains states had population growth of only one-seventh that of the two leading regions, witnessed a net outmigration, and had the smallest increases in the percent of their populations moving into metropolitan areas. The Plains states had the worst fiscal climates, with a 22 percent decline in tax revenues, and the highest tax effort-to-tax capacity ratios. Regarding their transportation agencies, the Plains states had the lowest multimodality scores, the lowest pro-active environmental policy scores, the lowest overall environmental policy scores, and neither of the states was contemplating new ways of raising transportation revenue.

6.3 Recommendations for WASHTO: Transportation Policy Concerns and Cooperative Projects

Several major areas of mutual concern in transportation policy emerge from this study, all of which are also subjects that might serve as mutually beneficial, cooperative projects for coalitions of WASHTO states.

First, since all states save two saw highway mileage per 1000 vehicle registrations drop over the last decade, and only four WASHTO states (those in the high-growth category) were able to increase their expenditures for highways, it might benefit WASHTO states to carry out studies on whether to follow demand-side or supply-side approaches to the problem of accommodating increasing volumes of vehicles and vehicle miles traveled (VMT). Throughout this century in the U.S., the traditional approach has been to accommodate steadily increasing VMT through a supply-side strategy, i.e., by simply building more, and more capacious, roads. As urban rights-of-way are becoming more scarce, environmental constraints on the use of internal combustion engines begin to take hold, and highway construction and maintenance funds become subject to a wide array of competing demands, transportation economists and engineers are beginning to examine the possibilities inherent in demand-management strategies as a means to deal with increasing VMT, urban congestion, and the escalating costs of new highway construction and maintenance. Some of these methods include toll roads, congestion pricing, and new urban planning and land-use management techniques designed to emphasize multimodal approaches to transportation planning and system management.

A second issue that directly concerns high-growth states, those in the Southwest and Far West, and WASHTO states that are net donors to the Federal Highway Trust Fund, is alternative revenue sources for highways and other transportation modes. Since many of these WASHTO agencies are already studying ways to raise revenue outside of traditional sources such as the gasoline tax, it might be beneficial for those agencies to share their information and findings, especially if shared results are products of pilot projects.

A third area of common concern is, of course, the environment and the environmental policies of WASHTO transportation departments. As noted in

Section V, WASHTO agencies provide a great deal of environmental due process, but little in the way of pro-active, mitigative environmental policy. This is an area of potential concern for WASHTO member agencies. Merely following environmental due processes may not be a sufficient condition for fulfilling overall environmental responsibilities. In this connection, WASHTO states with particularly good pro-active and ameliorative environmental policies and strategies--i.e., those in the Far West and Rocky Mountain states--could provide emulative leadership for the rest of WASHTO by formally sharing their experience in this area.

The last concern raised by this study relates to the basic way in which WASHTO itself is organized. Clearly, high-growth states, their transportation departments, and their transportation systems share a number of important characteristics, not the least of which is that they are geographically proximate, if not contiguous to one another. On the other hand, the Plains states share similar characteristics as well, and very different problems than the high-growth states of the Far West and Southwest. The findings in this report suggest that economic and geographically based sub-groups of WASHTO states might be able to conduct joint research and mount other cooperative projects on all or some of the issues discussed in this section, as well as others that may concern them in the future. These sub-groups could consist of WASHTO states divided into their respective BEA regions, or WASHTO states in economic growth categories.

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APPENDIX 1

Contents of WASHTO Database

I. STATE ENVIRONMENTAL CHARACTERISTICS

Growth of Carbon Emissions 1963-1986 (%)

Carbon Emissions--Ton Released per Mill.\$ GSP (ton)

Hazardous Waste Generated lb. per Capita (1985)

(Source: Institute for Southern Studies, "Green Index:

A State-by-State Report Card on the Nation's Environment,"

April 10, 1990.)

II. STATE ECONOMIC DEVELOPMENT CHARACTERISTICS

MFG73--MANUFACTURING EMPLOYMENT, 1973, PER 1000 CIVILIAN EMPLOYEES; SOURCE: FLORIDA STATE DATA

MFG79--SAME AS ABOVE, 1979

MFG84--SAME AS ABOVE, 1984

MFG87--SAME AS ABOVE, 1987

MFG39--percent change in manufacturing employment, 1973-'79; MFG94--percent change in manufacturing employment, 1979-'84; MFG47-- " " " " , 1984-'87; MFG37-- " " " " " " , 1973-'87.

MIN39--PERCENT CHANGE IN MINING EMPLOYMENT, 1973-79, PER 1000 CIVILIAN EMPLOYEES; SOURCE: FLORIDA STATE UNIVERSITY

MIN94---SAME AS ABOVE

MIN47--SAME AS ABOVE

MIN37--SAME AS ABOVE

TRD39-37 (WHOLESALE AND RETAIL TRADE EMPLOYMENT), FIRE39-37 (FINANCE, INSURANCE AND REAL ESTATE EMPLOYMENT), SERV39-37 (SERVICES EMPLOYMENT), AND GOV39-37 (GOVERNMENT EMPLOYMENT).

MFGINC73-- ratio of manufacturing income per capita to GSP per capita, 1973;

MFGINC79-- " " " " " " " " " " , 1979; MFGINC84-- " " " " " " " " " " , 1984;

TRDINC39-37; FIREINC39-37; SERINC39-37; GOVINC39-37

ENGYPNT--ENERGY AS A PERCENT OF GROSS STATE PRODUCT, 1963-86
(Survey of Current Business, U.S. Department of Commerce)

AGPNT--AGRICULTURE AS PERCENT OF GROSS STATE PRODUCT, 1963-86 (SAME)

NRPNT--NATURAL RESOURCES AS PERCENT OF GROSS STATE PRODUCT, 1963-86 (SAME)

III. STATE ECONOMIC GROWTH CHARACTERISTICS

SPGROW39, SPGROW94, SPGROW47, SPGROW37--average annual growth rates in per capita Gross State Product, for '73-'79, '79-'84, '84-'87, '73-'87, respectively

MGROW39, MGROW94, MGROW47, MGROW37--the median of the average annual growth rates in per capita Gross State Product for WASHTO states (excluding Arkansas and Louisiana), for '73-'79, '79-'84, '84-'87, '73-'87, respectively

EMPGRO39, EMPGRO94, EMPGRO47, EMPGRO37--average annual nonagricultural employment growth rates for '73-'79, '79-'84, '84-'87, '73-'87, respectively

MEMGRO39, MEMGRO94, MEMGRO47, MEMGRO37--the median of the annual average nonagricultural employment growth rate for all WASHTO states, for '73-'79, '79-'84, '84-'87, '73-'87, respectively

UNEMP39, UNEMP94, UNEMP47, UNEMP37--average unemployment rates for '73-'79, '79-'84, '84-'87, '73-'87, respectively

MUNEMP39, MUNEMP94, MUNEMP47, MUNEMP37--the median of the average unemployment rates for all WASHTO states for '73-'79, '79-'84, '84-'87, '73-'87, respectively

RGPIPC39, RGPIPC94, RGPIPC47, RGPIPC37--rate of growth in (real) per capita personal income, for '73-'79, '79-'84, '84-'87, '73-'87, respectively

MRGPCP39, MRGPCP94, MRGPCP47, MRGPCP37--the median of the average annual growth rates in per capita personal income for WASHTO states (excluding Arkansas and Louisiana), for '73-'79, '79-'84, '84-'87, '73-'87, respectively

IV. STATE FISCAL AND TAX POLICY CHARACTERISTICS

SLTR70--state and local tax revenue per \$100 of personal income, 1970
(NCSL, "Interstate Tax Comparisons and How They Have Changed Over
Time", Legislative Finance Papers #66, 2/89, Table 4, p. 11)

SLTR78--state and local tax revenue per \$100 of personal income, 1978

SLTR87--state and local tax revenue per \$100 of personal income, 1987

RANK70, RANK78, RANK87--state ranking vis-a-vis the above for the
designated years

SLPTCH08, SLPNTCH87, SLPNTCH07--percent change for above periods,
from Table 5 of above reference, p. 13

TAXCAP--TAX CAPACITY, BY STATE (75, 79, 84, 88). (SOURCE: ACIR)

TAXEFF--TAX EFFORT, BY STATE (75, 79, 84, 88). (SOURCE: ACIR)

V. STATE SOCIAL DEVELOPMENT CHARACTERISTICS

POVERTY RATES, BY STATE (CHECK YEARS). SOURCE: TDOC

DISTRO--INCOME DISTRIBUTION (Cfed, ON ORDER, 11/01/90)

MEDIAN--MEDIAN FAMILY INCOMES, BY STATE, CHANGES BY DECADE
(SOURCE: 1980 CENSUS, VOLUME PC-80-1-C1)

PCHLTH73, PCHLTH79, PCHLTH84, PCHLTH87--PER CAPITA HEALTH
EXPENDITURES, 1973, 79, 84 (FSU data set), AND 87 (SAUS, P. 281),

PCWELF73, PCWELF79, PCWELF84, PCWELF87--PER CAPITA WELFARE
EXPENDITURES, 1973, 1979, 1984 (FSU DATA SET), 1987, (SAUS, P. 281)

VI. STATE EDUCATIONAL CHARACTERISTICS

PUSPND74, PUSPND79, PUSPND84, PUSPND87--PER PUPIL

EXPENDITURES ON EDUCATION, 1974, '79, '84, '87, Digest of Educational
Statistics

MSPND74, MSPND79, MSPND84, MSPND87--median per pupil expenditures
on education, WASHTO states, 1974, 1979, '84, '87

LTHS--PERCENT OF POPULATION 25 or over with less than a high school
education, DIGEST OF EDUCATIONAL STATISTICS

GTHS--PERCENT OF POPULATION WITH HIGH SCHOOL EDUCATION OR
GREATER

GT4COLL--PERCENT OF POPULATION WITH 4 YEARS OF COLLEGE OR
MORE OF EDUCATION

PHDCAP--SCIENCE AND ENGINEERING PHDS PER CAPITA

RND--TOTAL AMOUNT OF UNIVERSITY CONDUCTED R&D, 1985, (IN MILLIONS), P. 584, SAUS

RNDCAP--PER CAPITA UNIVERSITY RND

VII. STATE DEMOGRAPHIC CHARACTERISTICS

PGROW37--average annual population growth rates, '73-'87

APGROU537--average annual population growth rates (under age 5 cohort), by state, '73-'87

APGRO517--average annual population growth rates (age 5-17 cohort), by state, '73-'87

APGR1864--average annual population growth rates (age 18-64 cohort), by state, '73-'87

APGROV64--average annual population growth rates (over 65 cohort), by state, '73-'87

APGRMIN--average annual population growth rates for minority population (African-American, Hispanic, other), by state, '73-'87

PNTMIN73--minority population as percent of total population, 1973

PNTMIN87--minority population as percent of total population, 1987

CPNTMIN--percent change in minority population as percent of total population, 1973-87

NMIG7387--average annual net migration rates, by state, '73-'87

SMAPOP73--percent of population residing in SMSA counties, 1973

SMAPOP87--percent of population residing in SMSA counties, 1987

NMET73--percent of population residing in non-SMSA counties, 1973

NMET87--percent of population residing in non-SMSA counties, 1987

VIII. STATE TRANSPORTATION SYSTEM CHARACTERISTICS

A. WATERBORNE TRANSPORTATION VARIABLES

TRAFFIC--TOTAL WATERBORNE FREIGHT TRAFFIC, (TONS PER CAPITA) BY STATE, 1988, "WATERBORNE COMMERCE OF THE UNITED STATES, 1988", U.S. ARMY CORPS OF ENGINEERS, PARTS 2 AND 4, VARIOUS PAGES.

TRAFCHNG--PERCENT CHANGE IN WATERBORNE TRAFFIC, (TONS PER CAPITA) BY STATE, 1978-88, SAME SOURCE

B. RAILROAD TRANSPORTATION VARIABLES

RAILMI71-RAILMI88--railroad mileage per state, by successive year (one variable per year)

RAMIPC71-RAMIPC88--railroad mileage per state, per capita, per year

SOURCE: AMERICAN ASSOCIATION OF RAILROADS

C. AERONAUTICAL TRANSPORTATION VARIABLES

TOWER--NUMBER OF AIR TRAFFIC CONTROL TOWERS BY STATE, 1987, P. 9 OF "TERMINAL AIR FORECASTS" (FAA)

RANK--NUMBER OF AIRPORTS PER STATE RANKED AMONG THE TOP 100 IN THE U.S. IN TERMS OF PASSENGER EMPLANEMENTS, 1988, PP. 10-13 OF "TERMINAL AIR FORECASTS" (FAA)

PASSGR84--PER CAPITA PASSENGER EMPLANEMENTS BY STATE, 1984, PP. AAL I-ETC., SAME SOURCE

PASSGR88--PER CAPITA PASSENGER EMPLANEMENTS BY STATE, 1988, PP. AAL I-ETC., SAME SOURCE

CHNG8488--PERCENT CHANGE IN PER CAPITA PASSENGER EMPLANEMENTS, 1984-88, SAME SOURCE

PASSGR02--PER CAPITA PASSENGER EMPLANEMENTS BY STATE, 2002 (FORECAST), PP. AAL I-ETC., SAME SOURCE

CHNG8802--PERCENT CHANGE IN PER CAPITA PASSENGER EMPLANEMENTS, 1988-2002, SAME SOURCE

D. HIGHWAY TRANSPORTATION VARIABLES

VEHCAP88--TOTAL VEHICLE REGISTRATIONS (ALL CATEGORIES) PER CAPITA, 1988, FROM "HIGHWAY STATISTICS, 1988", p. 17

VEHCAP78--TOTAL VEHICLE REGISTRATIONS (ALL CATEGORIES) PER CAPITA, 1978, FROM "HIGHWAY STATISTICS, 1978"

PNT78881--PERCENT CHANGE IN TOTAL VEHICLE REGISTRATIONS (ALL CATEGORIES) PER CAPITA, 1978-88, COMPUTED FROM ABOVE TWO VARIABLES

REC88--TOTAL PER CAPITA STATE FUEL TAX RECEIPTS, HIGHWAY USER FEES, REGISTRATION FEES, ETC. (LESS FEDERAL FUNDS DISBURSED TO THE STATE), 1988, FROM "HIGHWAY STATISTICS, 1988", PP. 66-68

REC78--TOTAL PER CAPITA STATE FUEL TAX RECEIPTS, HIGHWAY USER FEES, REGISTRATION FEES, ETC. (LESS FEDERAL FUNDS DISBURSED TO THE STATE), 1978, FROM "HIGHWAY STATISTICS, 1988"

PNT78882--PERCENT CHANGE IN PER CAPITA STATE FUEL TAX RECEIPTS, HIGHWAY USER FEES, REGISTRATION FEES, ETC. (LESS FEDERAL FUNDS DISBURSED TO THE STATE), 1978-88, COMPUTED FROM ABOVE TWO VARIABLES

FF88--TOTAL PER CAPITA FEDERAL HIGHWAY FUNDS DISBURSED TO A GIVEN STATE, 1988, FROM "HIGHWAY STATISTICS, 1988", P. 68

FF78--TOTAL PER CAPITA FEDERAL HIGHWAY FUNDS DISBURSED TO A GIVEN STATE, 1978, FROM "HIGHWAY STATISTICS, 1978"

PNT78883--PERCENT CHANGE IN TOTAL PER CAPITA FEDERAL HIGHWAY FUNDS, 1978-88, COMPUTED FROM ABOVE TWO VARIABLES

DISBUR88--TOTAL STATE PER CAPITA DISBURSEMENTS ON HIGHWAYS, 1988, (IN MILLIONS OF DOLLARS), FROM "HIGHWAY STATISTICS, 1988", P. 70

DISBUR78--TOTAL STATE PER CAPITA DISBURSEMENTS ON HIGHWAYS, 1978, (IN MILLIONS OF DOLLARS), FROM "HIGHWAY STATISTICS, 1978"

PNT78884--PERCENT CHANGE IN TOTAL PER CAPITA STATE EXPENDITURES ON HIGHWAYS, 1978-88, COMPUTED FROM ABOVE TWO VARIABLES

STALOC88--TOTAL STATE PER CAPITA DISBURSEMENTS TO LOCAL GOVERNMENTS FOR ROADS AND STREETS, 1988, FROM "HIGHWAY STATISTICS, 1988", P. 77

STALOC78--TOTAL STATE PER CAPITA DISBURSEMENTS TO LOCAL GOVERNMENTS FOR ROADS AND STREETS, 1978, FROM "HIGHWAY STATISTICS, 1978"

PNT78885--PERCENT CHANGE IN PER CAPITA STATE DISBURSEMENTS TO LOCAL GOVERNMENTS FOR ROADS AND STREETS, 1978-88, COMPUTED FROM ABOVE TWO VARIABLES

LOC88--LOCAL GOVERNMENT DISBURSEMENTS FOR HIGHWAYS, PER CAPITA, 1988, BY STATE, FROM "HIGHWAY STATS, 1988", P. 94

LOC78--LOCAL GOVERNMENT DISBURSEMENTS FOR HIGHWAYS, PER CAPITA, 1978, BY STATE, FROM "HIGHWAY STATS, 1978"

PCTSTA88--PERCENT OF LOCAL GOVERNMENT RECEIPTS FOR HIGHWAYS FROM STATE GOVERNMENT, 1988, FROM "HIGHWAY STATS, 1988", P. 94

PCTSTA78--PERCENT OF LOCAL GOVERNMENT RECEIPTS FOR HIGHWAYS FROM STATE GOVERNMENT, 1978, FROM "HIGHWAY STATS, 1978"

PNT78886--PERCENT CHANGE IN PERCENT OF LOCAL GOVERNMENT RECEIPTS FOR HIGHWAYS FROM STATE GOVERNMENT, 1978-88, COMPUTED FROM ABOVE TWO VARIABLES

CAPTAL88--TOTAL STATE PER CAPITA CAPITAL OUTLAYS, 1988, FROM "HIGHWAY STATISTICS, 1988", PP. 78-79-80.

CAPTAL78--TOTAL STATE PER CAPITA CAPITAL OUTLAYS, 1978, FROM "HIGHWAY STATISTICS, 1978"

PNT78887--PERCENT CHANGE IN TOTAL STATE PER CAPITA CAPITAL OUTLAYS, 1978-88, COMPUTED FROM ABOVE TWO VARIABLES

MAINT88--TOTAL STATE PER CAPITA MAINTENANCE OUTLAYS, 1988, FROM "HIGHWAY STATISTICS, 1988", PP. 78-80.

MAINT78--TOTAL STATE PER CAPITA MAINTENANCE OUTLAYS, 1978, FROM "HIGHWAY STATISTICS, 1978"

PNT78888--PERCENT CHANGE IN TOTAL STATE PER CAPITA MAINTENANCE OUTLAYS, 1978-88, COMPUTED FROM ABOVE TWO VARIABLES

PNT78889--PERCENT CHANGE IN STATE PER CAPITA DISBURSEMENTS FOR MASS TRANSIT, 1978-88, COMPUTED FROM ABOVE TWO VARIABLES

MILE88--TOTAL ROAD/HIGHWAY MILEAGE PER 1000 VEHICLE REGISTRATIONS, 1988, FROM "HIGHWAY STATS, 1988", P. 113

MILE78--TOTAL ROAD/HIGHWAY MILEAGE PER 1000 VEHICLE REGISTRATIONS, 1988, BY STATE, FROM "HIGHWAY STATS, 1978"

CHMILE88--PERCENT CHANGE IN ROAD/HIGHWAY MILEAGE PER 1000 VEHICLE REGISTRATIONS, 1978-88, COMPUTED FROM ABOVE TWO VARIABLES

VEMILE88--ANNUAL PER CAPITA VEHICLE MILES OF TRAVEL, 1988, FROM "HIGHWAY STATS, 1988", P. 173

VEMILE78--ANNUAL PER CAPITA VEHICLE MILES OF TRAVEL, 1978, FROM "HIGHWAY STATS, 1978"

CHVEMILE--PERCENT CHANGE IN ANNUAL PER CAPITA VEHICLE
MILES OF TRAVEL, 1978-88, COMPUTED FROM ABOVE TWO VARIABLES

E. MASS TRANSIT VARIABLES

MASS88--TOTAL STATE PER CAPITA DISBURSEMENTS FOR MASS
TRANSIT, 1988, FROM "HIGHWAY STATS, 1988", p. 93

MASS78--TOTAL STATE PER CAPITA DISBURSEMENTS FOR MASS
TRANSIT, 1978, FROM "HIGHWAY STATS, 1978"

APPENDIX 2

Raw Responses from Survey of WASHTO Transportation Agencies

Table 1--Levels of Responsibility Toward Air Transportation, WASHTO Transportation Agencies					
STATE	Funding	Construction	Planning	Research/Technical	Overall Score
Alaska	YES	YES	YES	YES	10
California	YES	YES	YES	YES	10
Idaho	YES	YES	YES	YES	10
Oklahoma	YES	YES	YES	YES	10
Oregon	YES	YES	YES	YES	10
S. Dakota	YES	YES	YES	YES	10
Washington	YES	YES	YES	YES	10
Arizona	YES	YES	YES	NO	9
New Mexico	YES	NO	YES	YES	7
Wyoming	YES	NO	YES	YES	7
Montana	YES	NO	YES	NO	6
Texas	YES	NO	YES	NO	6
Utah	YES	NO	YES	NO	6
Nevada	NO	NO	YES	NO	2
N. Dakota	NO	NO	NO	NO	0
Colorado ¹	PENDING	PENDING	PENDING	PENDING	--
% YES	81%	50%	87.5%	56.3%	113
Hawaii	NO RESPONSE				

¹The Colorado Department of Highways has recently become the Colorado Department of Transportation. The degree to which it will have responsibility for air transportation is currently being studied.

Table 2--Levels of Responsibility Toward Rail Transportation, WASHTO
Transportation Agencies

STATE	Funding	Construction	Planning	Research/ Technical	Overall Score
Idaho	YES	YES	YES	YES	10
Oklahoma	YES	YES	YES	YES	10
S. Dakota	YES	YES	YES	YES	10
Nevada	YES	YES	YES	NO	9
Oregon	YES	NO	YES	YES	7
California	YES	NO	YES	NO	6
N. Dakota	YES	NO	YES	NO	6
Texas	NO	YES	YES	YES	6
Washington	YES	NO	YES	NO	6
Montana	NO	YES	YES	NO	5
Alaska	NO	NO	YES	YES	3
New Mexico	NO	NO	YES	YES	3
Utah	NO	NO	YES	NO	2
Wyoming	NO	NO	YES	NO	2
Arizona	NO	NO	NO	NO	0
Colorado ¹	PENDING	PENDING	PENDING	PENDING	--
%YES	50%	37.5%	87.5%	43.8%	85
Hawaii	NO RESPONSE				

¹See Note 1 on Table A1.

Table 3--Levels of Responsibility Toward Water Transportation, WASHTO
Transportation Agencies

STATE	Funding	Construc- tion	Planning	Research/ Technical	Overall Score
Alaska	YES	YES	YES	YES	10
Texas	YES	YES	YES	YES	10
Washington	YES	YES	YES	YES	10
Utah	YES ¹	YES	NO	NO	7
Idaho	NO	NO	YES	NO	2
California	NO	NO	YES	NO	2
Arizona	NO	NO	NO	NO	0
Montana	NO	NO	NO	NO	0
Nevada	NO	NO	NO	NO	0
New Mexico	NO	NO	NO	NO	0
N. Dakota	NO	NO	NO	NO	0
Oklahoma	NO	NO	NO	NO	0
S. Dakota	NO	NO	NO	NO	0
Wyoming	NO	NO	NO	NO	0
Oregon	NO	NO	NO	NO	0
Colorado ²	PENDING	PENDING	PENDING	PENDING	--
% YES	25%	25%	31%	18.8%	41
Hawaii	NO RESPONSE				

¹Operates ferry on Lake Powell.

²See Note 1 on Table A1.

Table 4--Levels of Responsibility Toward Highway Transportation, WASHTO Transportation Agencies

STATE	Funding	Construction	Planning	Research/Technical	Overall Score
Alaska	YES	YES	YES	YES	10
Arizona	YES	YES	YES	YES	10
California	YES	YES	YES	YES	10
Colorado	YES	YES	YES	YES	10
Idaho	YES	YES	YES	YES	10
Montana	YES	YES	YES	YES	10
Nevada	YES	YES	YES	YES	10
New Mexico	YES	YES	YES	YES	10
N. Dakota	YES	YES	YES	YES	10
Oklahoma	YES	YES	YES	YES	10
Oregon	YES	YES	YES	YES	10
S. Dakota	YES	YES	YES	YES	10
Texas	YES	YES	YES	YES	10
Utah	YES	YES	YES	YES	10
Washington	YES	YES	YES	YES	10
Wyoming	YES	YES	YES	YES	10
% YES	100%	100%	100%	100%	160
Hawaii	NO RESPONSE				

Table 5--Levels of Responsibility Toward Urban/Interurban
Mass Transit, WASHTO Transportation Agencies

STATE	Funding	Construc- tion	Planning	Research/ Technical	Overall Score
Arizona	YES	YES	YES	YES	10
Texas	YES	YES	YES	YES	10
Oregon	YES	YES	YES	YES	10
Alaska	YES	NO	YES	YES	7
California	YES	NO	YES	YES	7
Idaho	YES	NO	YES	YES	7
New Mexico	YES	NO	YES	YES	7
S. Dakota	YES	NO	YES	YES	7
Washington	YES	NO	YES	YES	7
Montana	YES	NO	YES	NO	6
Nevada	YES	NO	YES	NO	6
N. Dakota	YES	NO	YES	NO	6
Oklahoma	YES	NO	YES	NO	6
Utah	NO	NO	YES	NO	2
Wyoming	NO	NO	NO	NO	0
Colorado ¹	PENDING	PENDING	PENDING	PENDING	--
% YES	81.3%	18.8%	87.5%	56.3%	98
Hawaii	NO RESPONSE				

¹See Note 1 on Table A1.

Table 6--Levels of Responsibility Toward Intra-urban Roads and Streets, WASHTO Transportation Agencies

STATE	Funding	Construction	Planning	Research/Technical	Overall Score
Alaska	YES	YES	YES	YES	10
California	YES	YES	YES	YES	10
S. Dakota	YES	YES	YES	YES	10
Texas	YES	YES	YES	YES	10
Nevada	YES	YES	YES	NO	9
New Mexico	YES	NO	YES	YES	7
Oregon	YES	NO	YES	YES	7
Oklahoma	YES	YES	NO	NO	7
Wyoming	YES	YES	NO	NO	7
Colorado	YES	NO	YES	NO	6
Washington	NO	YES	YES	YES	6
Idaho	YES	NO	NO	YES	5
Utah	YES	NO	NO	YES	5
Montana	YES	NO	NO	NO	4
N. Dakota	NO	NO	YES	YES	3
Arizona	NO	NO	NO	NO	0
% YES	81.3%	50%	62.5%	62.5%	106
Hawaii	NO RESPONSE				

Note: most of the funding of intraurban roads and streets reported by WASHTO member agencies is with Federal "pass-through" monies.

Table 7--“Multimodality” Rankings of State Transportation Agencies,
WASHTO States

STATE	COMBINED SCORE AND RANK
Texas	52 (1)
Alaska	50 (2)
Washington	49 (3)
S. Dakota	47 (4)
California	45 (5)
Idaho	44 (6)
Oregon	44 (6)
Oklahoma	43 (7)
Nevada	36 (8)
New Mexico	34 (9)
Utah	32 (10)
Montana	31 (11)
Arizona	29 (12)
Wyoming	26 (13)
N. Dakota	25 (14)
Colorado	16* (15)
MEAN	37.7
MEDIAN	39.5

*As noted, Colorado has recently become a Department of Transportation and is currently studying several additional modal responsibilities.

Table 8--Provisions for Environmental "Due Process",
WASHTO Transportation Agencies

STATE	Impact Assessments?	Written Procedures?	Public Statements?	Public Hearings?	Overall Score
Alaska	YES	YES	YES	YES	4
Arizona	YES	YES	YES	YES	4
California	YES	YES	YES	YES	4
Colorado	YES	YES	YES	YES	4
Idaho	YES	YES	YES	YES	4
Nevada	YES	YES	YES	YES	4
New Mexico	YES	YES	YES	YES	4
Oklahoma	YES	YES	YES	YES	4
Oregon	YES	YES	YES	YES	4
S. Dakota	YES	YES	YES	YES	4
Texas	YES	YES	YES	YES	4
Utah	YES	YES	YES	YES	4
Washington	YES	YES	YES	YES	4
Montana	YES	NO	YES	YES	3
N. Dakota	YES	NO	YES	YES	3
Wyoming	YES	NO	YES	NO	2
% YES	100%	81.3%	100%	93.8%	60
Hawaii	NO RESPONSE				

These responses were to the following questions (moving left to right from the second column):

*Does your agency routinely (i.e., in all or nearly all cases) assess the environmental impacts of proposed transportation projects?

*Does your agency have a written set of procedures for conducting environmental impact assessments?

*Are environmental impact statements available to the public?

*Are public hearings routinely held as part of the process related to impact assessments?

Table 9--Pro-active Environmental Goals and Policies, WASHTO Transportation Agencies

STATE	Written Goals?	Report Results?	Mitigating procedures?	Alternative research ?	Pave-ment recycling?	Overall score
CA	YES	YES	YES	YES	YES	5
WA	YES	YES	YES	YES	YES	5
OR	YES	YES	YES	YES	YES	5
AZ	YES	NO ¹	NO	YES	YES	3
CO	YES	YES	NO	NO	YES	3
ID	NO	YES	YES	NO	YES	3
NV	NO	YES	YES	NO	YES	3
NM	YES	YES	NO	NO	YES	3
SD	YES	YES	NO	NO	YES	3
UT	YES	YES	NO	NO	YES	3
MT	NO	YES	NO	NO	YES	2
TX	NO	NO	NO	YES	YES	2
WY	NO	YES	NO	NO	YES	2
AK	NO	NO	NO	NO	YES	1
ND	NO	NO	NO	NO	YES	1
OK	NO	NO	NO	NO	YES	1
%YES	50%	68.8%	38.5%	38.5%	100%	45
Hawaii	NO RESPONSE					

¹Legislation is pending that may require Arizona DOT to report results of environmental impact studies to a state clearinghouse agency.

These responses were to the following questions (moving left to right from the second column):

*Does your agency have a set of written environmental goals?

*Does your agency routinely report the results of its impact assessments to any other state agencies?

*If your agency conducts environmental impact assessments, does it have a written set of procedures for mitigating negative impacts, if any are found?

*Is your agency conducting research on environmentally benign alternative transportation technologies (e.g., fuels, vehicles, etc.)?

Table 10--Summary and Comparison of Responses,
Environmental Policy Questions, WASHTO States

Response Category	"Due Process" Responses	"Pro-active" Responses
Average % Yes	93.8	59.2
Average state score	3.75	2.81
Combined WASHTO score	60	45

Table 11--Environmental Policy Rankings of Transportation Agencies,
WASHTO States

STATE	COMBINED SCORE AND RANK
California	9 (1)
Oregon	9 (1)
Washington	9 (1)
Arizona	7 (2)
Colorado	7 (2)
Idaho	7 (2)
Nevada	7 (2)
New Mexico	7 (2)
S. Dakota	7 (2)
Utah	7 (2)
Texas	6 (3)
Alaska	5 (4)
Montana	5 (4)
Oklahoma	5 (4)
N. Dakota	4 (5)
Wyoming	4 (5)
MEAN	6.6
MEDIAN	7

Table 12--Organizational Missions, WASHTO States				
STATE	Mission Changed?	Broadened or Narrowed?	New Transportation Roles Added?	Other Roles Added?
Alaska	YES	NARROW	NO	NO
Arizona	YES	BROADEN	YES	YES
California	YES	BROADEN	YES	YES
Colorado	YES	BROADEN	PENDING	PENDING
Idaho	YES	BROADEN	YES	NO
Montana	YES	BROADEN	YES	YES
Nevada	YES	BROADEN	YES	NO
New Mexico	YES	BROADEN	YES	NO
N. Dakota	NO	--	--	--
Oklahoma	NO	--	--	--
S. Dakota	YES	BROADEN	YES	YES
Texas	YES	BROADEN	YES	YES
Utah	YES	BROADEN	YES	YES
Washington	YES	BROADEN	YES	YES
Wyoming	YES	BROADEN	YES	NO
Oregon	YES	BROADEN	YES	YES
Scores	87.5% (Yes)	92.8% (Broaden)	92.3% (of broadened agencies)	61.5% (of broadened agencies)
Hawaii	NO RESPONSE			

These responses are to the following questions:

*Has your mission statement been changed at any time during the past decade?

*Did the change broaden or narrow the scope of your department's responsibilities and functions?

*If your agency's responsibilities were broadened, were new transportation roles added?

*As part of the revision of your department's mission statement, were any new environmental, economic development, or community and regional planning roles explicitly added to your agency's tasks?

Table 13-Organizational Policy Initiatives, WASHTO States

STATE	"Innovator" or "Follower"?	Private Contracting?	Recent Public Information or Education Campaigns?	Recent Highway Safety Program?
Texas	I	YES	YES	YES
N. Dakota	F ¹	YES	YES	YES
Oklahoma	I	YES	YES	YES
Arizona	I	YES	YES	YES
Colorado	I	YES	YES	YES
Oregon	I	YES	YES	YES
S. Dakota	I	YES	YES	YES
Alaska	F	YES	YES	YES
New Mexico	F	YES	YES	YES
Utah	F	YES	YES	YES
California	I	YES	YES	NO
Idaho	F	YES	YES	YES
Nevada	F ²	YES	YES	YES
Washington	I	YES	NO	YES
Montana	F	YES	NO	NO
Wyoming	F	YES	NO	NO
Scores	I--50% F--50%	100%	81.3%	81.3%
Hawaii	NO RESPONSE			

¹The Minnesota DOT has adopted North Dakota DOT's reporting system for monitoring accidents.

²Nevada DOT reports that its roadside revegetation program has attracted interest from other states.

These responses were to the following questions:

*Compared to other state Departments of Transportation, do you consider your agency an "innovator" or "follower" in state transportation policy?

*Does your agency contract to private firms for road maintenance or for engineering or design services?

*Has your agency conducted any major public information/education campaigns since 1985?

*Has your agency initiated any new highway safety programs since 1985?

Table 14--Research and Development Initiatives, WASHTO States

STATE	Research Program?	Joint University Research?	Technology Transfer Procedures?
California	YES	YES	YES
New Mexico	YES	YES	YES
Arizona	YES	YES	YES
Colorado	YES	NO	NO
Idaho	YES	YES	NO
Nevada	YES	YES	NO
Oregon	YES	YES	NR
S. Dakota	YES	NO	YES
Texas	YES	YES	NO
Utah	YES	NO	YES
Washington	YES	YES	NO
Montana	YES	NO	NO
N. Dakota	YES	NO	NO
Oklahoma	YES	NO	NO
Wyoming	YES	NO	NO
Alaska	NO	NO	NO
%YES	94%	50%	31.3%
Hawaii	NO RESPONSE		

Table 15--State Fiscal Environment, WASHTO State Transportation Agencies		
STATE	New Revenue Methods?	Donor or Recipient State?
Alaska	YES	RECIPIENT
Arizona	YES	DONOR
California	YES	DONOR
Colorado	NO	RECIPIENT
Idaho	NO	RECIPIENT
Montana	NO	RECIPIENT
Nevada	YES	RECIPIENT
New Mexico	YES	RECIPIENT
North Dakota	NO	RECIPIENT
Oklahoma	YES	DONOR
Oregon	YES	DONOR
South Dakota	NO	RECIPIENT
Texas	YES	DONOR
Utah	YES	RECIPIENT
Washington	YES	RECIPIENT
Wyoming	NO	RECIPIENT
%YES	62.5%	--
Hawaii	NO RESPONSE	

The responses above were to the following questions:

*In light of the Federal Government's pre-emption of gasoline taxes as a continuing source of revenue for state transportation needs, is your agency contemplating new methods of raising revenue?

*Does your state contribute more to the Federal Government in highway fees/gasoline taxes, etc., than it receives back in Federal highway assistance?

Table 16--Summary of Responses, State Fiscal Environments, WASHTO States	
% WASHTO States Contemplating New Revenue Sources	62.5% (10 of 16)
% <u>Donor</u> States Contemplating New Revenue Sources	100% (5 of 5)
% <u>Recipient</u> States Contemplating New Revenue Sources	45% (5 of 11)

Table 17--Interstate and International Cooperation (Projects with Other Agencies), WASHTO States

STATE	Projects with Other State Transportation Agencies?	Projects with Mexican or Canadian Agencies?
Alaska	NO	YES
Arizona	YES	YES
California	YES	YES
Colorado	YES	NO BORDER
Idaho	NO	NO
Montana	YES	YES
Nevada	YES	NO BORDER
New Mexico	YES	YES
North Dakota	YES	YES
Oklahoma	YES	NO BORDER
Oregon	YES	NO BORDER
South Dakota	YES	NO BORDER
Texas	YES	YES
Utah	YES	NO BORDER
Washington	YES	YES
Wyoming	NO	NO BORDER
%YES	81.3%	88.8% (of border states)
Hawaii	NO RESPONSE	

These responses were to the following questions:

*Is your agency currently executing or planning any projects in cooperation with other state transportation agencies?

*If your state borders on Mexico or Canada, is your agency currently executing or planning any transportation projects in cooperation with the Mexican or Canadian governments?