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Analysis of the Port of Portland Facility Hinterlands

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Most of the United States port authorities delineate their hinterland by the use of freight rate schedules used by inland carriers. The hinterland is defined as that region having favorable rates to and from a port. The use of freight rate schedules can be applied to a) individual commodities or to b) all the commodities moving through a port. The freight rate method is built on the "rational man" concept. That is, a situation is assumed where there is "perfect knowledge" and a desire to minimize transportation costs. This assumption does not always coincide with reality.

This paper classifies commodities according to the facilities required to handle them. This is most relevant to port authorities who decide what special facilities may be needed. This classification is also highly relevant to the delineation of port hinterlands. If a port does not provide a given facility for loading and unloading, commodities requiring that type of facility for handling can not move through that port.

The delineation of "facility hinterlands" has two advantages. First, it more closely approximates reality than does the use of freight rates. Second, while it is more time consuming than using freight rates, it does not require expenditures of time and money as large as with the determination of individual commodity hinterlands. Facility hinterland delineation, thus, offers an alternative for port authorities.

The Port of Portland has four main groups of facilities for handling imports and exports: dry bulk, break-bulk, containerized cargo and liquid bulk. In addition, the Port of Portland has special import facilities for steel and automobiles, and special export facilities for grain and logs. The major source of data used to obtain the domestic origins and destinations, by tonnage, for each facility group was the _1973 Export and Import Domestic City Origin and Destination Report Quarterly Reports_.

The origins and destinations are, in most cases, warehousing and distribution points. Therefore, the hinterlands, as identified, are not necessarily ultimate origin and destination hinterlands, but rather they are hinterlands of transshipment points. A port city is a focal point, a gateway, for inbound and outbound cargo. It is expected, therefore, that Portland should have a larger warehousing sector in its economy, than cities which are not ports, which handles a great deal of cargo that does not originate in, nor is destined for, Portland.

In an attempt to ascertain the volume, by facility group, of cargo that actually originated in or was destined for Portland, a questionnaire was sent to the exporters and importers who handled cargo originating in or destined for Portland. The questionnaire was sent to all exporters and/or importers who handled 100 tons or more in any given quarter of 1973. The data from the responses to the questionnaires was combined with the original data to delineate the Port of Portland's hinterlands.

Edward Ullman's three-factor typology fits the flow of export goods from domestic origins, through the Port of Portland, to foreign destinations. Complementarity, transferability, and intervening opportunity, each represent factors making the northwest quadrant of the United States the Port of Portland's export hinterland.

Oregon, Washington, Idaho, Montana, and Wyoming make up the heart of this hinterland to varying degrees generally correlated to distance. The states bordering the hinterland tend to be less important than those in the hinterland, but more important than states even more distant. The three-factor typology, also, fits the flow of import goods from the Port of Portland to domestic destinations. The three factors combine to place the Port of Portland's import hinterland primarily in Oregon and Washington. However, complementarity provides a basis for an extended commodity flow in terms of distance and magnitudes for imports.

AN ANALYSIS OF THE PORT OF PORTLAND FACILITY HINTERLANDS

by

TIMOTHY D. WILSON

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INTRODUCTION

The purpose of this study is to identify the domestic facility hinterlands of the Port of Portland, Portland, Oregon. Chapter I provides some basic concepts of port and hinterland geography, and a definition of facility hinterlands. Chapter II presents a literature review of some contributions to hinterland research via theoretical location and interaction theory. Chapter III classifies the Port of Portland's cargo movement into facility groups, and identifies the domestic origins of exports and the domestic destinations of imports by those facility groups. The tonnage of cargo indicated in Chapter III is further analyzed in Chapter IV based on questionnaires sent to all exporters and importers in Portland who handled 100 tons or more in 1973. This further analysis is necessary to find the amount of cargo that passed through Portland as a transshipment point and did not actually originate in nor was destined for Portland. Chapter V combines the data from Chapter III and Chapter IV to identify the domestic import and export facility hinterlands of the Port of Portland.

A port's "... primary function is to transfer goods (and people) from ocean vessels to land or to inland carriers, and vice versa" (Weigend, p. 570). A port, then, is the place where land and maritime space meet. The relationships between a port and its hinterland are inseparable. "No port structure can be understood when not seen together with its hinterland" (Boerman, p. 6). It follows that a port's hinterland must be delineated and studied to understand that port's trade and development. An understanding of the spatial interrelationships between port and hinterland is necessary for the port administration and commercial interests to attain and maintain a successful port operation. "The port must find ways and means of providing services and facilities that will induce maritime interests and shippers in the hinterland to use it in preference to another port" (Weigend, p. 573). Inducements are necessary because a port is rarely an originator of cargo, rather cargo is generated in the port's hinterland.

Hinterland, as it is used here, is an economically organized and developed land space which is connected with a port by means of transport lines, and which receives or ships goods through that port. Hinterland boundaries are difficult to determine because they vary for different types of commodities, undergo periodic and seasonal variation, and consistently overlap other hinterlands at the periphery. Because of the variable character of hinterlands, "a port does not necessarily have exclusive claim to any part of its hinterland, and an inland area may be the hinterland of several ports" (Weigend, p. 578). It can generally be assumed, however, that the ties of a hinterland with one specific port become closer as the distance from the port decreases.

"Function, export or import, is the most important element in the classification of a hinterland" (Berkis, p. 73). Export and import do not, as used here, refer only to the foreign trade of the country in which the port is located. They refer to commodities arriving at the port, or moving out of the port, by sea regardless of national or international origin or destination.

The study of port geography has developed a theoretical hinterland concept. "The theoretical hinterland concept has three distinct stages: (1) the pure or primary hinterland, (2) the discontinuous hinterland, and (3) the secondary hinterland" (Berkis, p. 66). Regions with a basic internal economic structure and strong geographic controls usually are primary hinterlands. The transportation network in a primary hinterland has its focus on one main outlet for the region, and the region itself is isolated from any other outlet. A pure or primary hinterland is exemplified by the coastal ports of the Pacific Northwest (see Figure 1). The commodities that move through ports with primary hinterlands either originate in an area

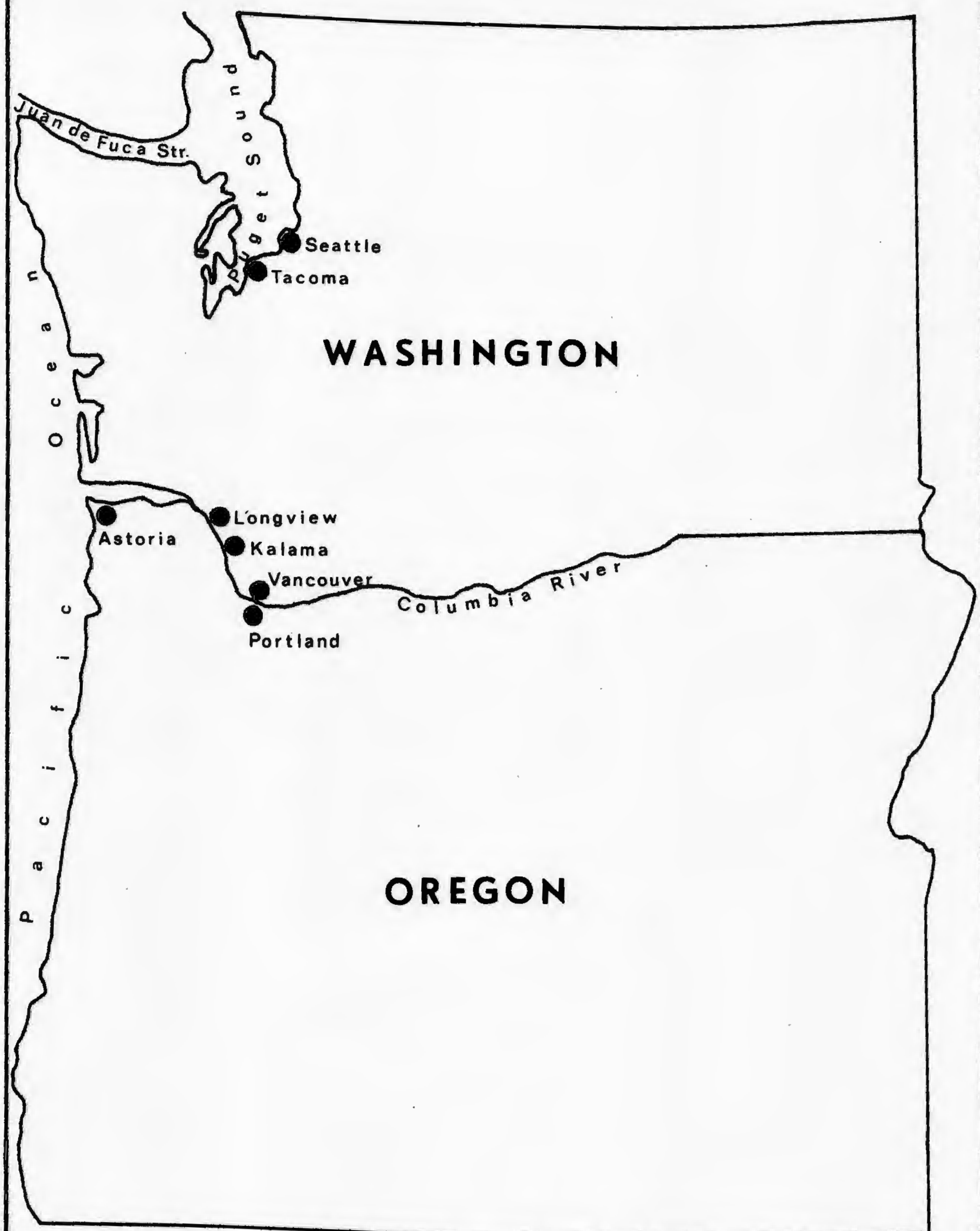

Figure 1. Selected ports of the Pacific Northwest.

in close proximity to the port facilities, or are destined for a close-in area (close proximity refers to distance in time and money costs).

"Identification of a discontinuous hinterland takes into consideration the fact that some regions are economically closely associated with a primary center, but that the intervening territory has no particular interest for the center" (Van Cleef, p. 309). In a discontinuous hinterland, the producing and consuming areas, each with their own respective primary hinterlands, are separated spatially due to physical features or the lack of a transportation system connecting them together. A Pacific Northwest example of a port with a discontinuous hinterland is Kalama, Washington, located in the lower Columbia River area. "Kalama, because of its trade concentration consisting of grain has only one commodity hinterland which is located in Eastern Washington, Eastern Oregon, Idaho and Montana" (Berkis, p. 69).

The secondary hinterland is the area of overlapping zones of influence in which several ports compete with each other (Morgan, 1958). Exporting and importing areas with equal transportation connections to more than one port constitute secondary hinterlands of those ports. If freight rates are equal to the ports involved, then shipment to or from any of the ports becomes a discretionary choice for the producers in the secondary hinterlands in that, as the distance from the port increases, competition with other ports increases. Seattle, Tacoma, Longview and Vancouver, Washington, and Portland, Oregon, are Pacific Northwest ports which have secondary hinterlands because "each of these ports has equal access and rates for any part of the Pacific Northwest region as well as the rest of the United States" (Berkis, p. 71).

A separate hinterland exists for each commodity exported or imported through a port. The commodities that make up the total cargo of a port are usually classified as bulk or general cargo. Bulk cargo moves unpacked in large quantities and can be rapidly transferred from one carrier to another with a minimum of handling if the appropriate machinery is available. General cargo comprises everything that is not carried in bulk and thus encompasses a multitude of commodities, packed or unpacked, which must be handled individually. The division between general cargo and bulk hinterlands is significant to port studies, and to port authorities. Bulk commodities are generally low value goods and cannot stand the value added in transportation, therefore, they will seek the nearest existing port. General cargoes usually are higher in value and are not as sensitive to transportation cost. The general cargo hinterland is, therefore, generally larger than is the bulk cargo hinterland where cost is the major variable.

Most of the United States port authorities delineate hinterlands by the use of freight rate schedules used by inland carriers. Regions having favorable rates to and from the port are defined as its hinterland. The use of freight rate schedules can be applied to individual commodities or to all the commodities moving through a port in aggregate; the results being many separate hinterlands or one generalized hinterland. This method is built on the "rational man" concept. That is, a situation is assumed where there is "perfect knowledge" and a desire to minimize transportation costs. This assumption does not always coincide with reality.

The separation of all commodities into imports and exports, and even into individual commodities, would result in a more meaningful and complete geographical analysis of port traffic than the use of freight rates. While freight rate hinterland delineation assumes a questionable reality, individual commodity hinterland delineation is costly and time consuming. Most port authorities are unwilling and/or unable to examine individual commodity hinterlands because of the expense involved.

Commodities moving through a port can be classified in any number of ways, i.e., individually, export, import, transport mode used, etc. The classification is a matter of choice based on an author's perception of relevance to his particular study. This paper classifies commodities according to the facilities required to handle them. This is most relevant to port authorities who are involved in making decisions that dictate the need (or lack of need) for specific facilities. This classification is also highly relevant to the delineation of port hinterlands. If a port does not provide a given facility for loading and unloading, commodities requiring that type of facility for handling cannot move through that port.

The delineation of "facility hinterlands" has two distinct advantages. First, it more closely approximates reality than does the use of freight rates because of the "perfect knowledge" assumption in the freight rate method. Second, while it is more time consuming than using freight rates in aggregation, it is not as costly and time consuming as investigating individual commodity hinterlands. Facility hinterland delineation, thus, offers a viable alternative for port authorities. The facility hinterland analysis in this paper is for the Port of Portland, Portland, Oregon. The methodology and underlying criteria, however, can be applied by any port authority.

CHAPTER II

THEORETICAL LOCATION AND INTERACTION THEORY

Most hinterland research has involved itself in theoretical location and interaction theory concerning areas of primary production. This chapter is a review of some of the major contributions made in this area of geographic research. The discussion below relates spatial-interaction and location processes to each other, and reviews location theories, spatial-interaction theories and flow analysis.

SPATIAL-INTERACTION AND LOCATION PROCESSES

Agricultural, industrial and tertiary-activity location processes are inseparable from spatial-interaction processes, or processes relating to a specific class of movement. Any total pattern of spatial interaction, regardless of whether it involves the shipment of commodities or the travel of humans, can be seen as an aggregate expression of individual movements between pairs of origins and destinations. It is this aggregate expression of movements that accounts for production location. The purely economic reasons for production location are the summation of all individual's perspectives on economies of scale, transport costs and agriculture's need for space (Valavanis, p. 69).

"The motive force which lies behind the determination of production location in agriculture is the same as that which lies behind the equilibrium of all economic forces--namely, the maximization of economic return" (Dunn, p. 266). There are two forms of equilibrium, objective and subjective. The criteria for the former is that equilibrium prices are determined by the condition that the demand for each commodity must equal its supply. Subjective equilibrium requires that all individuals and economic units in the economic society base their maximization of economic return upon equilibrium price. In other words, they regard prices as constant parameters independent of individual influence and production location depends on transport costs. It must be borne in mind that equilibrium is a theoretical concept. Equilibrium conditions in a theoretical system might imply a movement in the direction of equilibrium in reality. "But in a full historic sense, actual economic life never does realize a state of equilibrium" (Isard, 1956, p. ix).

LOCATION THEORIES

Johann Heinrich von Thünen is considered one of the founders of classical location theory. However, von Thünen's ideas do not constitute location theory. "They amount to a method of analysis which may be applied to any situation in any time or place, and von Thünen himself was at pains to make it clear that his particular findings had no claim to universality" (Chisholm, p. 34). The basic assumption underlying von Thünen's analysis is that the areal distribution of crops, livestock and types of farming depends upon competition between products and farming systems for the use of any particular plot of land. Also, "... for every farm there is an optimal combination of land uses, land-use intensities and market outlets, and every farmer is implicitly capable of determining this combination by virtue of his perfect knowledge (information) and ability to reason flawlessly ..." (Pred, 1967, p. 67). Therefore, on any specified piece of land, the enterprise which yields the highest net return will be the use on that land and competing enterprises will be relegated to other plots where they will yield the highest return. Von Thünen's two particular points of concern were "the monetary return over and above the monetary expenses incurred by different types of agriculture" (Chisholm, p. 34), and that such net returns pertain to a unit area of land and not to a unit of product.

Von Thünen concluded that since the controlling factor in the determination of land-use is land rent, those enterprises (land uses) which can afford the highest rent will locate closest around the urban area. The next highest use, in rent paying ability, will locate in a second ring outside the first, and so on. Von Thünen related transportation costs to the concentric ring model by generalizing "... that products whose transport costs are high relative to value will be produced closest to the market" (Dunn, p. 268). Thus, distance for von Thünen was economic distance, not merely physical distance; economic distance being the cost incurred over a given physical distance and not the mileage distance.

In von Thünen's illustration, there was but one city upon the plain. He did not consider the possibility of unusable land or land particularly suited to a lower order land use. Thus, where von Thünen's rings do exist in reality, they tend to be distorted bands rather than concentric circles (Isard, 1956, p. 276). The distortion is a reflection of the variables mentioned above and the impact of lower transport rates along major transport routes. "In his initial formulation, von Thünen assumed that the cost of transport was proportional to distance" (Chisholm, p. 39). Von Thünen did examine the situation which arises when a more economical transport system is introduced, i.e., navigable river or canal, in later formulations.

Edgar Dunn agrees with von Thünen that the form of land-use which provides the greatest return will make the highest bid for the land and hence displace all others. However, according to Dunn, the land-use closest to the market may not be the highest yielder. Products with a high market price and transport rate might occupy the favored market position even though their yield in terms of transport units (pounds, barrels, tons, etc.) was less than some other product. Assuming, then, that transport rates are identical so that transport costs are proportional to weight and volume, it does not follow that the product for which the transport cost form the biggest percentage of value will be located closest to the market.

In dealing with hypothetical production units, Dunn concerned himself with maximizing rent and not profits. With this in mind, he formulated the distance-rent function:

$$R=E(p-a)-Efk$$

Where R = rent per unit of land
k = distance
E = yield per unit of land
p = market price per unit of commodity
a = production cost per unit of commodity
f = transport rate per unit of distance of each commodity

This formula clearly expresses as a function of distance the additions to total land rent made by each new unit of the land devoted to the cultivation of a single commodity as the distance from the market is increased. The assumptions behind the above formula are threefold. First, it is assumed that perfect mobility and divisibility of all factors other than land is present. Second, the yield per unit of land is assumed to be the same everywhere. Third, the assumption is made that the supply of factors is adequate for all production and is available at constant prices. Given the marginal rent function R = E (p-a)-Efk and the assumptions outlined above, "... it becomes plain that the formula describes a linear functional relationship between the two variables, distance and rent" (Dunn, p. 266).

Weber's classical theory of industrial location revolves around transport cost minimization (1929). Manufacture at any other location away from the point of destination will involve an increase in total transportation costs for raw and finished materials. In an attempt to explain reality more closely, Weber also dealt with the idea of weight-losing materials. These are raw materials which experience higher transport costs to the production point than those of the finished product that leaves that point due to weight-loss in manufacture. Raw materials can never bind production to the place where those materials draw industries toward the sources of production. In a situation of a single market and two weight-losing materials located at different points, the place of production will be found within a triangle the lines of which connect the market and the material sources.

August Lösch (1954) and Walter Christaller (1966) also made contributions to location and spatial interaction theories. In Christaller's central place theory, distance plays a vital role in the determination of hinterland regions, especially distance measured in time and cost (economic distance).

Lösch's theory deals with price funnels and crop gradients. The price funnel and crop gradient concept states that the demand for a commodity is a direct function of the price at the production point, and an inverse function of the transport costs required to carry the commodity over space. Industry selling to widely dispersed customers is characterized by price funnels. Conversely, agriculture selling to a city is characterized by crop gradients. Lösch's crop gradients represent the continuous counterpart of von Thünen's rings.

Lösch's market area networks and Christaller's central place theory are based on one major assumption that says consumers procure goods and services from the nearest source (in terms of economic distance) that provides the required good or service. Pred (1967, p. 113) points out two exceptions to this major assumption. First, the consumer may travel to a relatively distant center of the same order if sales-price savings exceed additional transportation costs. This can easily be translated into producers of goods (consumers) seeking service (port facilities) for their goods. Second, the consumer may simultaneously obtain both low and high order goods from a high order center which is more distant than the closest low order center. A producer of goods may seek services at a more distant port than the closest one because the former offers a greater variety of service facilities.

Various agricultural, industrial and central place theorists have stated or inferred that economic units behave differently. Most frequently the different behavior has been expressed in one of three categories; sometimes in terms of profit maximization (Lösch), sometimes in terms of cost minimization (Weber), and occasionally in terms of the individual's maximization of his space use (central place theory and journey to consume). It was not until 1922, when Theodor Brinkmann considered both the personal qualities of the agricultural entrepreneur as a factor of [production] intensity and the influence of the farmer's personal qualities upon the location of production (Pred, 1967), that behavioral variables were formally introduced in location theory. All previous and most subsequent location theory, to Brinkmann, involved a fundamental behavioral implication that the location and/or land-use composition of all economic units can best be analyzed theoretically by assuming that the individuals making up the economic units involved act in an unerring and totally rational way. Brinkmann recognized the possibility (or probability) of judgement errors by the individuals and the unlikeliness of any individual having perfect knowledge.

SPATIAL-INTERACTION THEORIES

The gravity model, or so-called interactance hypothesis, used by geographers to explain spatial interaction, does not totally achieve this goal. The premise of the basic gravity model maintains that spatial interaction of any kind between pairs of places or points is a positive function of their populations (mass) and inversely proportionate to intervening distance between the pairs. This is expressed symbolically below:

$$I_{ij}=\frac{P_i P_j}{D_{ij}}$$

Where I_{ij} = the interaction between place i and place j
P_i = the population (mass) at place i
P_j = the population (mass) at place j
D_{ij} = the distance between place i and place j

The major fault in the basic gravity model is that it does not admit that places can be (and most often are) influenced simultaneously by more than one other point in an interacting system. The potential model is an expansion of the basic gravity model as it allows the estimation of interaction among a set of places. However, to use a potential model in port hinterland analysis would require data for all ports included in the analysis.

Another model of spatial interaction was proposed by E.L. Ullman. In his classic description of an intranation commodity flow, Ullman (1957) attempted to delineate the pattern of spatial connections in the American economy. Ullman believed "... that he had found a logical response to geography and distance, from which he postulated his three-factor typology of spatial interaction: complementarity, intervening opportunity, and transferability" (Smith, p. 130). Areal differentiation is the cause of interaction or circulation, but differentiation itself does not produce interchange. There are many areas in the world that have no connection with each other. Ullman felt that in order for two areas to interact, there must be a demand in one and supply in the other (complementarity). However, complementarity generates interaction between two areas only if no intervening source of supply is available. Transferability, or distance, is measured in terms of transfer and time costs. "If the distance between market and supply is too great and too costly to overcome, interaction will not take place in spite of perfect complementarity and lack of intervening opportunity" (Ullman, 1966, p. 868). Ullman concluded that the real world movement of people and commodities between points or areas can be explained by the interplay between complementarity, intervening opportunity, and transferability. Ullman would have us believe that movement can be expected to be to the nearest market (this follows from the intervening opportunity concept) and that opportunities occurring outside of a circle whose diameter stretches from A to B would have absolutely no effect on spatial interaction between those two points or areas.

Transportation is the key to differentiation and interaction. "Organized transportation is a geographical factor -- an influence on the location of other economic activities; for without means of transport there would be no commercial coal mining, no production of surplus wheat, no commercial lumbering" (Alexander, p. 465). In fact, without a commercial transportation system the world's economy would become no more than subsistence economy, and regional specialization, which yields exchangeable surpluses, would be impossible. Transportation networks are made up of three fundamental elements: (1) origins, (2) routes, and (3) destinations. These man-made features are essential elements in geographic location and spatial interaction. However, the cost of using a transportation network is often as great an element in its importance as its actual presence. The variation in transportation cost is a geographical factor which influences the circulation of people and goods in a region. Also, this variation is a geographic element which can express the very characteristics of a region. The realization of this fact has led some port authorities to use freight rate schedules to delineate their general hinterlands. While these methods only superficially define the areal extent of the port's hinterland, they are valuable to the port authorities because the spatial delineation of a rate advantage hinterland provides a boundary for an area which a port can seek to develop.

Geographers seldom consider the effects of freight rate schedules. "... the very absence of recognition of freight rate analysis in geographic studies supports the conclusion that geographers are rather uniformed on spatial variations in such costs" (Alexander, Brown and Dahlberg, p. 553). Studies that considered the role of transport costs generally assume, due to a lack of evidence otherwise, that freight rate structures form concentric circles about transportation nodes. The lack of freight rate research has fostered two major misconceptions concerning freight rates: (1) freight rates assessed by the same form of transport increase, from any given point, equally in all directions, (2) freight rates always increase with distance (Alexander, Brown and Dahlberg, 1967). Freight rates are like tariffs; they are to regions and to urban centers what tariffs are to nations. Freight rates may be manipulated, as with tariffs, to the advantage or disadvantage of any given urban center or region.

FLOW ANALYSIS

Another method used for analyzing spatial interaction is flow analysis. "Flow" is the volume and direction of all movement of goods, people, and/or information. Thus, flows, and the interaction involved, are prime targets for geographical investigations from the diffusion of innovations to the movement of consumers and goods. Flow and movement are continuous phenomena, but in investigations are almost always considered to be static and discrete. Thus, "taking the existence of routes and stocks as given, we are now concerned with accounting for the volume of traffic that flows over different routes or through different nodes" (Smith, p. 130).

Many factors influence flows in general. In the case of foreign trade cargoes through ports there are two major classes of factors which influence the flow; exogenous, the most important, and endogenous (Sun, p. 156). The exogenous factors are regional, national and international in character and, therefore, mostly beyond an individual port's influence. These factors determine the magnitude of foreign trade cargoes. Endogenous factors are related to the ability of a port to perform its function of managing the transfer of goods. It is the endogenous factors that this thesis is going to analyze.

Most flow analyses involve considerations of demand (complementarity) and distance (friction) in an attempt to establish "yardstick flows." Yardstick flows are established when "the observed flows are arrayed against 'predicted' flows over the relative magnitude of the actual flows" (Smith, p. 133). The use of the distance variable as a predictor of commodity flow has been shown to provide reliable results. Using data on a total tonnage of commodities moving over various distances, by 25-mile and 100 mile zones, Isard found that the impact of the distance variable, whether measured as miles or "economic" distance, is always present (Isard, 1956). It can be expected, however, that the significance of distance differs for various commodities. Certain flows, such as those of cement, are extremely sensitive to the distance variable while others, such as those of transistor radios and television sets are insensitive.

There have been many different methods used in commodity flow analysis. Inter-regional flow studies generally examine the precise distance and route characteristics of flows. In this type of analysis the terminals are central points within each producing and consuming area, and the volume of movement between origins and destinations are known. A variation involves studying inter-nodal flow. In this situation the terminals are specific urban centers or other transport terminals, and the routes and distances between nodes are known.

At the simplest level a variety of ratios and indices have been employed in the study of the volume of flows. An examination of the ratio of actual traffic at a center or along a route to the total available traffic in the hinterland results in the "traffic-capture" ratio. Other methods looks at the ratio of weight from a given origin to weight from all origins. Various ratios between terminating, originating, and highway bridge traffic over certain segments of a transportation network have also been used. All of these techniques are essentially descriptive, but they can be used as points of departure for further study.

Another investigative method involves the structure of flows rather than the flows themselves. Flow structure analysis considers the identification of generic locational characteristics of groups of origins, or of groups of destinations, or of groups of origins and destinations. "This type of analysis rests on the proposition that these clusters are not readily apparent from inspection of a pattern of commodity flow such as the flow matrix" (Smith, p. 139).

A few methods predict total flow on the basis of a hypothetical even share of that flow at all destinations, on national compared with regional shares (location quotients), on the traffic volumes at earlier times (shift techniques), or finally on the total amount received by each destination (transportation flows) (Smith, p. 137). Commodity flows through ports have been investigated using the relative shift technique where traffic volumes at time t + 1 are projected on the basis of the time t share. The problems involved with this technique are that it does not account for changes in shares and absolute gains may still constitute a relative loss. Location quotients, while not predictors themselves, are of considerable use as starting points in the prediction of flows (Isard, 1960, p. 123). Symbolically, transaction flow analysis states:

$$RA_{ij} = \frac{A_{ij} - E_{ij}}{E_{ij}}$$

Where RA_{ij} = relative acceptance from origin i to destination j
A_{ij} = actual transaction (flow) from origin i to destination j
E_{ij} = expected transaction (flow) from i to j

The calculation of expected flows is based on the assumptions of origin/destination independence and that flow from i to j reflects to total flow to j. Thus, in a data matrix with 1 to n columns (destinations) and 1 to m rows (origins), if the sum of column 3 was 10 percent of the sum of all column totals, this model would argue that origins 1, 2, 3, ..., m should ship 10 percent of their respective row totals to destination 3. Whether or not this method is valid depends on the fit with reality. Another "... issue concerns the interpretation of the size of the relative acceptance measures, and their departure (+ or -) from zero: how large must an index be to indicate salience?" (Smith, p. 134).

Simple linear correlation and regression analysis has been used frequently in the analysis of commodity flows, especially in situation involving one origin and many destinations, or vice versa. A form of gravity model has also been used in commodity flow analysis. In his study of Durban's hinterland, Shaffer (1965) did not explicitly draw on the gravity model, but his model for predicting traffic from (or to) a port to (or from) hinterland points resembles a multiple regression form of a gravity model (Shaffer, 1965). "In correlation-regression and gravity-potential methods of predicting volume flows, the level of explanation from distance (friction) and population (attractive mass) is high" (Smith, p. 137).

Investigation into the efficiency of flows is concerned with descriptive and normative characteristics of the routing of commodity flow patterns. Efficiency usually implies the minimizing of distance, or transportation costs. The efficiency criterion can involve the maximization of some quantity such as the flow over a given route or through a specified terminal. Smith argues that: "The formal technique most useful in the study of the efficiency of a commodity flow pattern is the linear programming transportation model" (Smith, p. 137).

In spite of the extensive work completed in the field of spatial interaction, no "best" theory has been forthcoming. Due to the complex nature of flow phenomena, it is not surprising "... that no single theory or concept has emerged which satisfactorily covers the real-world aspects of all spatial interaction" (Pred, 1967, p. 111). The reasons for this may lie in the common base found in most location and spatial interaction theories.

"In common with the economic man of other forms of economic theory, the locational decision-maker of traditional location theory inferentially has a single profit or cost or space utility goal, omniscient powers of preception, reasoning and computation, and is blessed with perfect predictive abilities" (Pred, 1967, p. 6). The criticisms of this "economic man" theory fall into three main groups. First, some dispute the logical consistency of the assumptions in this theory. The theory demands that action optimal for one economic unit depends on the actions of other units, and, it requires every unit to outguess all other units without being outguessed by them. Also, the theory implies a static market and population situation which is in fact dynamic over geographic space. Second, there are those who question the motives ascribed to economic man. An entrepreneur may only want a return that he considers satisfactory on his investment, or he may seek to optimize market share rather than profits. Third, some authors reject the knowledge level and mental acumen attributed to economic man. These three points are dismissed in general for their unwarranted departure from reality, and in particular because information is something that must be obtained rather than something that is given.

While these criticisms are powerful enough to quell universal acceptance of any one location and spatial interaction theory, they have not stopped the ongoing investigation and research in this field. Each new theory delving into the dynamic nature of applicable variables adds new knowledge in the quest for a "handle" on reality. It is probable that no "absolute" answer is attainable given the dynamic nature of the applicable variables over time and geographic space. However, continual development of theoretical approaches without consideration of pertinent practical data, as these data become available, is a problem. This can lead to building theory upon theory without injecting new data concerning reality into the "theory building system".

CHAPTER III

THE PORT OF PORTLAND'S CARGO MOVEMENT CLASSIFIED INTO FACILITY GROUPS

The present task is to delineate the spatial extent of the major import and export facility hinterlands of the Port of Portland. The data utilized was for the calendar year 1973. The use of a full year smooths seasonal variation. Commodity volumes, origins and destinations vary over time and space. Using the latest full year established the contemporary facility hinterlands which may vary somewhat from year to year but should nevertheless provide a useful depiction.

The commodities that make up the total cargo of the Port of Portland are classified as bulk or general cargo. Bulk cargo moves unpacked in large quantities and, given the proper machinery, can be rapidly transfered from one carrier to another. Bulk cargo at the Port of Portland is further classified into liquid bulk, e.g., molasses, and dry bulk, e.g., flour, with special facilities to handle each type of movement. General cargo is everything, packed or unpacked, that is not carried in bulk. A further classification of general cargo is breakbulk and containerized cargo. Containerized cargo is general cargo moved in containers from origin to destination or, loaded in containers at dock side for shipment. Breakbulk cargo is the remainder of the general cargo. Special terminal facilities are provided at the Port of Portland for handling containerized and breakbulk cargo. The four main groups of facilities, dry bulk, breakbulk, container and liquid bulk, are designed to handle both imports and exports. In addition, the Port of Portland has special import facilities for steel and automobiles, and special export facilities for grain and logs. All of the Port of Portland facilities are assembled at four operating terminals (see Figure 2); Terminal 1, Terminal 2, Terminal 4, and Terminal 6. Terminal 6 does not pertain to this study because it was not operating in 1973.

A complete list of the import and export commodities handled at the Port of Portland in 1973 is provided in Appendix A. These commodities were grouped into the following facility classifications for the present task:

EXPORT

Facility Classification	Commodity
Grain	Wheat and Barley
Liquid Bulk	Tallow, Tall Oil and Molasses
Dry Bulk	All other commodities exported in bulk
Containerized	All commodities exported in containers
Logs	Logs
Breakbulk*	All commodities exported in breakbulk, except logs

* Excluding the noted exceptions above, breakbulk cargo includes everything not shipped in bulk or containers.

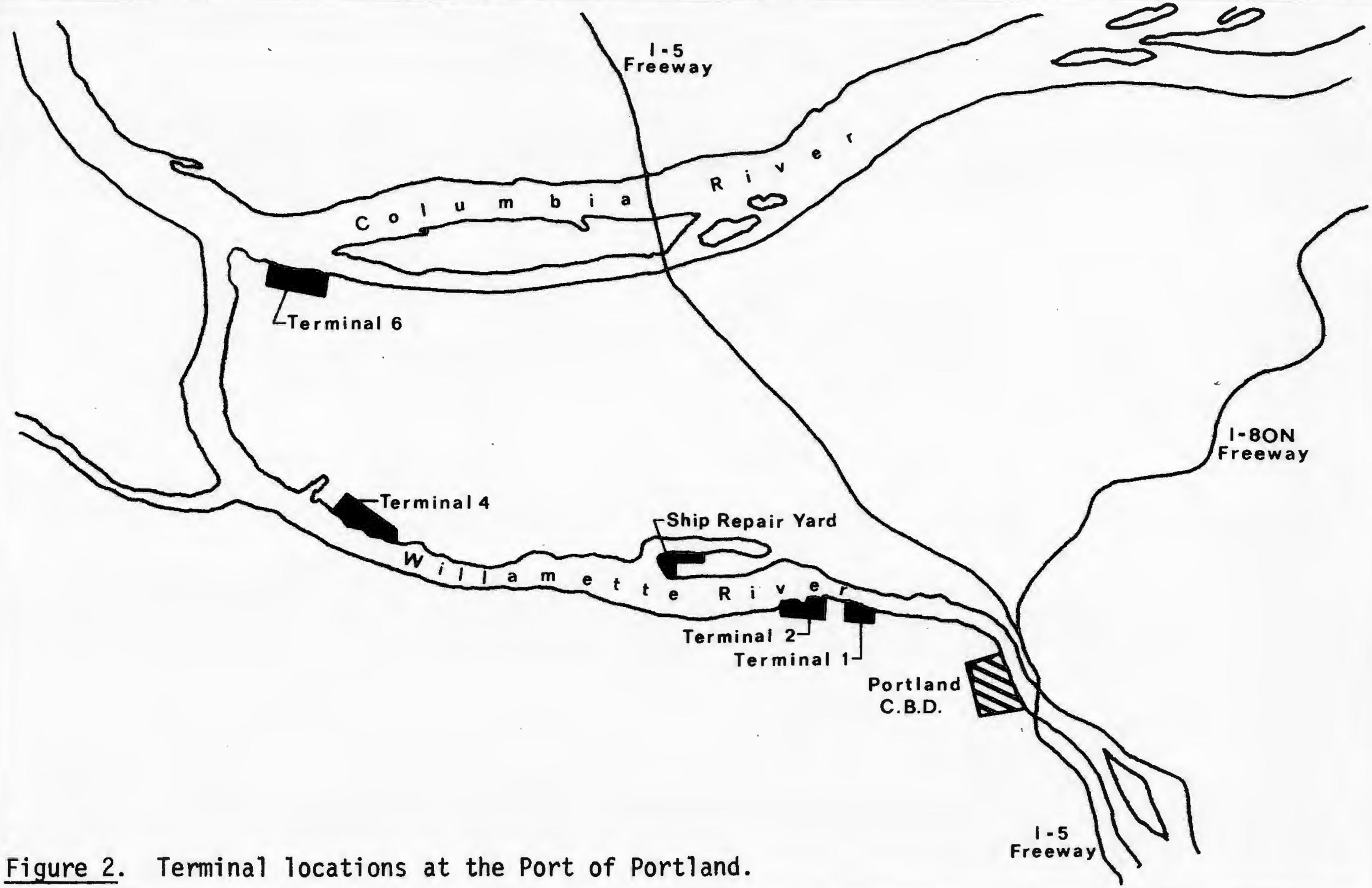

Figure 2. Terminal locations at the Port of Portland.

IMPORT

Facility Classification	Commodity
Bulk	All commodities imported in bulk
Containerized	All commodities imported in containers
Automobiles	New and used automobiles
Steel	Iron bars, iron sheets, steel flats and bars, steel beams, anglers and channels, steel coils, steel pipe and tubing, steel sheet and plate, and steel not elsewhere classified
Breakbulk*	All commodities imported in breakbulk except steel and automobiles as listed above

The classification above has two basic criteria. First, as mentioned before, the Port of Portland has special handling facilities for these particular categories. Second, the handling facilities and the above groups coincide with actual cargo movement, i.e., steel and automobiles are not exported, and logs and grain are not imported. Liquid bulk was deleted from the import facility group because no commodity was imported in liquid form through Port of Portland facilities.

The major data source used was the Port of Portland's <u>1973 Export and Import Domestic City Origin and Destination Report Quarterly Reports</u>. These data are compiled from individual dock receipts and bills of lading. While this source has the most complete data available, it does have certain shortcomings. Despite continual double checking, human error persists in most massive data collections.

* Excluding the noted exceptions above, breakbulk cargo includes everything not shipped in bulk or containers.

Inaccuracies can enter this report through mis-coded commodities, inaccurate weight statements, inability to read handwriting, and the placing of commodities into the wrong classification. Sharon Froberg, Port of Portland Research Technician, was responsible for the collection of the base data for the last three quarters of 1973. Ms. Froberg, in an interview, indicated that the data had an accuracy level of 80 to 90 percent. In large part, the possible errors involving individual commodities were minimized through the grouping of the data into facility groups.

An additional problem in the data source concerns identification of the actual origins and destinations of export and import cargo from the data. The origins and destinations as identified by the dock receipts and bills of lading are, in most cases, warehousing and distribution points. A port city is a focal point, a gateway, for inbound and outbound cargo. It is to be expected that Portland should have a larger than usual warehousing sector in its economy which handles a great deal of cargo that does not originate in, nor is destined for Portland. The data source, then, will over emphasize Portland as an origin and destination point for Port of Portland cargo. In order to delineate the facility hinterlands of the Port of Portland, the tonnage of cargo that is actually destined for or originates in Portland must be separated from the cargo which is just warehoused in Portland in transit.

The analysis that follows breaks down the origins and destinations of the Port of Portland cargo as identified in the base data source. The tonnage indicated as originating in or destined for Portland will be extracted in Chapter IV. A sample will be taken from this tonnage in order to identify where it actually originated at or was destined for. The sample results will then be combined with the remaining origin and destination data in the current analysis to identify the Port of Portland facility hinterlands in Chapter V.

EXPORTS

The facility group breakdown of 1973 exports from Port of Portland facilities is shown in Table I. As indicated by Table I, 59.56% of exports consisted of grain.

TABLE I

1973 EXPORTS FROM
PORT OF PORTLAND FACILITIES

Facility Group	Short Tons	Percent
Liquid Bulk	23,262.85	0.83
Grain (wheat and barley)	1,666,630.46	59.56
Dry Bulk	176,860.40	6.32
Containerized	288,171.94	10.30
Logs	264,525.96	9.45
Breakbulk	378,935.00	13.54
Total	2,798,386.61	100.00

The other bulks, liquid bulk and dry bulk, were 0.83% and 6.32%, respectively. The total bulk export movement amounted to 66.71% of all exports. Grain accounted for 89.28% of the bulk export movement tonnage making it the predominant bulk facility group. Containerized, logs and breakbulk movement were 10.30%, 9.45% and 13.54% respectively, of total export movement. The later three facility groups make up the general cargo exports. General cargo export movement was 33.29% of total exports. Containerized cargo, logs and breakbulk cargo represent 30.94%, 28.39% and 40.67% respectively, of general cargo. Because containerized and breakbulk movement consists of various commodities, logs are the dominant single general cargo export. The origin of the predominant (grain and logs) as well as the lesser commodities that move through Port of Portland facilities, is of prime importance to marketing efforts for two major reasons: first, so that current widely dispersed areas can be identified, and second, so that widely dispersed areas that are weak can be strengthened through increased marketing efforts.

The city of origin breakdown for exports, by facilities, is shown in Appendix B.

Liquid Bulk

The origin of liquid bulk cargo by state, is shown in Table II. Portland dominated as origin for 85.71% of total exported liquid bulk and 98.16% of Oregon's tonnage, which was the major state of origin. Eastern Washington provided 7.07% of the liquid bulk exports, with Pasco as the origin of 92.86% of the Washington tonnage.

TABLE II

THE STATE ORIGINS OF 1973
LIQUID BULK EXPORTS FROM
PORT OF PORTLAND FACILITIES

State	Short Tons	Percent
Montana	174.39	0.75
Oregon	20,313.88	87.32
Washington	1,643.50	7.07
Unknown	1,131.08	4.86
Total	23,262.85	100.00

Oregon and Washington together provided 94.38% of the liquid bulk exports from the Port of Portland. Liquid bulk provides an example of a primary hinterland. Eastern Washington and Oregon are geographically close to Port of Portland facilities and have good transportation linkage via highway, rail and water.

Grain

There were only two states of origin for grain. They were Oregon and Washington as shown in Table III.

TABLE III

THE STATE ORIGINS OF 1973
GRAIN EXPORTS FROM PORT OF PORTLAND FACILITIES

State	Short Tons	Percent
Oregon	1,644,967.07	98.70
Washington	11.55	0.00
Unknown	21,651.84	1.30
Total	1,666,630.46	100.00

Portland was the only city of origin in Oregon. It therefore represented 98.70% of the grain exported from the Port of Portland in 1973. While Kalama was the only Washington city, it provided no representative percentages. Since grain is not grown in these cities, this is an example of the direct origin of commodities shipped being transshipment points rather than production origins.

Dry Bulk

The state origins for dry bulk are shown in Table IV. Like the previous export groups, Portland was the dominant city of origin with 39.11% of total dry bulk exports. Unlike the previous export groups, however, dry bulk had a second major city of origin in 1973, Lovell, Wyoming, with 23.30% of total dry bulk exports.

Alder, Montana, and Pocatello, Idaho, with 8.39% and 9.52%, respectively, of total dry bulk exports, represented 100.00% of their state totals.

TABLE IV

THE STATE ORIGINS OF 1973
DRY BULK EXPORTS FROM
PORT OF PORTLAND FACILITIES

State	Short Tons	Percent
Idaho	16,844.26	9.52
Montana	14,838.05	8.39
Oregon	89,884.60	50.82
Washington	5,013.16	2.84
Wyoming	50,280.33	28.43
Total	176,860.40	100.00

Portland origins represented 76.95% of all Oregon origins. Oregon was the primary state of origin with Wyoming in second place. Idaho, lying between these two leading states, was less significant. This can be viewed as a spatially discontinuous hinterland (Wyoming) combined with a primary hinterland (Oregon).

Containerized

Table V indicates the state origins for 1973 containerized exports. In order of magnitude, the three highest states of origin were Oregon, Washington and Idaho with 69.68%, 18.09% and 3.11%, respectively. The remaining twenty-three origin states represented less than 1% each of containerized exports from the Port of Portland. Portland was the dominant city of origin with 37.05% of total containerized exports, and 53.16% of Oregon's total. Vancouver, Washington accounted for 12.44% of total containerized exports, and 68.74% of the Washington total.

TABLE V

THE STATE ORIGINS OF 1973
CONTAINERIZED EXPORTS FROM
PORT OF PORTLAND FACILITIES

State	Short Tons	Percent
Alabama	2.45	0.00
Arizona	447.49	0.16
Arkansas	487.74	0.17
California	112.45	0.04
Canada	80.27	0.03
Idaho	8,965.27	3.11

Illinois	25.99	0.01
Indiana	5.50	0.00
Iowa	40.03	0.01
Michigan	3.77	0.00
Minnesota	24.25	0.01
Montana	567.50	0.20
Nebraska	116.64	0.04
New Hampshire	507.50	0.18
New Jersey	20.86	0.01
Nevada	68.81	0.02
Oregon	200,818.06	69.68
Pennsylvania	33.12	0.01
Tennessee	159.89	0.06
Texas	175.47	0.06
Utah	137.54	0.05
Virginia	124.92	0.04
Washington	52,132.94	18.09
Washington, D.C.	15.50	0.01
Wisconsin	38.18	0.01
Wyoming	1,201.67	0.42
Unknown	21,858.13	7.58
Total	288,171.94	100.00

The major Idaho city of origin was Twin Falls with 21.55% of the state total. However, Twin Falls accounted for only 0.67% of the total containerized exports. The spatial distribution, by magnitude, of origins indicates two hinterlands; primary and secondary. The primary hinterland is centered around Portland, and diminishes with distance eastward to Idaho. The remaining origins indicate that, while the Port of Portland gets some containerized exports from these areas, it is in competition with other ports for containerized cargo exported from these other ports.

<u>Logs</u>

There were only two states of origin for logs. This is indicated in Table VI.

TABLE VI

THE STATE ORIGINS OF 1973
LOG EXPORTS FROM PORT OF PORTLAND FACILITIES

State	Short Tons	Percent
Oregon	230,409.45	87.10
Washington	5,493.49	2.08
Unknown	28,623.02	10.82
Total	264,525.96	100.00

Vancouver, Washington accounted for 93.86% of its state's total and 1.95% of total log exports. Portland dominated all Oregon origins with 76.74% of the state, and 66.84% of total log exports. The log hinterland appears to be a very compact primary hinterland.

Breakbulk

The distribution of state origins for breakbulk is shown in Table VII. Breakbulk displayed the most extensive spatial distribution among the exports.

However, the hinterland appears to be of a primary nature, decreasing in magnitude with distance. Oregon provided 77.41% of the breakbulk exports, and Portland dominated Oregon city origins with 17.35%. Portland also was the major city for total breakbulk exports with 13.43%. Washington was the second highest breakbulk originating state with 15.20%. Vancouver was the largest origin city in Washington with 13.81%. As distance increases and ease of accessability decreases from Port of Portland facilities, the percentage of breakbulk provided decreased. After Oregon and Washington follow, Idaho, Wyoming, Utah, Montana, and California with 2.20%, 1.71%, 0.77%, 0.45%, and 0.23%, respectively. Wyoming's major city of origin was Cody with 92.18% of the state's total. Montana, Utah and California indicated a lesser degree of centralization. Their major cities were Three Forks, Montana, with 59.35%, Ironton, Utah, with 52.75%, and Weed, California, with 49.42%. Idaho displayed the least centralization with only 15.63% of its breakbulk exports originating in one city, Troy. All of the remaining states provided the origin for less than 225 short tons each, or 0.06% of total breakbulk exports.

TABLE VII

THE STATE ORIGINS OF 1973 BREAKBULK EXPORTS FROM PORT OF PORTLAND FACILITIES

State	Short Tons	Percent
Arizona	3.93	0.00
Arkansas	46.21	0.01
California	868.26	0.23
Canada	133.99	0.04
Connecticut	1.32	0.00
Idaho	8,349.45	2.20
Illinois	140.48	0.04
Iowa	20.98	0.01
Louisiana	1.50	0.00
Maine	0.02	0.00
Michigan	29.77	0.01
Minnesota	11.27	0.00
Mississippi	46.21	0.01
Montana	1,705.81	0.45
Missouri	0.26	0.00

New Hampshire	161.98	0.04
New Jersey	10.31	0.00
Nevada	221.62	0.06
Ohio	2.25	0.00
Oregon	293,328.25	77.41
Pennsylvania	198.93	0.05
South Dakota	185.50	0.05
Texas	128.65	0.03
Utah	2,930.69	0.77
Washington	57,609,77	15.20
Wisconsin	4.70	0.00
Wyoming	6,461.04	1.71
Unknown	6,331.85	1.67
Total	378,935.00	99.99*

IMPORTS

The five facility group breakdown of 1973 imports from Port of Portland facilities is shown in Table VIII. Unlike exports, there is no markedly dominant facility group for imports. Steel, bulk and breakbulk are the top three with 42.32%, 29.24% and 13.93%, respectively. Containerized cargo and automobiles are less important with 9.05% and 5.46%, respectively.

With bulk as the exception, all the import facility groups combine to comprise general cargo. General cargo, therefore, represents 70.76% of the Port of Portland's imports. The predominant general cargo commodity is steel. However, this may be due to weight factors rather than volume factors.

The city of destination breakdown for import facilities is in Appendix C.

* Total does not add to 100% due to rounding.

TABLE VIII

1973 IMPORTS THROUGH
PORT OF PORTLAND FACILITIES

Facility Group	Short Tons	Percent
Bulk	195,853.51	29.24
Containerized	60,648.67	9.05
Steel	283,469.68	42.32
Automobiles	36,586.18	5.46
Breakbulk	93,270.60	13.93
Total	669,828.69	100.00

Bulk

The state of Oregon was the destination for 99.34% of bulk imports through Port of Portland facilities. This is shown in Table IX. The only other state that received imported bulk was Washington.

TABLE IX

THE STATE OF DESTINATION OF 1973
BULK IMPORTS THROUGH
PORT OF PORTLAND FACILITIES

State	Short Tons	Percent
Oregon	194,560.20	99.34
Washington	816.26	0.42
Unknown	477.05	0.24
Total	195,853.51	100.00

Portland was the recipient of 100.00% of Oregon's total and Tacoma received 99.93% of Washington's. Due to the high percentage shown by Portland, one could generalize that the import bulk hinterland does not extend beyond the local area surrounding the Port of Portland facilities, Tacoma aside.

Containerized

The state destinations for containerized cargo are shown in Table X. Oregon, Washington and Illinois are the highest states with 74.27%, 16.45% and 5.02%, respectively.

TABLE X

THE STATE OF DESTINATION OF 1973 CONTAINERIZED IMPORTS THROUGH PORT OF PORTLAND FACILITIES

State	Short Tons	Percent
Alaska	43.56	0.07
California	124.27	0.21
Canada	44.29	0.07
Idaho	290.42	0.48
Illinois	3,042.94	5.02
Iowa	3.56	0.01
Kansas	13.69	0.02
Michigan	222.32	0.37
Minnesota	14.43	0.02
Montana	79.80	0.13
Nevada	2.21	0.00
New Jersey	60.33	0.10
New York	245.51	0.41
Ohio	78.99	0.13
Oregon	45,041.45	74.27
Pennsylvania	3.40	0.01
Tennessee	9.11	0.02
Texas	272.85	0.45
Utah	50.93	0.08
Washington	9,977.76	16.45
Wisconsin	63.86	0.11
Wyoming	12.41	0.02
Unknown	950.58	1.57
Total	60,648.67	100.02*

* Total does not add to 100% due to rounding.

Portland is the highest destination city with 58.30% of total containerized imports and 78.50% of Oregon's containerized imports.

The dominant Washington destination city was Longview with 56.35% of that state's total. Illinois was a unique case. The dominant destination city in Illinois is South Holland with 61.98% of the state total. The Port of Portland owns its own warehouse in South Holland, Illinois, and sends import cargo bound for the Midwest and East to that warehouse for transshipment. Allowing for this discrepancy, the containerized hinterland appears to be predominantly a primary one around Portland and Longview. The remaining destination points indicate varying degrees of competitiveness in a secondary hinterland.

<u>Steel</u>

The destination states for steel are fewer than those for containerized cargo. This is evident in Table XI. The dominant states are Oregon, Washington and Idaho with 89.89%, 4.63% and 1.60%, respectively. Portland is again the major destination city with 76.47% of the total import steel and 85.07% of Oregon's import steel. Washougal, Washington was the destination of 48.61% of Washington's steel imports.

However, Washougal represents only 2.25% of total steel imports. In this category, Eugene, Oregon, and Salem, Oregon, surpassed Washougal with 5.35% and 2.67%, respectively. The major steel importing cities in Idaho were

TABLE XI

THE STATE OF DESTINATION OF 1973
STEEL IMPORTS THROUGH
PORT OF PORTLAND FACILITIES

State	Short Tons	Percent
California	1,290.84	0.46
Canada	31.61	0.01
Idaho	4,521.86	1.60
Illinois	8.58	0.00
Montana	623.51	0.22
New York	23.08	0.01
Oregon	254,805.41	89.89
Utah	158.09	0.06
Washington	13,128.00	4.63
Wyoming	.03	0.00
Unknown	8,878.67	3.13
Total	283,469.68	100.01*

Boise and Twin Falls, with 40.17% and 38.28% of the state total, respectively. The hinterland is primary for the steel imports passing through the Port of Portland. A secondary hinterland is evident, but to a much smaller degree than with imported containerized cargo.

Automobiles

The hinterland for imported automobiles coming through Port of Portland facilities is primary in nature. This can be seen in Table XII.

* Total does not add to 100% due to rounding.

TABLE XII

THE STATE OF DESTINATION OF 1973
AUTOMOBILE IMPORTS THROUGH
PORT OF PORTLAND FACILITIES

State	Short Tons	Percent
Oregon	35,700.15	97.58
Washington	830.91	2.27
Unknown	55.12	0.15
Total	36,586.18	100.00

Oregon was the destination for 97.58% of the imported automobiles passing through Port of Portland facilities, 96.13% of this amount to the Portland area. Next to Portland, Tigard received 3.68% of the state total. Washington was the destination of only 2.27% of the imported automobiles, and 78.96% of this amount to Seattle.

Breakbulk

Imported breakbulk cargo passing through Port of Portland facilities appears to have a primary hinterland. Oregon was the destination for 79.89% of this type of cargo, with Washington and Idaho following with 13.02% and 2.02%, respectively. A secondary hinterland of lesser significance is apparent.

Portland was again the dominant destination city with 64.56% of the total imported breakbulk and 80.81% of the Oregon total. Vancouver, Washington, was the major destination city of that state with 59.21%, and Boise had

TABLE XIII

THE STATE OF DESTINATION OF 1973 BREAKBULK IMPORTS THROUGH PORT OF PORTLAND FACILITIES

State	Short Tons	Percent
Alaska	14.00	0.02
Arkansas	1.99	0.00
California	432.74	0.46
Canada	30.95	0.03
Colorado	4.59	0.01
Idaho	1,886.55	2.02
Illinois	101.18	0.11
Kansas	1.65	0.00
Louisiana	38.77	0.04
Maryland	112.41	0.12
Michigan	1.77	0.00
Minnesota	37.62	0.04
Montana	275.80	0.30
Nebraska	243.11	0.26
Nevada	1,386.91	1.49
New York	0.43	0.00
Ohio	132.09	0.14
Oregon	74,513.02	79.89
Rhode Island	0.01	0.00
South Dakota	2.92	0.00
Tennessee	9.04	0.01
Texas	70.91	0.08
Utah	239.07	0.26
Washington	12,145.96	13.02
Wisconsin	1.10	0.00
Unknown	1,586.01	1.70
Total	93,270.60	100.00

44.24% of Idaho's total. Vancouver represented the destination of 7.71% of total imported breakbulk, and Boise represented 0.89%.

CONCLUSIONS

Exports

According to the data, most exports from Port of

Portland facilities originate in a primary hinterland: Oregon. Table XIV indicates that more than 50% of exports from all facility groups originated in Oregon.

TABLE XIV

OREGON AND PORTLAND ORIGIN PERCENTAGES
OF 1973 EXPORTS FROM
PORT OF PORTLAND FACILITIES

Facility Group	% Originating in Oregon	% Originating in Portland	Portland Origins as a % of Oregon Origins
Liquid Bulk	87.32	85.71	92.86
Grain (wheat and barley)	98.70	98.70	100.00
Dry Bulk	50.82	39.11	76.95
Containerized	69.68	37.05	53.16
Logs	87.10	66.84	76.74
Breakbulk	77.42	13.43	17.35

Only dry bulk and containerized cargo indicate a significant secondary hinterland. All other facility groups have in excess of 75% of their origins in Oregon. Portland represents the degree of spatial compactness of the primary hinterland. Portland origins accounted for over 75% of four of the six facility group exports. Containerized and breakbulk cargo were the exceptions. However, the exceptions were still dominated by Oregon indicating more diversified origins within the primary hinterland rather than a greater spatial extent of that hinterland.

Imports

The import data indicates an even more compact primary hinterland in Oregon, with Portland as an even stronger focus.

In all facility groups more than 74% of the destinations were in Oregon. Portland destinations accounted for more than 58% of tonnage through all facility groups. Portland represented over 78% of tonnage to Oregon destinations for all import facility groups. As with exports, a secondary hinterland is evident, but to a lesser extent.

TABLE XV

OREGON AND PORTLAND DESTINATION PERCENTAGES OF 1973 IMPORTS THROUGH PORT OF PORTLAND FACILITIES

Facility Group	% with Destinations in Oregon	% with Destinations in Portland	Portland Destinations as a % of Oregon Destinations
Bulk	99.34	99.34	100.00
Containerized	74.27	58.30	78.50
Steel	89.89	76.47	85.07
Automobiles	97.58	93.98	96.31
Breakbulk	79.89	64.56	80.81

The conclusions drawn from the above data must be seen in the proper perspective. The hinterlands, as identified, are not necessarily ultimate origin or destination hinterlands, but rather they are hinterlands of transshipment points. To obtain the ultimate origin for exports, i.e., a farmer's field, or ultimate destination for imports, i.e., a consumer's home, would require research far beyond the scope of the current effort. If one accepts that primary (ultimate) consumers and producers abide by the "transportation cost minimization" ideal, then it is reasonable to treat transshipment points as the ultimate origin and destination points for the purpose of delineating port facility hinterlands. The assumption is that if imports are shipped to a transshipment point, Boise, Idaho for instance, the ultimate destination is in Boise or in close proximity to Boise, and commodities produced for export are assumed to have originated in or near the place of transshipment. Portland must be an exception to this assumption due to its nature as a port city, and thus, a major transshipment point.

This accounts for Portland's dominance as an origin and destination point since the data represents the first transshipment point for imports and the last transshipment point for exports. The hinterland of Port of Portland facilities, then can not be completely ascertained until the origins and destinations of Portland cargo has been identified. The following chapter will attempt to identify those origins and destinations. Chapter V will combine the current data with that in Chapter IV and show the mapped results with concluding comments.

CHAPTER IV

PORTLAND'S VOLUME AS AN ULTIMATE ORIGIN AND DESTINATION POINT

As pointed out in the last chapter, Portland's predominance as an origin and destination point in the movement of goods through the Port of Portland is tempered by it's nature as a port city. In order to delineate the Port of Portland's hinterland it is necessary to quantitatively identify the tonnage of goods that was actually destined for or originated in Portland, and the tonnage warehoused in Portland only for transshipment purposes.

In an attempt to ascertain the volume of cargo, by facility group, that actually originated in or was destined for Portland, a questionnaire was sent to the exporters and importers which, according to the _1973 Export and Import Domestic City Origin and Destination Report Quarterly Reports_, handled cargo originating in or destined for Portland. The exporters and importers who received questionnaires included all those who shipped or received 100 tons or more of cargo in any given quarter of 1973. A list of the exporters and importers who were sent questionnaires is in Appendix D.

Due to the limited scope of this project, financial constraints, and the expected less than full involvement by the respondents, sending a questionnaire to the entire population was impossible. A random sample was considered inappropriate because the population data distribution is not normal but highly concentrated. Including all exporters and importers who handled 100 tons or more in any given quarter of 1973 provided the best coverage of tonnage moved. Questionnaires were sent to each firm selected asking for city and state origins and/or destinations, by percentage, of their total movement in 1973. A copy of the export and import questionnaire is in Appendix E. Percentages were sought because it was felt that a larger response would result than if tonnages were requested. Each firm's respective percentages were, however, applied to their 1973 tonnage by facility group, as shown in the 1973 Export and Import Domestic City Origin and Destination Report Quarterly Reports.

EXPORTS

A total of 78 export questionnaires were sent out. Table XVI indicates the total exporter returns by facility group. The number of returned export questionnaires, 41, represents a 53% response. Table XVI also indicates tonnage and percentage of returned export questionnaires by facility group, and the percentage the response represents of the total tonnage which the 1973 Export and Import Domestic City Origin and Destination Report Quarterly

TABLE XVI

RESULTS OF QUESTIONNAIRES SENT TO EXPORTERS WHO SHIPPED
100 TONS OR MORE THROUGH PORT OF PORTLAND FACILITIES IN 1973

	Questionnaire Tonnage	Response Tonnage	Response Tonnage % of Questionnaire Tonnage	Response Tonnage % of Total Tonnage	Residual Tonnage
Grain	1,664,967.07	1,644,967.07	100.00	100.00	0
Dry Bulk	15,595.21	15,364.71	98.52	22.21	53,805.63
Liquid Bulk	18,397.89	16,645.67	90.48	83.48	3,293.40
Containerized	67,583.16	39.471.90	58.40	36.97	67,285.84
Logs	1,621.04	0	0.00	0.00	176,814.57
Breakbulk	47,518.45	23,266.57	48.96	45.71	27,631.95

Reports indicated originated in Portland. The residual tonnage indicates the portion of Portland originating cargo, as shown by the above report, which is left unexplained by the responses.

While the questionnaires asked for city and state of origin, most returns listed state origins only. Therefore, the data were arranged into state origins.

Grain

The response for grain represented 100.00% of the total grain movement. Thus, the state origins can be shown without a residual factor. Table XVII indicates that the grain originally showing a Portland origin actually originated over a six state area with Montana, Washington and Oregon dominating as state origins.

Dry Bulk

The responses for dry bulk sample represented 22.21% of the total dry bulk movement. The residual, 53,805.63 tons, was allocated to the states according to the percentage each state represented of the responses. The results are shown in Table XVIII.

Again, the response indicates origins over a six state area with Oregon, Montana and Washington dominating.

Liquid Bulk

The liquid bulk response accounted for 16,645.67 tons

TABLE XVII

THE STATE ORIGINS OF GRAIN WHICH THE 1973 EXPORT AND IMPORT DOMESTIC CITY ORIGIN AND DESTINATION REPORT INDICATED AS ORIGINATING IN PORTLAND

	Returned Questionnaire Tonnage	State % of Returned Questionnaires
Colorado	164,199.91	9.99
Idaho	114,939.93	6.99
Montana	544,827.70	33.12
North Dakota	98,519.95	5.99
Oregon	344,819.79	20.96
Washington	377,659.79	22.95

TABLE XVIII

THE STATE ORIGINS OF DRY BULK WHICH THE 1973 EXPORT AND IMPORT DOMESTIC CITY ORIGIN AND DESTINATION REPORT INDICATED AS ORIGINATING IN PORTLAND

	Returned Questionnaire Tonnage	State % of Returned Questionnaires	Residual Allocation Based on State's % of Returned Questionnaires	Actual Plus Allocated Tonnage
Colorado	986.04	6.42	3,454.32	4,440.36
Idaho	1,173.58	7.64	4,110.75	5,284.33
Montana	3,737.28	24.32	13,085.53	16,822.81
North Dakota	591.62	3.85	2,071.52	2,663.14
Oregon	5,641.60	36.72	19,757.43	25,399.03
Washington	3,234.59	21.05	11,326.08	14,560.67

of the 19,939.07 total tons, or 83.48%. The residual of 3,293.40 tons was allocated to the states represented in the liquid bulk response in the same manner as dry bulk. The results are indicated in Table XIX.

Oregon is by far the largest of the four state origins, with 85.79%.

<u>Containerized</u>

The residual tonnage of the containerized response, 67,285.84 tons, was applied to the 36.92% response, again, according to state percentages in the returned questionnaire. Table XX shows the results. Oregon, Washington, and Idaho were the only states higher than 1% of the responses with 89.977%, 5.979%, and 3.277%, respectively.

<u>Logs</u>

There were no returns for logs. Those exporters sent questionnaires, however, represented only 0.92% of the tonnage originally indicated as originating in Portland. It would have been tenuous, at best, to work with that size response. This does not indicate that exporters of logs only handled less than 100 tons each. Most of the shippers of logs were listed as unknown and could, therefore, not be identified.

<u>Breakbulk</u>

Table XXI indicates the response for breakbulk. The 27,631.95 ton residual was allocated by the individual

TABLE XIX

THE STATE ORIGINS OF LIQUID BULK WHICH THE 1973 EXPORT AND IMPORT DOMESTIC CITY ORIGIN AND DESTINATION REPORT INDICATED AS ORIGINATING IN PORTLAND

	Returned Questionnaire Tonnage	State % of Returned Questionnaires	Residual Allocation Based on State's % of Returned Questionnaires	Actual Plus Allocated Tonnage
Idaho	591.50	3.55	116.92	708.42
Montana	591.50	3.55	116.92	708.42
Oregon	14,279.67	85.79	2,825.40	17,105.07
Washington	1,183.00	7.11	234.16	1,417.16

TABLE XX

THE STATE ORIGINS OF CONTAINERIZED CARGO WHICH THE 1973 EXPORT AND IMPORT DOMESTIC CITY ORIGIN AND DESTINATION REPORT INDICATED AS ORIGINATING IN PORTLAND

	Returned Questionnaire Tonnage	State % of Returned Questionnaires	Residual Allocation Based on State's % of Returned Questionnaires	Actual Plus Allocated Tonnage
California	36.11	0.090	60.56	96.67
Idaho	1,293.46	3.277	2,204.96	3,498.42
Kansas	6.94	0.018	12.11	19.05
Missouri	0.28	0.001	0.67	0.95
Montana	259.34	0.660	444.09	703.43
Oregon	35,515.72	89.977	60,540.43	96,056.15
Washington	2,360.05	5,979	4,023.02	6,383.07

TABLE XXI

THE STATE ORIGINS OF BREAKBULK CARGO WHICH THE 1973 EXPORT AND IMPORT DOMESTIC CITY ORIGIN AND DESTINATION REPORT INDICATED AS ORIGINATING IN PORTLAND

	Returned Questionnaire Tonnage	State % of Returned Questionnaires	Residual Allocation Based on State's % of Returned Questionnaires	Actual Plus Allocated Tonnage
California	11.84	0.05	13.82	25.66
Idaho	27.56	0.12	33.16	60.72
Missouri	2.60	0.01	2.76	5.36
Oregon	23,054.13	99.09	27,380.50	50,434.63
Washington	170.44	0.73	201.71	372.15

state percentage of the responses.

Oregon was by far the largest origin state with 99.09%.

IMPORTS

A total of 154 import questionnaires were sent out, of which 46%, or 71 questionnaires were returned. Table XXII indicates the total importer questionnaire size by facility group. Also indicated is the tonnage and percentage of returned import questionnaires by facility group, and the percentage the response represents of the total 1973 tonnage previously shown as having a Portland destination.

As with the export questionnaires, the import returns indicated predominately state rather than city of destination. Therefore, the import data were arranged into state destinations.

Bulk

The response for bulk accounted for 36.80% of the total bulk movement. Table XXIII includes the results of the bulk response. The residual, 122,956.04 tons, was allocated to Oregon and Washington based on their respective percentages of the responses.

Automobiles

Table XXIV includes the results of the automobile questionnaire. The responses accounted for 25.95% of the total 1973 automobile tonnage that originally indicated

TABLE XXII

QUESTIONNAIRES SENT TO IMPORTERS WHO RECEIVED 100 TONS OR MORE THROUGH PORT OF PORTLAND FACILITIES IN 1973

	Questionnaire Tonnage	Response Tonnage	Response Tonnage % of Questionnaire Tonnage	Response Tonnage % of Total Tonnage	Residual Tonnage
Bulk	194,554.73	71,604.16	36.80	36.80	122,956.04
Automobiles	31,276.00	8,922.91	28.53	25.95	25,459.33
Steel	214,994.99	137,324.44	63.87	63.35	79,450.02
Containerized	24,452.48	16,721.43	68.38	47.29	18,635.44
Breakbulk	45,237.20	15,899.42	35.15	26.41	44,312.32

TABLE XXIII

THE STATE DESTINATIONS OF BULK CARGO WHICH THE 1973 EXPORT AND IMPORT DOMESTIC CITY ORIGIN AND DESTINATION REPORT INDICATED AS DESTINED FOR PORTLAND

	Returned Questionnaire Tonnage	State % of Returned Questionnaires	Residual Allocation Based on State's % of Returned Questionnaires	Actual Plus Allocated Tonnage
Oregon	64,835.45	90.55	111,336.69	176,172.14
Washington	6,768.71	9.45	11,619.35	18,388.06

TABLE XXIV

THE STATE DESTINATIONS OF AUTOMOBILES WHICH THE 1973 EXPORT AND IMPORT DOMESTIC CITY ORIGIN AND DESTINATION REPORT INDICATED AS DESTINED FOR PORTLAND

	Returned Questionnaire Tonnage	State % of Returned Questionnaires	Residual Allocation Based on State's % of Returned Questionnaires	Actual Plus Allocated Tonnage
Alaska	720.24	8.07	2,054.57	2,774.81
Hawaii	8.45	0.09	22.91	31.36
Idaho	1,126.31	12.62	3,212.97	4,339.28
Montana	5.63	0.06	15.28	20.91
Oregon	2,829.44	31.71	8,073.15	10,902.59
Utah	19.71	0.22	56.01	75.72
Washington	4,213.13	47.22	12,024.44	16,237.57

Portland as a destination. Seven states were represented in the responses. Washington and Oregon were the largest destination states. The 25,459.33 ton residual was applied, as with all previous facility groups, according to each states' percentage of the responses.

Steel

The steel response represented 63.35% of the steel movement previously indicated as destined for Portland. Table XXV contains results from the steel questionnaire. The response accounted for destinations in six states and British Columbia with a 79,450.02 ton residual. The residual was again allocated to each destination based on that destinations percentage of the responses.

Containerized

Results of the containerized questionnaire are shown in Table XXVI. The residual, 18,635.44 tons, was allocated, in the same manner as above, among the ten states represented in the 47.29% response.

The containerized response contained a much broader geographical coverage than any of the facility group responses discussed above. However, Oregon was the largest destination state with 67.024%.

Breakbulk

The breakbulk response represented as broad a state destination coverage as the import containerized response.

TABLE XXV

THE STATE DESTINATIONS OF STEEL WHICH THE 1973 EXPORT AND IMPORT DOMESTIC CITY ORIGIN AND DESTINATION REPORT INDICATED AS DESTINED FOR PORTLAND

	Returned Questionnaire Tonnage	State % of Returned Questionnaires	Residual Allocation Based on State's % of Returned Questionnaires	Actual Plus Allocated Tonnage
British Columbia	78.66	0.06	47.67	126.33
California	135.71	0.10	79.45	215.16
Idaho	1,460.43	1.06	842.17	2,302.60
Montana	118.00	0.09	71.51	189.51
Oregon	129,606.49	94.38	74,985.02	204,591.51
Utah	19.67	0.01	7.95	27.62
Washington	5,905.48	4.30	3,416.35	9,321.83

TABLE XXVI

THE STATE DESTINATIONS OF CONTAINERIZED CARGO WHICH THE 1973 EXPORT AND IMPORT DOMESTIC CITY ORIGIN AND DESTINATION REPORT INDICATED AS DESTINED FOR PORTLAND

	Returned Questionnaire Tonnage	State % of Returned Questionnaires	Residual Allocation Based on State's % of Returned Questionnaires	Actual Plus Allocated Tonnage
Alaska	38.72	0.232	43.23	81.95
California	567.33	3.393	632.30	1,199.63
Idaho	40.34	0.241	44.91	85.25
Illinois	2,102.28	12.572	2,342.85	4,445.13
Michigan	2.04	0.012	2.24	4.28
Montana	0.67	0.004	0.75	1.42
New York	1,586.55	9.488	1,768.13	3,354.68
Oregon	11,207.43	67.024	12,490.40	23,697.83
Texas	692.46	4.171	777.28	1,469.74
Washington	478.61	2.862	533.35	1,011.96

The results of the breakbulk questionnaire are shown in Table XXVII. The response had a residual of 44,312.32 tons and represented 26.41% of the breakbulk movement originally indicated as destined for Portland. The residual was allocated in the same manner as the above facility group response residuals.

CONCLUSIONS

In all the facility groups, export and import, the residual values were appropriated to the states in the responses by the percentage those states represented in each responding facility group. The most obvious measure of validity was the range of response, 22.21% to 100.00%. However, the nature of the movement of the commodities making up each facility group is a measure of response representation. Therefore, the more complete the representation of the number of firms (those who direct movement) involved, the more representative of the population the response will be. Table XXVIII indicates the degree to which the response tonnage represented the number of firms. Thus, the three lowest facility groups, dry bulk (export), automobiles (import), and breakbulk (import), in terms of response tonnage, represented 67%, 50%, and 44%, respectively, of the firms sent questionnaires. The response, measured by percentage of total tonnage population or percentage of the firms sent questionnaires, was considered as

TABLE XXVII

THE STATE DESTINATIONS OF BREAKBULK CARGO WHICH THE 1973 EXPORT AND IMPORT DOMESTIC CITY ORIGIN AND DESTINATION REPORT INDICATED AS DESTINED FOR PORTLAND

	Returned Questionnaire Tonnage	State % of Returned Questionnaires	Residual Allocation Based on State's % of Returned Questionnaires	Actual Plus Allocated Tonnage
Alaska	4.40	0.03	13.29	17.69
California	227.50	1.43	633.67	861.17
Idaho	225.02	1.42	629.23	854.25
Illinois	711.24	4.47	1,980.76	2,692.00
Michigan	1.33	0.01	4.43	5.76
Nevada	18.32	0.12	53.17	71.49
New York	534.78	3.36	1,488.89	2,023.67
Oregon	13,119.11	82.51	36,557.68	49,676.79
Texas	110.64	0.70	310.19	420.83
Washington	947.05	5.96	2,641.01	3,588.06

TABLE XXVIII

FIRMS RESPONDING TO QUESTIONNAIRE
AS COMPARED TO FIRMS SENT QUESTIONNAIRES

	Firms in Questionnaires	To Questionnaire	%
Export Facility Group			
Grain	2	2	100
Liquid Bulk	5	3	60
Breakbulk	47	24	51
Containerized	58	31	53
Dry Bulk	6	4	67
Import Facility Group			
Steel	67	30	45
Automobiles	10	5	50
Breakbulk	109	48	44
Containerized	77	40	52
Bulk	7	4	57

representative of the population at the state aggregation level.

Chapter V combines the original data (Chapter III) with the questionnaire response data presented in this chapter. The results will show the facility hinterlands of the Port of Portland. Recognizing the limitations inherent in a response of less than 100%, the aggregate data will indicate an adequate representation of those hinterlands.

CHAPTER V

THE PORT OF PORTLAND FACILITY HINTERLAND

The following hinterland analysis of the Port of Portland represents the aggregation of data collected from the _1973 Export and Import Domestic City Origin and Destination Report Quarterly Reports_ (Chapter III) and the data from the questionnaires sent to Portland exporters and importers (Chapter IV). The data (tonnages) used to compile the figures shown here are presented in tabular form in Appendices F (Exports) and G (Imports). State totals were used rather than city totals due to a lack of city data in the returned questionnaires.

There were five basic principles that affected the flow patterns of Port of Portland facility hinterlands. They were complementarity, the friction of distance, the principle of least effort, intervening opportunity and commodity sensitivity to transport costs. The friction of distance and commodity sensitivity to transport costs, while not synonymous, are both distance factors. Distance has a diluting effect on commodity flows. This effect is commonly referred to as the friction of distance, and states that an inverse relationship exists between commodity flow and distance. Some degree of distance decay was characteristic of the commodities making up the Port of Portland facility groups, however, the amount of friction exerted by distance varied with different commodity movements. Some movements, particularly low value commodities, are more sensitive to the friction of distance than others. Commodity sensitivity to movement is related to distance measured in transfer time and costs, and is largely a function of the value per unit weight of the commodity shipped. Generally, low value commodities move short distances, and high value commodities move longer distances. In the analysis of Port of Portland facility hinterlands, the friction of distance and commodity sensitivity to transport costs were combined into one factor because the effect each had on commodity flow was inseparable. The combined factor was referred to in this analysis as the transferability of a commodity. Thus, transferability represents the fact that commodity movement over space involves time and money costs varying with distance. The relationship between movement costs and distance gives rise to one of the other basic principles that affect commodity flow patterns; distance minimization.

Distance minimization was introduced in the social sciences by Zipf (1949). He referred to distance minimization as the "principle of least effort." In terms of the analysis of Port of Portland facility hinterlands, the principle of least effort means that it was assumed that commodity movement decisions were made to minimize costs. While it was recognized that decision makers in commodity movements were not always rational and did not always have adequate cost information, it was fair to assume that attempts were made to reduce the effect of distance as much as possible and that this behavior was an important factor in forming commodity flow patterns. The basic principle of intervening opportunity was allied to distance minimization (the principle of least effort). In commodity movements, intervening opportunity can be thought of as a way of reducing the movement costs associated with distance if the rate structure is favorable. Decision makers in commodity movements will ship goods through the port nearest the place of production (exports) or the place of consumption (imports). Due to the fact that the underlying philosophy of both intervening opportunity and the principle of least effort is the same; distance minimization, they were combined in the analysis of Port of Portland facility hinterlands and were referred to as simply intervening opportunity.

The last of the five basic principles that affected the flow patterns of Port of Portland facility hinterlands, complementarity, concerns the conditions required for commodity movement between a point and its hinterland to take place. This concept states that commodity movement between the Port of Portland and its hinterland only took place when supplies of commodities existed at the Port of Portland, in the case of imports, and a demand for those commodities in the hinterland. The converse was the case for exports. The supply (production) of export commodities and the demand for (consumption) import commodities in the hinterland was directly related to production and consumption patterns in the hinterland. The concept of the supply of import commodities and the demand for export commodities at the Port of Portland was less clear. Foreign export production and import consumption were obvious factors in the supply and demand for goods at the Port of Portland. The most important factor was the level of services and facilities offered. If no facilities were present to handle a specific commodity, then movement for that commodity did not occur. Petroleum provides an example of this. The Port of Portland does not own facilities for the import of petroleum products, therefore, none of this commodity moved through the Port of Portland. All petroleum products imported in Portland move through private facilities. The lack of particular facilities does not, however, concern the present analysis. The object here is to delineate the Port of Portland facility hinterlands based on commodity movement passing through existing facilities in 1973. The fact that commodities requiring specific facilities passed through the Port of Portland indicates the existence of those facilities. In this analysis, the supply of commodities for the import facility groups was considered a given, and the demand for those commodities in the hinterland regulated magnitudes. The demand for export commodities at the Port of Portland from the hinterland was also considered as given since the facilities required for specific export movement exist. Thus, complementarity was measured as the demand for export goods provided the necessary facilities were available, and the demand for import goods existed in the hinterland of commodities requiring available facilities.

Thus, the five basic factors of spatial interaction that effected the flow patterns of the Port of Portland were equivalent to Ullman's three-factor typology (1947); complementarity, transferability and intervening opportunity. The above simplification provides a concise and simplified analysis of the Portland facility hinterlands.

EXPORTS

The origins of total exports through the Port of Portland in 1973 were dominated by Oregon, Montana and Washington. These three states accounted for 78.48% of the exports with 35.18%, 22.90% and 20.40%, respectively. The only other states accounting for more than 1% of exports were Colorado, Idaho, North Dakota, and Wyoming with 6.66%, 6.26%, 3.99% and 2.29%, respectively. While export origins were indicated in thirty-six states, the above seven states provided 97.68% of the 1973 exports. This can be seen in Figure 3. The spatial compactness of the total export hinterland is quite evident. The concentration of origins is centered in the northwestern quadrant of the United States.

This concentration of flows was the result of the interplay of all three variables of spatial interaction. The localization of export flows was a reflection of the cost of movement and the importance of transferability in the whole interaction system of the Port of Portland's export origins. The other variables, complementarity and intervening opportunity, had a smaller impact than transferability. The demand for export goods (complementarity) was present in all ports and the existence of other ports (intervening opportunities) was obviously a factor. However, the decreases in the magnitude of tonnage with the increases in the distance of origins was most dominant. This generalization applies to the origins of total exports, however, it is not characteristic of all the export facility groups.

Grain

The spatial distribution of the origins of grain exports is represented in Figure 4. Oregon, Washington, and Montana, with 20.69%, 22.66% and 32.69%, respectively, combine to account for 76.04% of the grain exported through the Port of Portland in 1973. The remaining states, Colorado, Idaho and North Dakota, each represented less than

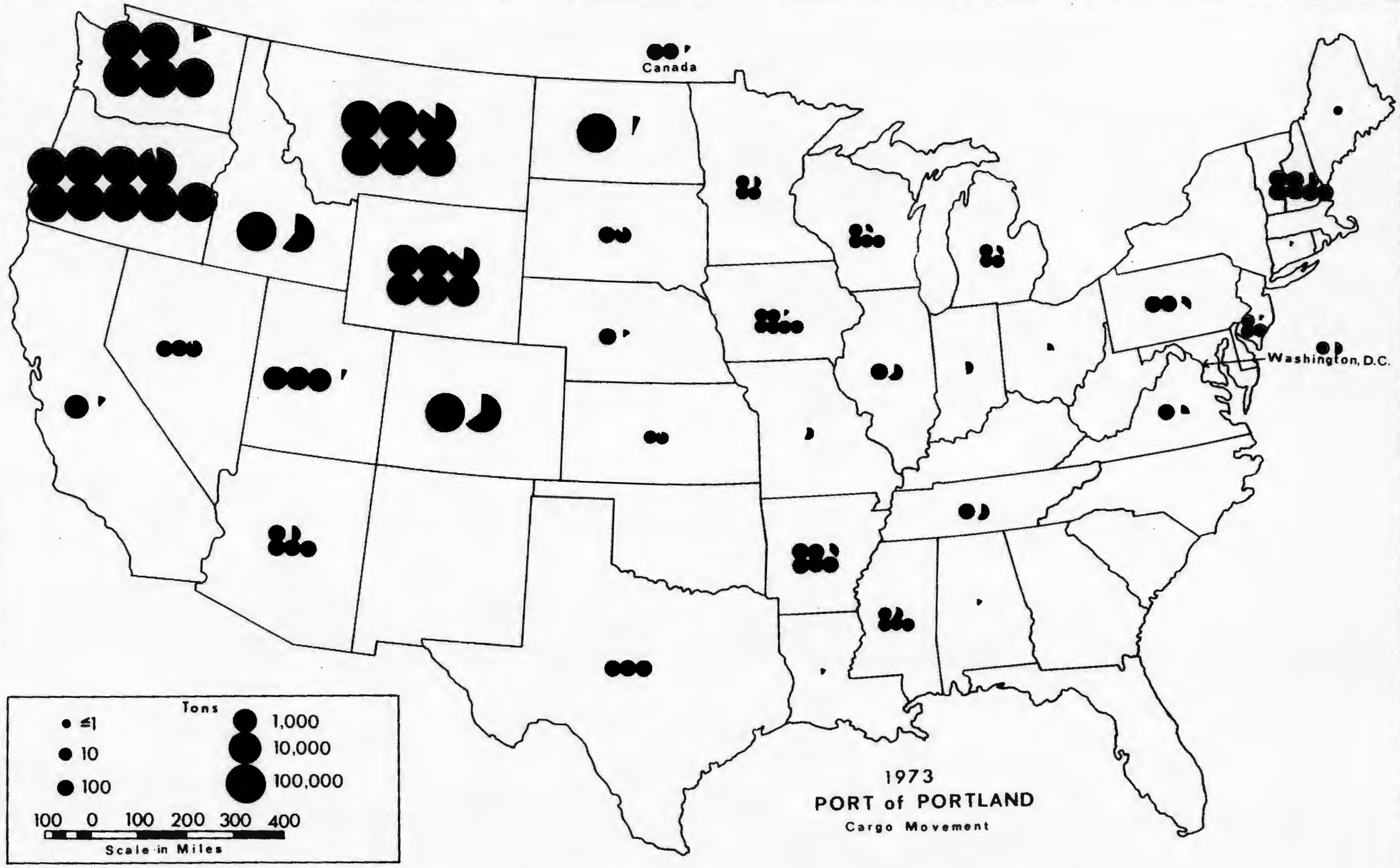

Figure 3. Origins of total exports.

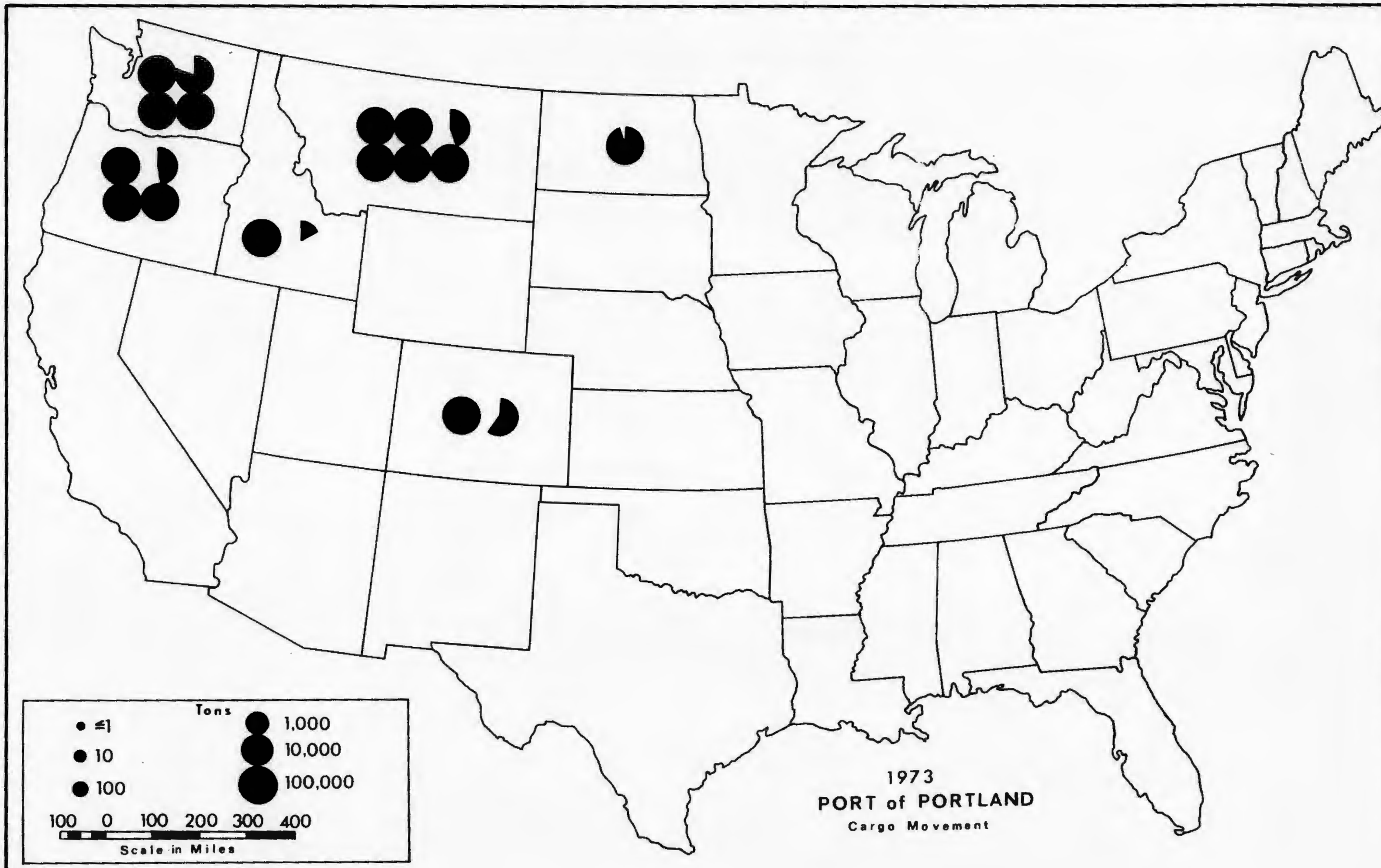

Figure 4. Origins of grain exports.

10% of the exported grain. The elements of complementarity, transferability and intervening opportunity were evident with grain flows, as with the flow of total exports.

Grain is shipped in bulk form, and its value is relatively low per unit weight of shipment. The lack of grain shipped through Port of Portland facilities from the grain producing regions of the midwest can be attributed, primarily, to transferability. Grain from the midwestern United States can be moved over a shorter distance and at much less expense through the Mississippi River system to the Gulf of Mexico where grain export facilities are available. Grain export facilities are available at the Port of Portland and at the Gulf of Mexico (complementarity), but the existence of inexpensive river transportation over a shorter distance (transferability) and the presence of other export grain facilities (intervening opportunity) oriented the export grain flows from the midwest to the Gulf of Mexico. The existence of facilities for exporting grain at Seattle and Portland exerted the effect of complementarity on the grain producing northwest quadrant of the United States, as well as providing intervening opportunity. However, grain produced in the northwest can be shipped to the Port of Portland cheaper than to Seattle by using the Snake and Columbia River systems (transferability). So, while complementarity, intervening opportunity and transferability all effected grain flow simultaneously, the sensitivity of grain to shipment costs (transferability) was the primary force in localizing grain flows, to the Port of Portland.

Liquid Bulk

The flow pattern for liquid bulk was even more centralized than grain, with Oregon representing 75.14% of the state origins. This can be seen in Figure 5. Washington, with 13.16%, was the number two state of origin for liquid bulk exports, Montana and Idaho, with 3.79% and 3.05%, respectively, were much less significant. This extreme localization of the flow pattern for liquid bulk is a further example of the effect of transferability. Liquid bulk commodities such as molasses, tall oil and tallow, which made up the entire export liquid bulk movement of the Port of Portland, were characterized by extremely high transport costs per value of unit volume moved. Sensitivity to transport costs not only localized the flow pattern of liquid bulk, but was also a factor contributing to the low tonnage; liquid bulk, with 23,262.85 tons, was the lowest export facility group.

Dry Bulk

The dominant state of origin for dry bulk, in 1973, was Wyoming with 28.43%. Oregon was a close second with 26.07%, and Montana, Idaho, and Washington followed with 17.91%, 12.51%, and 11.06%, respectively.

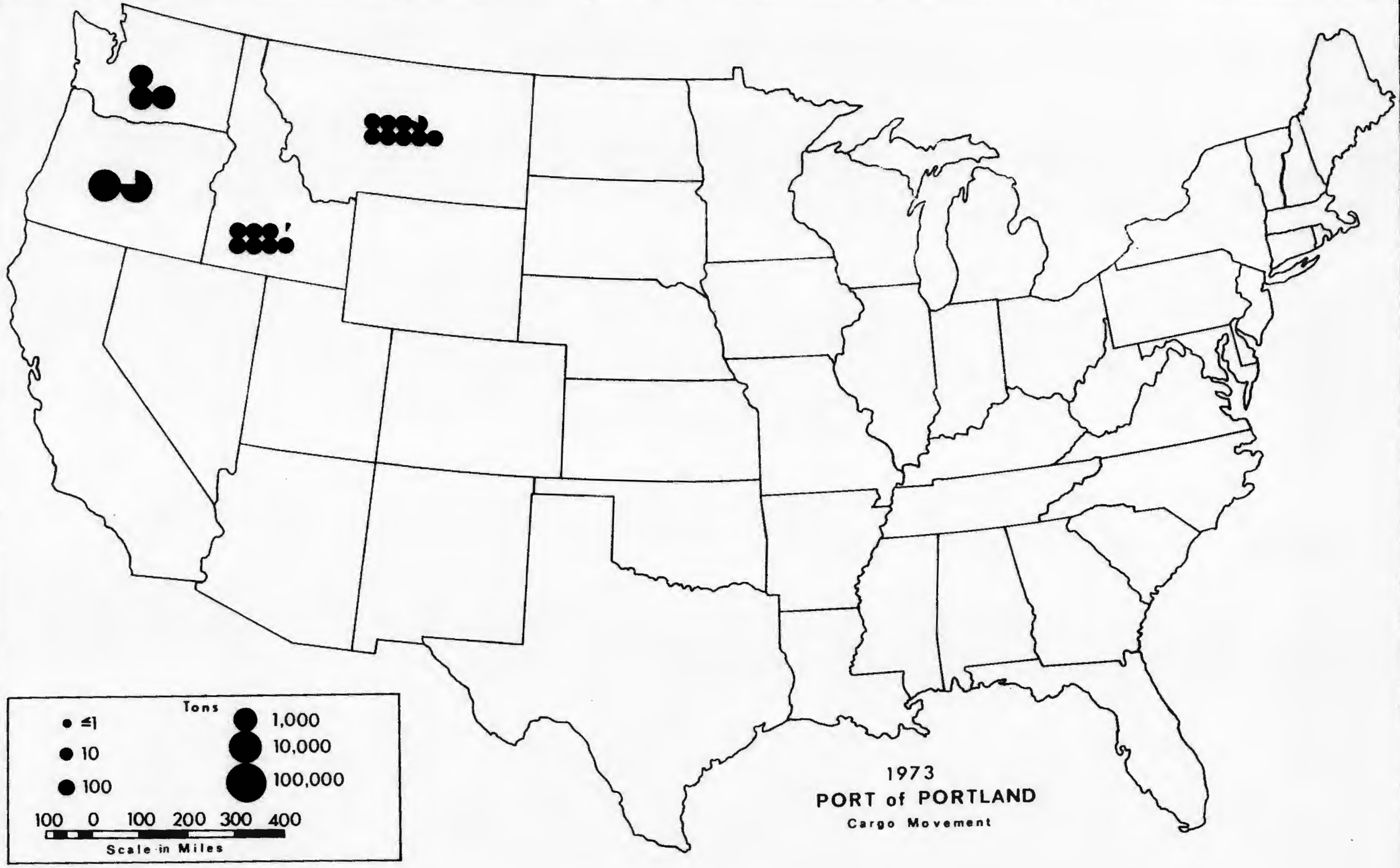

Figure 5. Origins of liquid bulk exports.

Figure 6 shows the spatial distribution of the origins of dry bulk. The flow pattern resembles that for grain, due primarily to the fact that the producing regions for the dry bulk commodities were in large part the same as those producing grain (sheat and barley). The variation that does exist between the dry bulk and grain hinterlands was caused by the inclusion of ores in the dry bulk facility group. The producing regions for ores vary from those for grain.

The sensitivity of ores to transport costs is at least as high as grain and other dry bulks. Ores are also characterized by a high weight loss in processing which causes industries who process ores to locate relatively close to the producing regions. However, the finished, or partially finished, product remains sensitive to high transport costs per unit of weight shipped. The factor of transferability was primarily the cause of the centralization of the dry bulk hinterland.

Containerized

The state origins of containerized cargo are represented in Figure 7. Oregon was again the major state of origin with 65.97%. Canada, Washington D.C., and the remaining 25 origin states accounted for less than 1% each of the containerized exports, except Washington and Idaho. The latter states were the origins for 20.30% and 4.33%, respectively, of the containerized exports. Only Arizona,

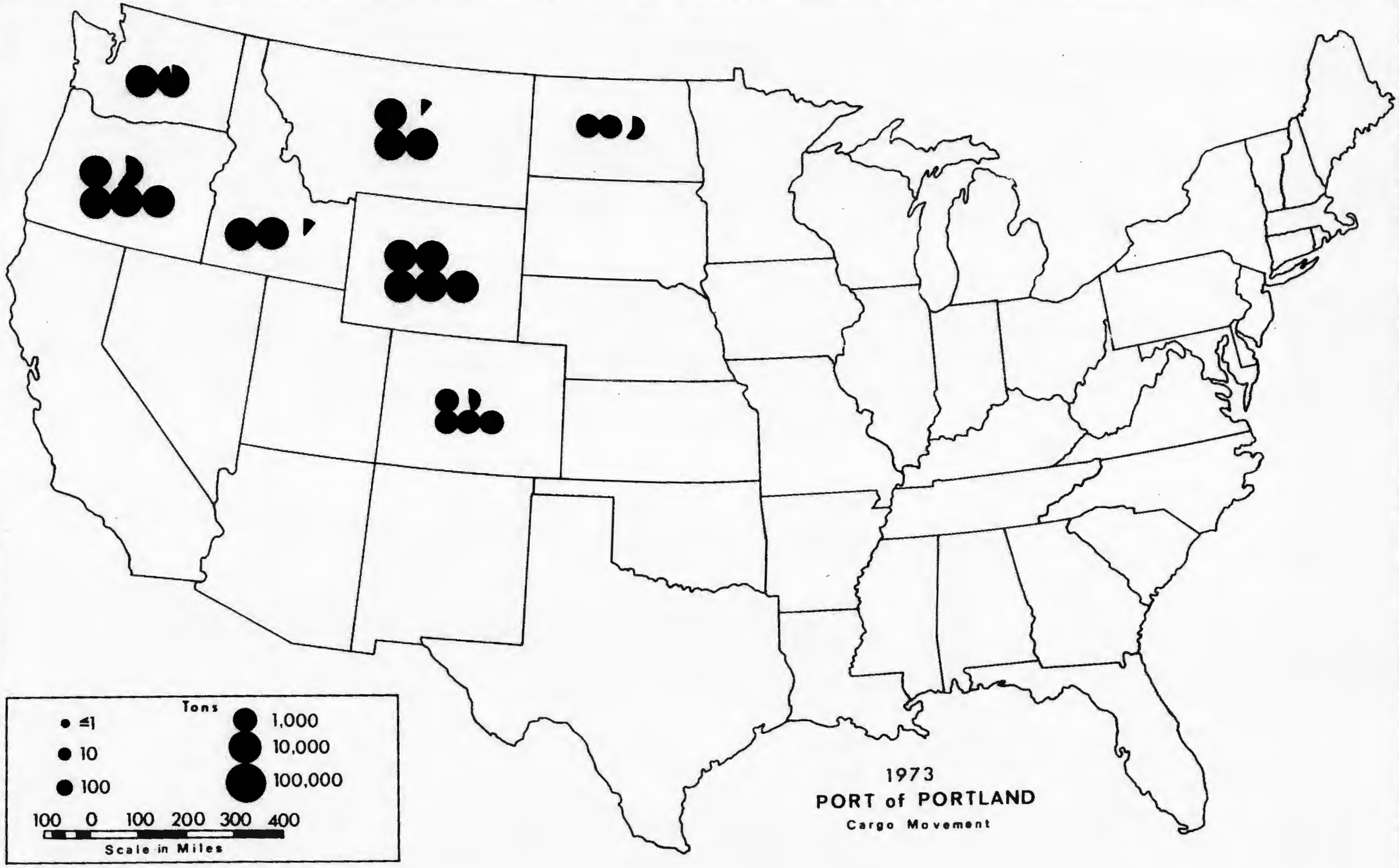

Figure 6. Origins of dry bulk exports.

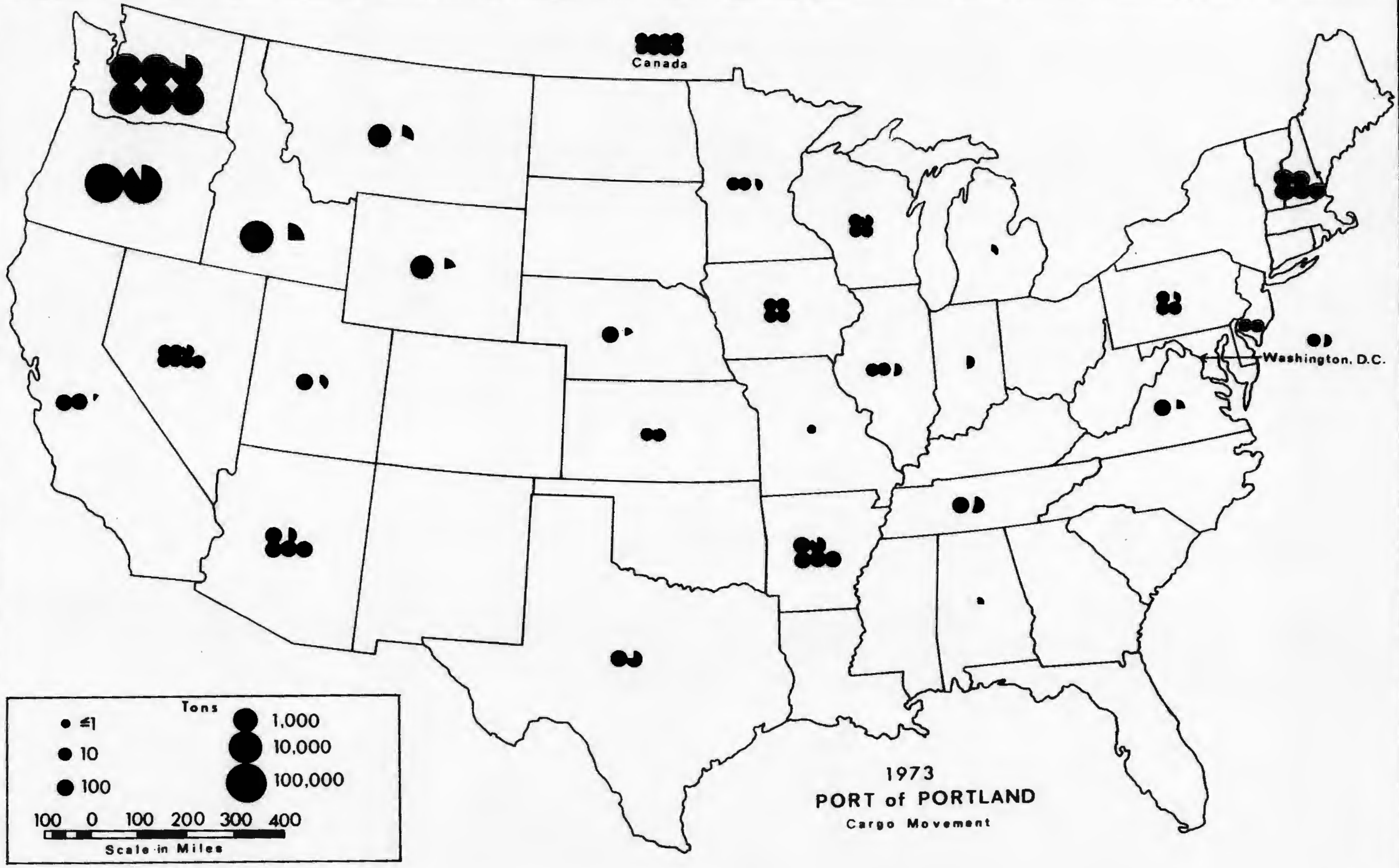

Figure 7. Origins of containerized exports.

Arkansas, and New Hampshire accounted for more than 0.1% of the cargo outside the northwestern quadrant of the United States. The total tonnage for these three states, 1,442.73, amounted to a combined 0.5% of the total movement.

The major effect of transferability was evident for containerized cargo with 86.27% of the origins in Oregon and Washington. In the case of containerized cargo, however, it was the friction of distance rather than shipment cost sensitivity which was the major factor. Containerized cargo, in general, is of higher value per unit shipped than commodities shipped in bulk and can experience higher transport costs and still remain competitive. The supply of containerized cargo (complementarity) and intervening opportunity were more important factors effecting containerized flows than they were with the bulks. The producing region of the many and varied commodities comprising containerized cargo included the entire United States. The facilities for handling containerized cargo require a large capital expenditure by ports, however, virtually all United States export ports have the necessary facilities because they want the revenue generated by movement of containerized cargo (more revenue per ton moved is generated by containerized cargo than with bulk movement). The supply of containerized cargo was dispersed over the entire United States and availability of containerized facilities (representing demand by ports) was present at all ports. Thus, while transferability localized the flow pattern of export containerized cargo around the Port of Portland, complementarity tended to regionalize and nationalize the flow pattern. The factor of intervening opportunity (other export ports closer to the individual producing areas) worked with transferability in localizing the flow pattern, and thus diminished the effect of complementarity.

Breakbulk

The flow pattern for breakbulk was very similar to that for containerized cargo. The breakbulk pattern is shown in Figure 8. Oregon was more dominant in the breakbulk facility group origins, accounting for 77.29%. Like the containerized facility group, Washington and Idaho were second and third with 15.30% and 2.22%, respectively, of the total movement. However, a greater percentage of breakbulk cargo originated outside the northwestern quadrant of the United States than of containerized cargo.

The value of breakbulk cargo is higher per unit of shipped weight, as with containerized cargo, than bulk cargo. Thus, transferability had the same effect on breakbulk cargo as containerized cargo, somewhat less of an effect than with the bulks in localizing flows. A dispersed producing area (supply) and the availability of breakbulk facilities at all ports (demand) is characteristic of breakbulk, as was the case with containerized cargo. The effect of comple-

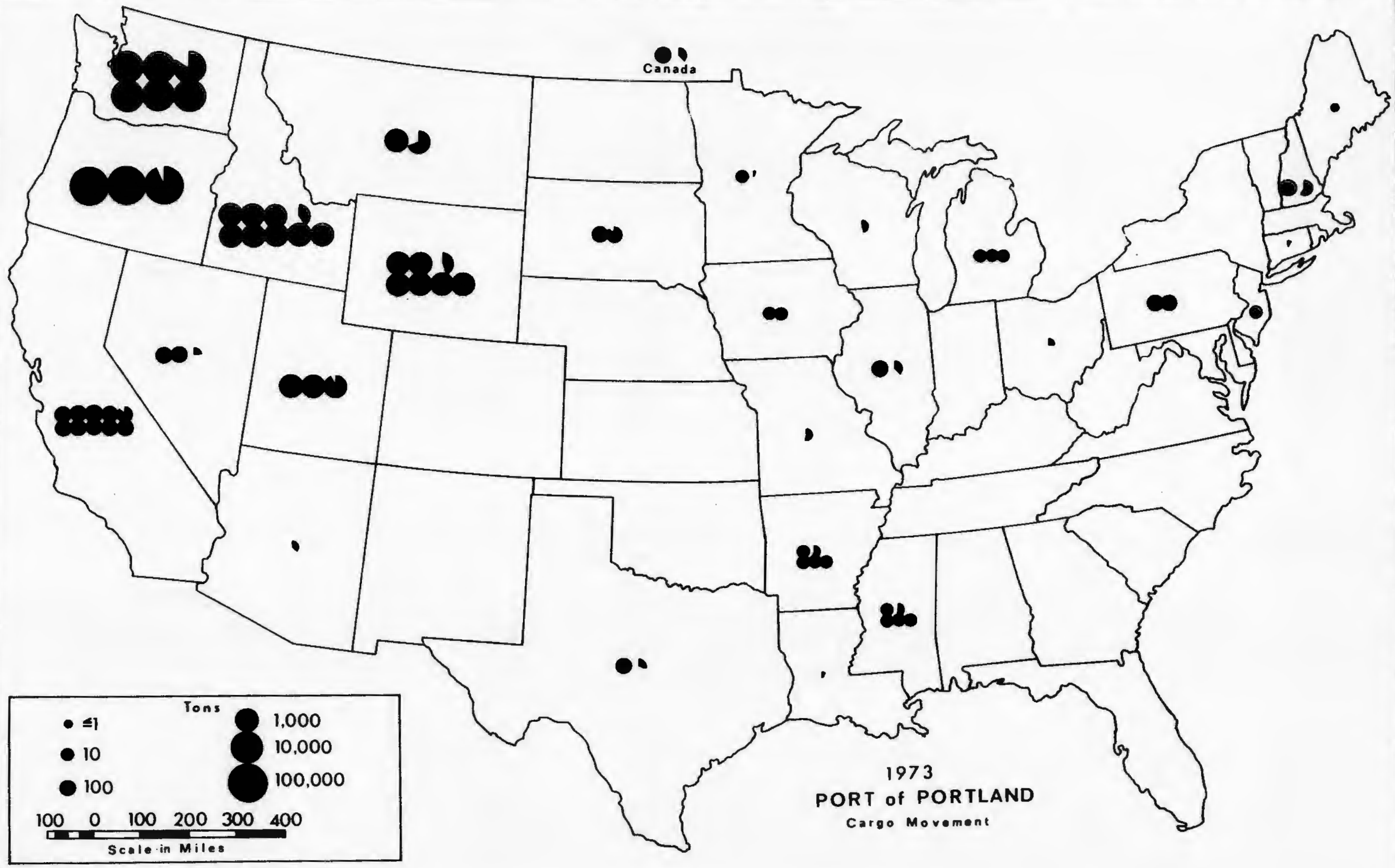

Figure 8. Origins of breakbulk exports.

mentarity (the supply and demand factor) was responsible for the expanded spatial distribution of the origins of breakbulk, as with the containerized facility group. The effect of intervening opportunity on breakbulk flows was less than with containerized cargo, as evidenced by the higher percentage of breakbulk tonnage originating outside the northwest quadrant of the United States. This is not readily explanable from the data used here. A probable explanation, however, might be the ultimate port destination of the cargo. Containerization is an innovation of the recent past and many ports, foreign and domestic, do not have adequate containerization handling facilities. Thus, non-bulk cargo destined for those ports must be shipped in breakbulk form rather than in containers from a port that has steamship service to breakbulk foreign ports. However, to establish this as the cause of the smaller effect of intervening opportunity on breakbulk cargo would require analysis of the foreign destination hinterlands of the Port of Portland combined with a look at the steamship service capabilities.

IMPORTS

The destinations of total imports through the Port of Portland were dominated by Oregon. That state was the destination for 78.88% of the imports. Washington was a distant second with 12.76% of the imports, as shown in

Figure 9. While import destinations, in percentage terms, were greater in Oregon than were export origins, the imports did not present as compact a hinterland. A concentration of import flow was evident in Oregon, Washington, and Idaho, however, import flows measured in percentages were greater throughout the United States than with the export flows, and represents a shift in importance of the elements of the three-factor typology. Complementarity (domestic demand) for imported goods is directly related to population. The extended flow pattern tended to be oriented toward major population states, i.e., California, Illinois, and New York. Thus, transferability caused a primary import hinterland in close proximity to the Port of Portland, and complementarity created a discontinuous as well as secondary hinterland in varying stages throughout the United States to a greater extent than with exports. Intervening opportunity in import facility hinterlands was represented by the existence of other ports with the same facilities, and tended to localize the import flow pattern, as with transferability. This generalization of the effects of the three factors does not pertain uniformly to all the import facility groups.

Bulk

Figure 10 indicates the extent of the import bulk hinterland. The primary nature of this hinterland is obvious. Oregon was the destination for 89.95% of the bulk

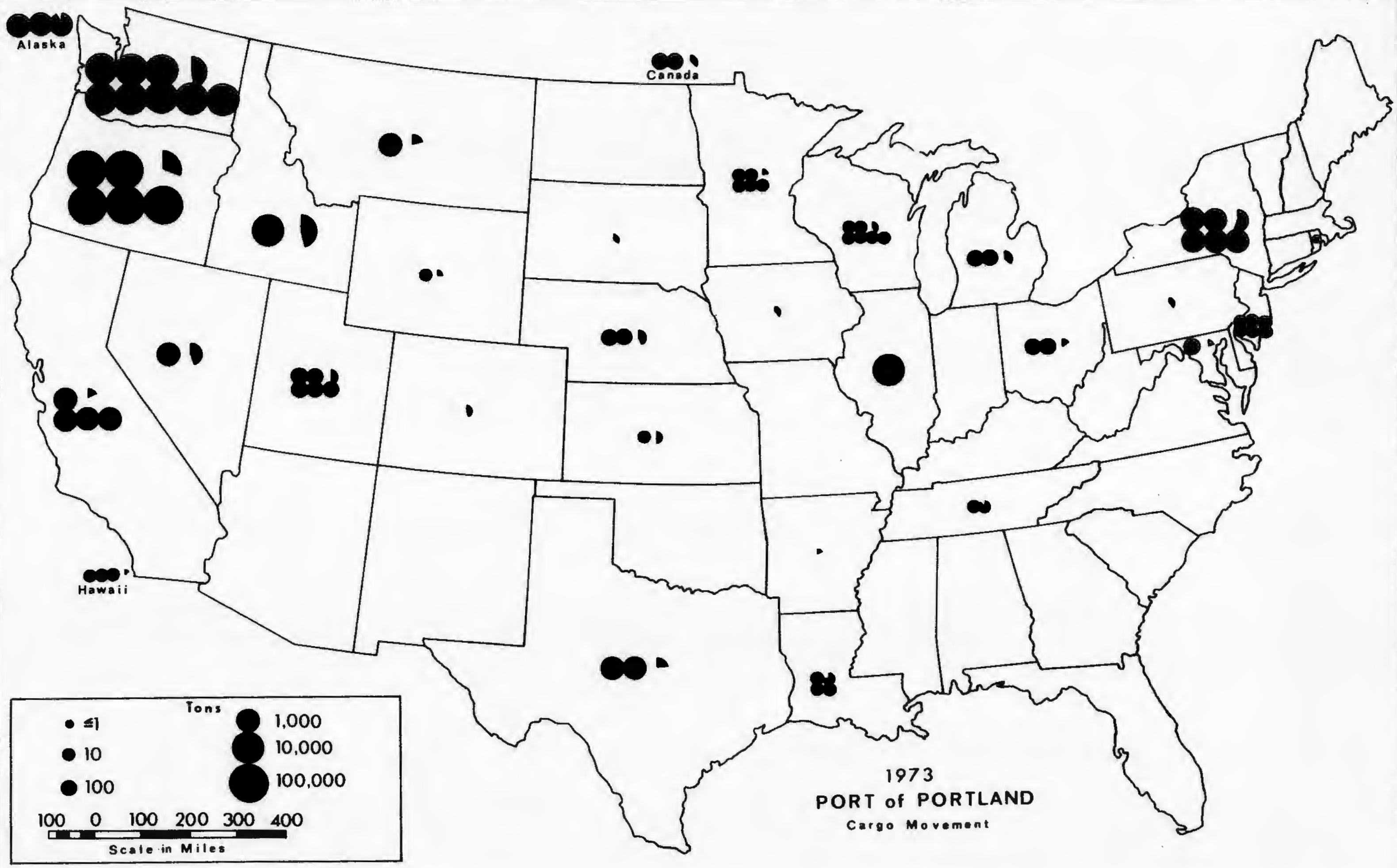

Figure 9. Destinations of total imports.

Figure 10. Destinations of bulk imports.

imports. Washington was much less important, but was the only other state of destination of bulk imports.

The supply of bulk imports was assumed to be a given because the availability of bulk off-loading facilities at the Port of Portland was indicated by the fact that import bulk movement took place at all. However, while complementarity (supply and demand) was a factor in influencing import bulk destinations, the bulk imports were strongly influenced by transferability. The reason for this is the same as it was for the export bulks. That is, the extreme sensitivity to transport costs of bulk cargo of relatively low value per unit of weight shipped. The existence of other ports, intervening opportunity, and bulk commodity sensitivity to transport costs, transferability, were the dominant factors in localizing bulk import flows and producing a compact primary hinterland around the Port of Portland.

Automobiles

The import hinterland for automobiles is indicated in Figure 11, Washington, Oregon, and Idaho had 46.65%, 33.40%, and 11.86%, respectively, of the total imported automobiles. The primary factor was the distribution system of the import automobile dealers, with complementarity, transferability, and intervening opportunity assuming a lesser degree of direct importance.

The importance of the three factors' influence on the

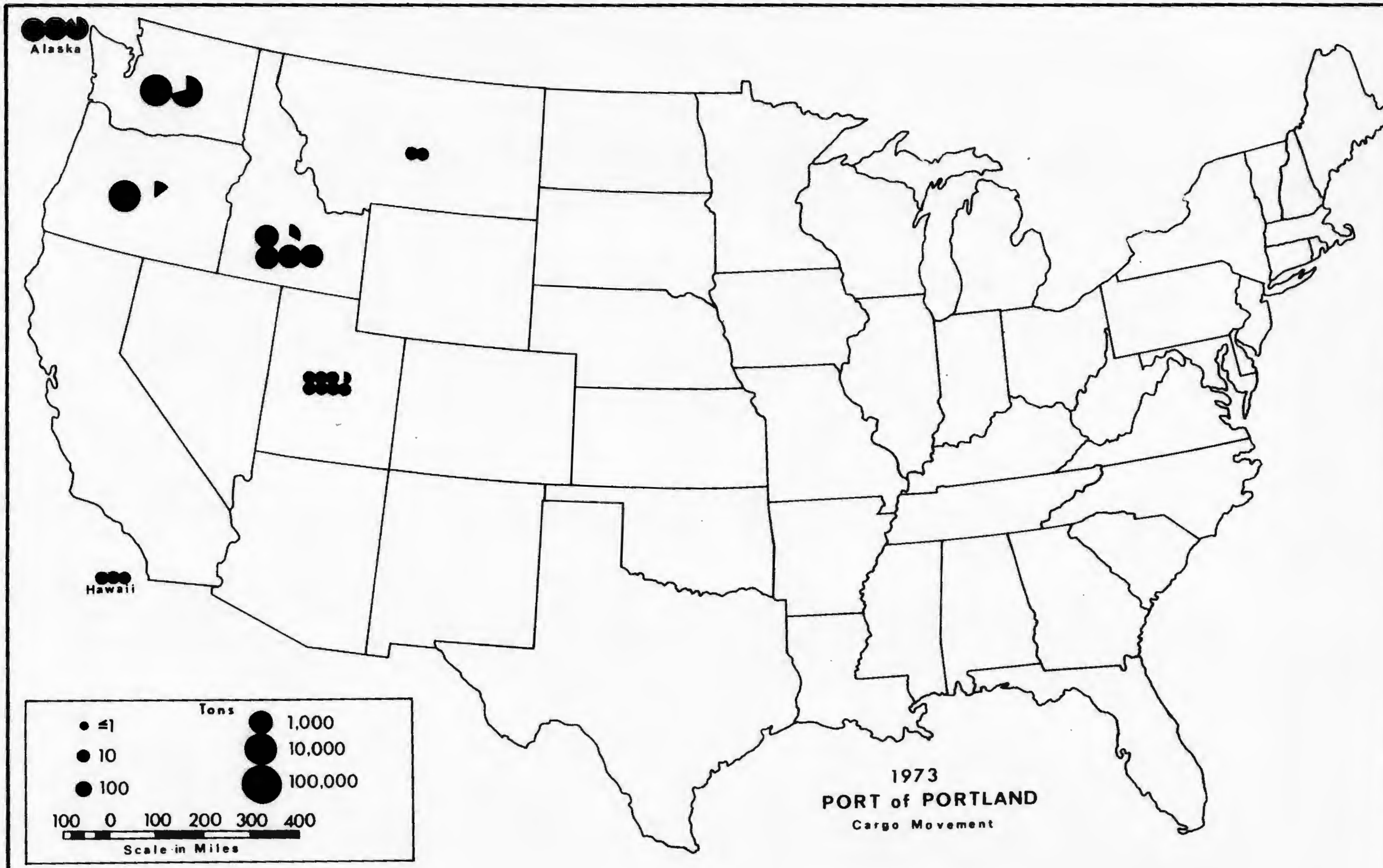

Figure 11. Destinations of automobile imports.

flow pattern of automobiles was indirectly related to the distribution system. The dealers who imported automobiles through Port of Portland facilities did so because of prearranged agreements, steamship service capabilities, and existing facilities owned or leased by them. Conditions of competition and contractual agreements largely negated any effects of intervening opportunity. Therefore, the quantity of automobiles imported in Portland as opposed to other ports was decided by market conditions in the United States for the particular automobiles handled by those dealers. The effect of transferability on the import automobile flow, within the existing distribution system, was evident, however, by the localization of the flow pattern. The high value per unit shipped of automobiles tended to negate transport cost sensitivity. The friction of distance was the prime factor in the centralization of flows. Complementarity, in the form of Port of Portland facilities (supply) and population demand, was evident by the fact that Washington, a more populous state, was the destination for more automobiles than Oregon. Facilities existing elsewhere were not necessarily factors of complementarity due to the distribution system. The indirect shipments to Alaska, as opposed to direct shipments to Alaskan ports, was the result of the existing distribution system.

Steel

The flow pattern for import steel is shown in Figure

12. Oregon was the destination for 85.58% of the imported steel, while Washington and Idaho accounted for 7.92% and 2.41%, respectively. Transferability is reflected in the primary hinterland exemplified by steel.

Complementarity was a factor in import steel flows in the form of domestic population (demand) and import steel facilities being present. However, intervening opportunity (the availability of import steel facilities at ports closer to steel consuming areas) combined with transferability to negate the complementarity existing between the Port of Portland and areas closer to other ports. This generalized statement did not hold for shipments to major population states such as California, Illinois, and New York. The reason for these exceptions is not apparent from the data. Steel is a heavy commodity sensitive to transport costs, as were the export and import bulks. However, the importance of cost sensitivity to movement is somewhat less than with bulks because the value of steel per unit shipped is greater. A possible explanation accounting for the extended flow pattern of steel might be the location of the customers of steel importers in Portland. The lesser sensitivity of steel to movement might allow shipments over longer distances to particular customers.

Containerized

The importance of complementarity and intervening opportunity in the spatial extent of import hinterlands was

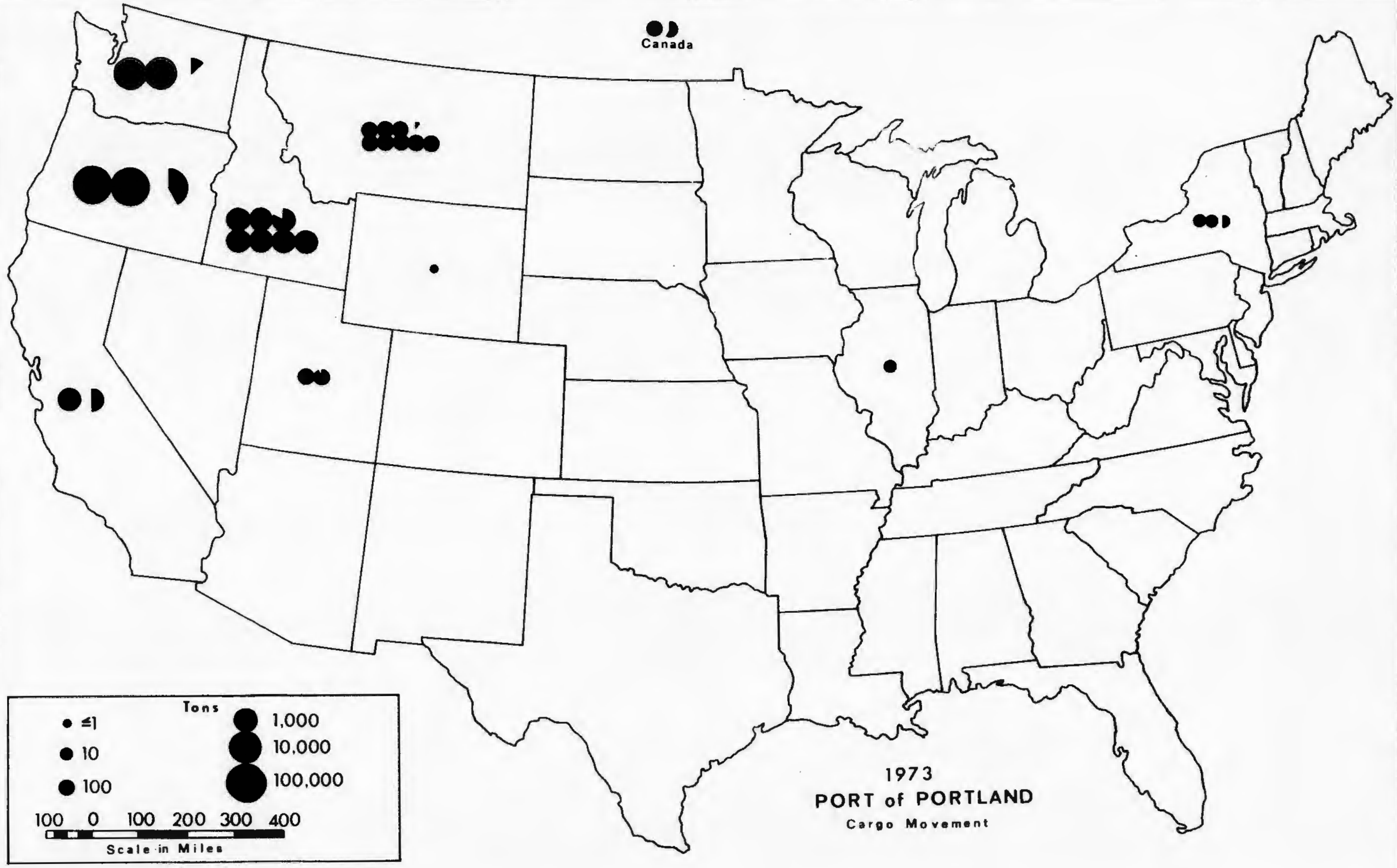

Figure 12. Destinations of steel imports.

quite evident in the import containerized cargo hinterland. A primary hinterland was evident in Oregon, which was the result of the friction of distance, or transferability. As with export containerized cargo, the import containerized cargo was generally high in value per unit of weight, thus negating transport cost sensitivity to a large degree. While Oregon was the destination for 55.05% of the containerized imports, California, Illinois and New York accounted for 20.47% of the total containerized imports, as shown in Figure 13. Washington represented a fringe area of the primary hinterland (Oregon) with only 18.12% of the containerized imports destined for that state.

Complementarity existed in the hinterland in the form a demand related to major population areas. The supply of facilities for handling import containerized cargo was present at all major ports. This universal supply and the friction of distance combined to provide the influence of intervening opportunity. With larger populations, it was assumed that California and Washington would demand more imported goods than Oregon, yet their respective tonnages are smaller than in Oregon. The reason is the fact that the imported containerized cargo destined for those other areas came from closer ports such as the Port of Seattle, the Port of Oakland and the Port of Los Angeles/Long Beach.

Another factor was present in the flow of imported

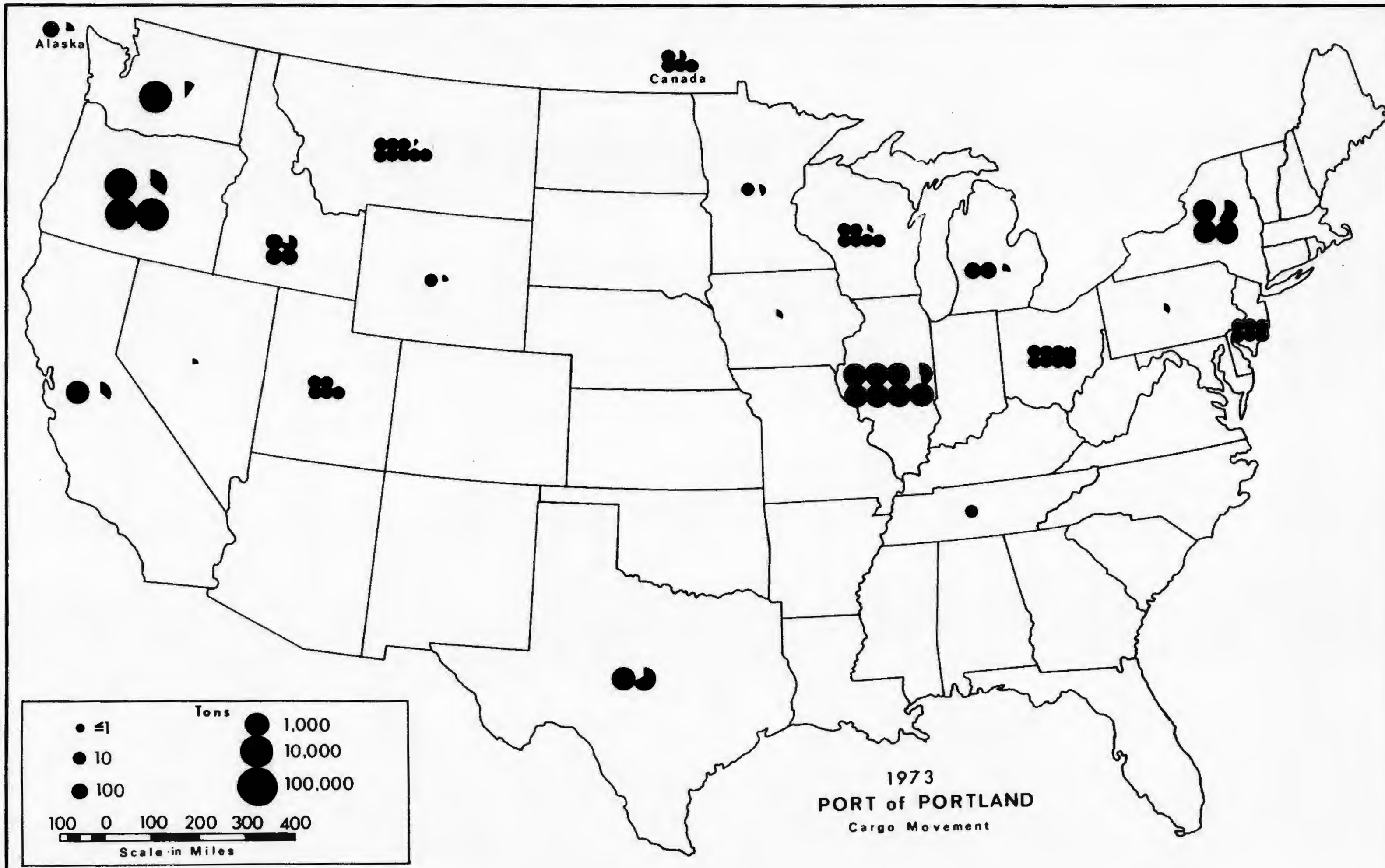

Figure 13. Destinations of containerized imports.

containerized cargo: the "Overland Common Point" (OCP) cargo freight rate. Basically, OCP means that certain cargo destined for any point east of a north/south line bisecting Denver, Colorado, is shipped at the same rate from any of the West Coast ports. OCP cargo was mostly containerized and breakbulk cargo. The effect that OCP cargo rates had on containerized imports at the Port of Portland was to increase the importance of complementarity (population demand) at the expense of transferability for eastbound cargo. This was evidenced by the shipments to such states as Texas, Illinois, Ohio and New York.

Breakbulk

The breakbulk import flow was similar to that of containerized imports as depicted in Figure 14. Oregon represented a stronger primary hinterland with 68.60% of the breakbulk imports destined for areas within its borders; a direct result of transferability (the friction of distance rather than sensitivity to transport costs). Complementarity, like containerized imports, was present between the hinterland (demand) and all ports (supply). The facilities for handling breakbulk cargo were available universally. Thus, transferability (the friction of distance) and complementarity provided increased opportunities for imported breakbulk cargo to move through other ports. The smaller movement from the Port of Portland to Washington and California was the result of intervening

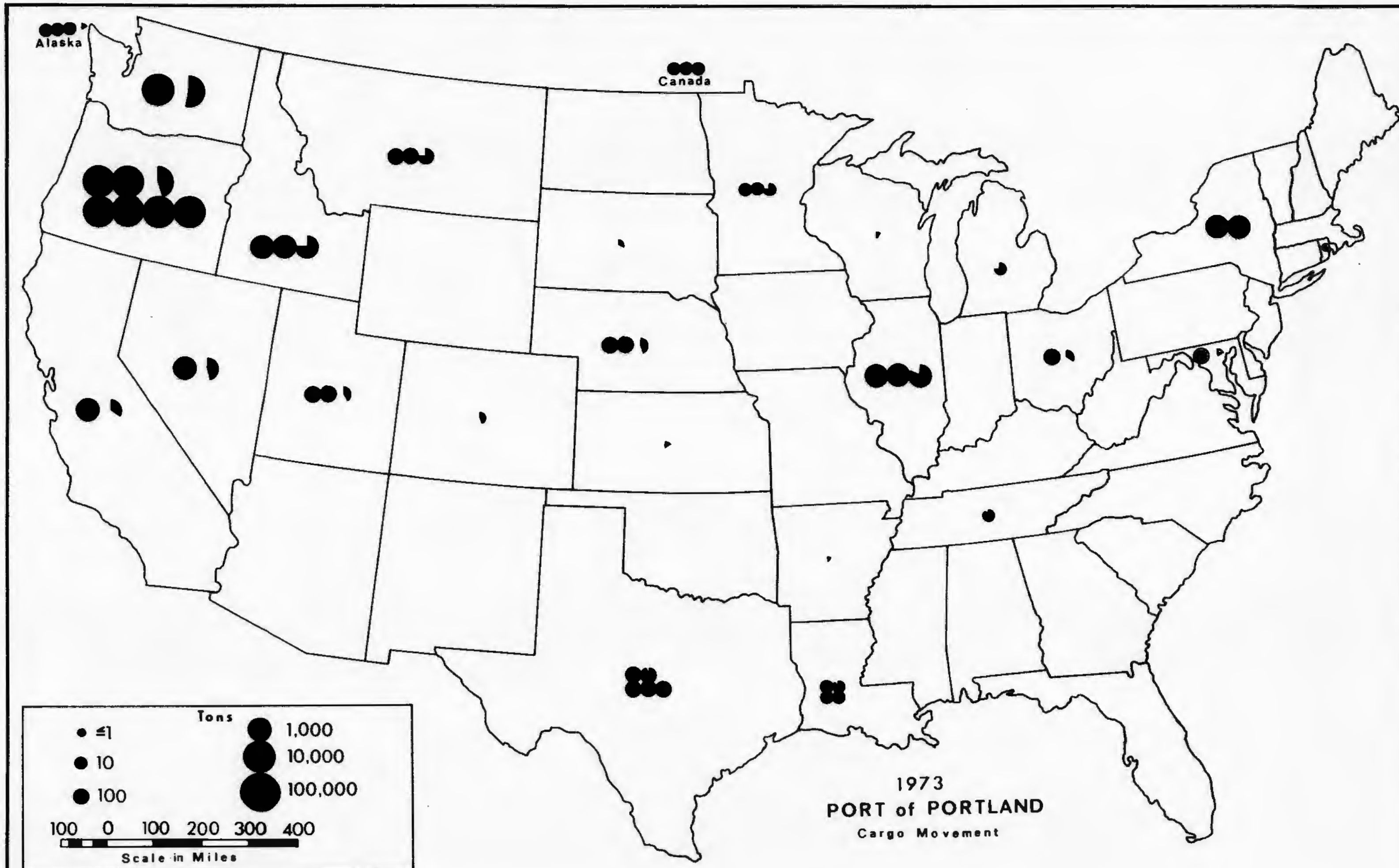

Figure 14. Destinations of breakbulk imports.

opportunities.

OCP rates (discussed in containerized cargo section above) had a smaller effect on breakbulk imports than on containerized imports, as evidenced by smaller tonnages shipped eastbound. The increase in the localization of import breakbulk flows as compared to import containerized flows was not completely explainable from the data. The cause may have stemmed from the level of steamship service alluded to above for export breakbulk. The foreign countries exporting breakbulk cargo destined for the United States may have been constrained by limited breakbulk steamship service. Also, the effect of OCP rates may have been less on breakbulk than containerized cargo because the quantity of OCP breakbulk cargo has been decreasing in the past few years. More and more OCP cargo has been shipped in containers because of the increase in ease of handling and the decrease in damage resulting from containerized movement.

CONCLUSIONS

Exports

The nature of the export hinterlands varied with the nature of the facility group. The scope of this study does not permit the analysis of secondary hinterlands because of the domestic origins of exports passing through other ports was not delineated. It was assumed, however, that overlapping hinterlands theoretically existed, to varying degrees, throughout the United States. It was possible to identify primary and discontinuous hinterlands, from the Port of Portland's perspective, within the scope of this study.

Containerized and breakbulk cargo was characterized by a primary hinterland in the states surrounding the Port of Portland and, following the assumption above, a secondary hinterland existed throughout the United States. The primary hinterlands of these two facility groups tended to decrease with distance while the secondary hinterland did not. The evidence of a secondary hinterland for containerized and breakbulk cargo was directly attributed to the factor of complementarity (availability of necessary facilities at other ports). The relatively small magnitude of the secondary hinterland was the result of the effect of intervening opportunity. The major factor in producing the localization of flows of containerized and breakbulk cargo into a primary hinterland was transferability. However, with these two facility groups, the friction of distance appeared to be more important to restricting the flows over distance than sensitivity to transport costs due to the generally higher value of containerized and breakbulk cargo.

The liquid bulk facility group represented a primary hinterland centered in Oregon, decreasing in importance through Washington, Idaho, and Montana. Grain and dry bulk were each represented by a primary hinterland, Oregon and Washington. The supply factor (complementarity) is partially responsible for localization of flows. This was due to the location of the producing regions of the commodities that make up the grain and dry bulk facility groups, and facility availability. The primary factor responsible for producing the localization of flows in the bulk facility groups was transferability. Unlike containerized and breakbulk cargo, however, the sensitivity to transport costs was paramount for bulks.

In general terms, the three-factor typology fitted the flow of export goods from domestic origins, through the Port of Portland, to foreign destinations. Complementarity, transferability, and intervening opportunity, each represented factors making the northwestern quadrant of the United States the Port of Portland's export hinterland, with transferability generally most important. Oregon, Washington, Idaho, Montana, and Wyoming made up the heart of this hinterland to varying degrees generally correlated to distance. The states bordering the hinterland tended to be less important than those in the hinterland, but more important than even more distant states.

Imports

As with exports, the nature of the import facility hinterlands varied with the nature of the facility group.

The three-factor typology played an important role in the flows making up the import hinterlands, but in a slightly different way than with exports.

All of the import facility groups exhibited a primary hinterland centered on Oregon and Washington, which was a direct result of the effect of transferability. This manifested itself as sensitivity to transport costs for bulk and steel, and the friction of distance for automobiles, containerized and breakbulk cargo. The factor of complementarity was largely negated by transferability and intervening opportunity in the case of bulk and steel flows. The existence of a set distribution system provided an increased importance of complementarity in import automobile flows. The existence of OCP cargo rates and the relatively high value per unit shipped of containerized and breakbulk cargo extended the flows of those to facility groups.

In general the three-factor typology fitted the flow of import goods from the Port of Portland to domestic destinations. The three factors combined to make the Port of Portland's import hinterland primarily located in Oregon and Washington. However, complementarity, due to the exogenous factors of OCP rates for containerized and breakbulk cargo and an already existing distribution system for automobiles, provided a basis for extended commodity flow in terms of distance and magnitudes.

It is not suggested that complementarity, transferability and intervening opportunity were the only factors involved in export and import commodity flows. The factors are actually many and varied, as is necessarily the case in an economic system as deversified and complex as that of the United States. What is suggested is that an understanding of the interaction of the three factors within the economic system explained a good deal of the export and import commodity flow of the Port of Portland, and thus its hinterlands.

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APPENDIX A

COMMODITIES MOVING THROUGH THE PORT OF PORTLAND BY FACILITY GROUPS 1973

Abbreviations:
- NOS - Not otherwise specified
- NEC - Not elsewhere classified
- CND - Canned
- FR - Fresh
- FZ - Frozen

IMPORTS

Steel

The following commodities were classified in the steel facility group because they are the major commodities that move through the Port of Portland's steel facility.

Iron Bars
Iron Sheets
Steel Flats and Bars
Steel Beams, Angles and Channels
Steel Coils
Steel Pipe and Tubing
Steel Sheet and Plate
Steel NEC

Automobiles

New Automobiles
Used Automobiles

Bulk, Containerized and Breakbulk

The following commodities can be shipped in either the containerized, breakbulk and, in some cases, bulk categories. Generally, ores and liquids move in bulk, but this is not always the case. All of the commodities listed below can be shipped in containers, but do not have to be. The facility group classification used in the text is based on the method actually used to move the commodities, on an individual basis, in 1973.

Agates
Alcoholic beverages, NOS
Alcoholic beverages, beer
Alcoholic beverages, wine
Alcohol polyvinyl
Alumina
Aluminum chloride
Aluminum foil
Aluminum manufactures
Aluminum sheets
Ammonium bicarbonate
Ammonium chloride
Ammunition & firearms
Anchovies, canned
Antimonyware
Apples, canned
Appliances
Arsenic powder
Artichokes, canned
Artificial flowers & fruit
Asbestos articles
Ascorbic acid
Asparagus, CND
Auto parts
Axes
Bacon, canned
Bags, NOS
Ball bearings
Bamboo shoots
Bambooware
Basketware
Bauxite
Bearings, NOS
Beef casings
Beef, canned
Beef, frozen
Bicycles & parts
Binoculars
Biscuits
Blood, dried
Boats & parts
Bone meal
Books & magazines
Brass sheets & strips
Brassware
Brooms, corn
Brushes NOS
Bulbs, flower
Burlap
Burlap bags
Calcium chloride
Calculators
Cameras
Canoles
Carbon tetrachloride
Casein
Cast iron stoves
Caustic potash
Cement-white
Chains, NOS
Chains, link
Chains, roller
Cheese
Chemicals, NOS
Chestnuts
Chinaware
Christmas decorations
Christmas lights
Chrome
Chromium oxide
Cigarettes
Circular saw blades
Clams, canned
Clothing & apparel
Cocoa crumbs
Cocoa powder
Coconut
Cod fillets
Coffee
Confectionery
Computer hardware
Cod liver oil, medicinal
Construction equipment, used
Conveyor belts
Cork, agglomerated
Cork board

Corrugated sheets
Cotton cloth
Cotton goods
Cotton linters
Cotton waste
Crab, CNO
Creosote oil
Cryolite synthetic
Cube powder
Cylinders, empty
Dates
Decorative greens
Dextrine
Display material
Coors
Coorskins
Drugs & medicine
Earthenware & ceramicware
Eggs, hatching
Electric batteries
Electric bulbs
Electric motors
Electric products
Electric transformers
Electrodes, carbon
Electrodes, cathode
Electronic equipment & instruments
Envelopes
Explosives
Expanded metal
Felt sheathing
Ferromanganese
Ferromanganese
Ferromanganese ore
Ferrous metal products
Fertilizer, NOS
Fiberboard
Fireworks
Fish, canned
Fish, frozen
Fish meal
Flatware
Flax scutched & retted
Foodstuffs, NOS
Footware
Formic acid
Fruit, canned
Fruit, dried
Fruit, fresh
Fruit preserves
Furniture
Gas water heaters
Gelatine indust
Ginger beer
Glass mirrors
Glass plate & window
Glass products
Glue
Granite blocks & slabs
Hams, canned
Handbags & purses
Handicrafts, NOS
Hardboard
Hardware & tools
Herring, canned
Hides
Horseradish
Housewares
Ink, printing
Insulators, porcelain
Iron ore
Jute
Kapok
Kelp meal
Lacquerware
Lead
Lead concentrate
Leather manufactures
Limestone rock
Lingon berries
Linoleum
Locust bean gum-meal
Lobsters, frozen
Lumber, hardwood
Lumber, NOS
Lumber, softwood
Machinery & parts
Machinery, agricultural
Machinery, diesel engines
Machinery, logging, lumber, plywood
Machinery, tractors
Magnesium chloride
Magnet powder
Marble manufactures
Marble slabs
Manganese metal
Manganese ore
Mats
Meat, canned
Medical-dental supplies
Metalware
Miscellaneous

Molasses
Monochloreacetic acid
Monosodium glutnate
Motorcycles, parts, & accessories
Mung beans
Mushrooms, canned
Musical instruments
Nails
Newspapers
Noodles
Nursery stock & plants
Nuts, cashew
Nuts, brazil
Olives
Olive oil
Onions, in brine
Onions, frozen
Optical goods
Oranges, canned
Oranges, fresh
Ore, NOS
Oysters, canned
Paint
Paintings & pictures
Palmyra stalks
Paper & manufactures
Papayas
Paprika
Peatmoss
Perchlorethylene
Perfume
Pesticides
Pet food & supplies
Petroleum products
Phonographs & parts
Phosphate
Photographic materials
Pimentos
Pineapple, canned
Pineapple, fresh
Pipe & pipe fittings
Pipe, galvanized
Plastic bags
Plastic manufactures
Plastic sheets
Plumbing supplies
Plywood & veneer
Potassium permanganate
Printed matter, NOS
Quebracho extract
Radios
Rags wiping
Rainwear
Rattanware
Rope
Rubber, crude
Rubber manufactures
Rugs
Rye crisp
Salmon, canned
Salt
Samples
Sardines, canned
Sausages
Saws, chain
Sea shells
Seed, NOS
Seedlac
Sewing machines & parts
Shellac
Shrimp, canned
Shrimp, frozen
Slate slabs
Snowmobiles
Sodium cyanide
Sodium trisulphate
Solder
Soy sauce
Spices
Sporting goods
Squidbait, frozen
Stainless steel sheets & plates
Stationery
Starch
Steel chains, NOS
Steel nuts, bolts, & screws
Stereo equipment
Sugar
Syrup
Talc
Tamaride powder
Tape
Tape recorders
Tapioca flour
Tapioca pearls
Tar
Tea
Television sets
Tile
Tinplate
Tin slabs
Titanium ingots

Titanium sponge (dioxide)
Tires & tubes
Tomatoes, canned & fresh
Toys
Travertine slabs
Tricaphos
Tropical fish
Trout, frozen
Tuna, canned
Tuna, frozen
Twine
Typewriters
Umbrellas
Urea
Valves & gates
Vegetables, canned
Vegetables, frozen
Vermiculite
Vises machine
Wax
Wheat gluten
Wire
Wire baler
Wire cloth
Wire fencing
Wire rope
Wood manufactures
Woodpulp
Wool
Yarn
Zinc ammonium chloride
Zinc cincentrate
Zinc plates
Zirconium sponge (oxide)
Zircon sand & flour
Zircon scrap

EXPORTS

Grain

Wheat
Barley

Liquid Bulk

Tallow
Molasses
Tall Oil

Logs

Logs

Dry Bulk, Containerized and Breakbulk

The following commodities can be shipped in either the containerized, breakbulk and, in some cases, dry bulk categories. Generally, ores and flowers move in bulk, but this is not a rule. All of the commodities listed below can be shipped in containers, but do not have to be. The facility group classification used in the text is based on the method actually used to move the commodities, on an individual basis, in 1973.

Abrasives
Adding & accounting machinery
Alcoholic beverages
Alfalfa cubes
Alfalfa pulp pellets
Aluminum ingots
Aluminum scrap
Ammunition & firearms
Apple concentrate
Apples, dried
Apples, fresh
Appliances, major home
Asparagus
Asphalt
Avacados
Beans, canned
Beans, dried
Beans, fresh
Beans, frozen
Beet pulp pellets
Beets, canned
Bentonite clay
Berries, canned
Berries, fresh
Berries, frozen
Blackberries, fresh
Blackberries, frozen
Blueberries, fresh
Blueberries, frozen
Blood meal
Boats & parts
Bone meal
Bowling equipment & supplies
Boysenberries, canned
Boysenberries, fresh
Boysenberries, frozen
Brass scrap
Broccoli
Building supplies
Bulk, NOS
Burlap bags
Cabbage
Cants
Carrots, canned & frozen
Carrots, fresh
Cascara bark
Cast iron pipe
Cauliflower
Chemicals, NOS
Cherries
Clothing
Coal
Coal tar pitch
Coke
Compressors
Copper cathodes
Copper bars & Ingots
Copper scrap
Corn, canned
Corn, fresh
Corn, frozen
Corn, grain
Crab, FR
Crab, FZ
Display material
Doors
Doorskins
Electrical goods, NOS
Electrical motors
Essential oils, NOS
Fabric goods
Feather meal
Feed, poultry & stock
Ferro phosphorous
Fertilizers
Fiberboard
Fiberglass & products
Film
Fish, canned
Fish digest
Fish, fresh
Flour
Foodstuffs, canned
Foodstuffs, frozen
Foodstuffs, NOS
Fruit, canned
Fruit, concentrate NOS
Fruit juices, frozen
Furs
Gauges
Gilsonite
Glue
Grapes
Grass screening cubes

Gypsum
Hand tools
Hardware
Hay cubes
Hides
Holly, fresh
Hop extract
Hops
Housewares
Hydrogen peroxide
Infusorial earth
Iron & steel
Lead scrap
Lentils
Lettuce
Lift trucks & parts
Lignin pitch
Linerboard
Livestock
Loganberries, fresh
Loganberries, frozen
Lubricating oil
Luggage
Lumber, hardwood
Lumber, NOS
Lumber products, NOS
Lumber, softwood
Machinery, agricultural
Machinery, heavy NEC
Machinery, light NEC
Machinery, log, lumber, plywood
Machinery, mining
Machinery, NOS
Magazines
Magnesium cloride
Malt
Meat, canned
Meat, frozen
Meat meal
Medical-dental supplies
Metal castings
Metal ingots
Metal scrap
Metals, NOS
Microfilm equipment
Milk, canned
Milk, powdered
Millfeed pellets
Milo
Miscellaneous
Motorcycles & parts
Nickel ingots
Nursery stock
Nuts
Oats
Oats, rolled
Old newspaper & scrap
Onions
Ore, NOS
Oscilliscopes & parts
Oysters
Paints & resins
Paper, NOS
Paper products
Particle board
Peaches
Pears, canned
Pears, fresh
Pear concentrate
Peas, canned
Peas, dried
Peas, fresh
Peas, frozen
Peppermint oil
Periodicals
Petroleum products NOS
Photographic equipment
Pickles
Pipe & pipe fittings
Plastic sheet & manufactures
Plums
Plywood
Poles
Potatoes, dehydrated
Potatoes, fresh
Potatoes, frozen
Potato flour
Potash
Poultry
Precut homes
Preserves
Prunes, dried
Pulpboard
Pumps
Rasberries, fresh
Rasberries, frozen
Rubber, crude
Rye
Salmon, frozen
Samples
Saw chains & tools
Scoups & parts
Seed, alfalfa

Seed, bean
Seed, bentgrass
Seed, bluegrass
Seed, clover
Seed, corn
Seed, fescue
Seed, garden
Seed, grass
Seed, pea
Seed, ryegrass
Seed, timothy
Seed, vegetable
Seed, orchardgrass
Shrimp, fresh
Shrimp, frozen
Soap & powder
Soybeans
Spearmint oil
Sporting goods
Steel & iron scrap
Strawberries, fresh
Strawberries, frozen
Talc
Technical instruments

Tinplate
Tin scrap
Tires & tubes
Trailers & parts
Trucks & parts
Vegetables, canned
Vegetables, fresh
Vegetables, frozen
Vitamins, pills & liquid
Wallboard
Weed killer compound
Whey
Wheat, rolled
Winches
Wire NOS
Wood burls
Woodchips
Woodfiller
Wood manufactures
Woodpulp
Youngberries, fresh
Youngberries, frozen
Zinc
Zirconium sponge

APPENDIX B

CITY ORIGINS OF EXPORTS FROM
PORT OF PORTLAND FACILITIES 1973

Abbreviations: NOS - Not otherwise specified
NEC - Not elsewhere classified

LIQUID BULK

	Short Tons	%	% of Respective State Total
Billings, Montana	114.65	0.49	65.74
Columbia City, Oregon	25.36	0.11	0.12
Eugene, Oregon	149.31	0.64	0.74
Great Falls, Montana	59.74	0.26	34.26
Hillsboro, Oregon	53.04	0.23	0.26
Ontario, Oregon	147.10	0.63	0.72
Pasco, Washington	1,526.06	6.56	92.86
Portland, Oregon	19,939.07	85.71	98.16
Spokane, Washington	44.76	0.19	2.72
Yakima, Washington	72.68	0.31	4.42
Unknown	1,131.08	4.86	-
Total	23,262.85	99.99*	-

GRAIN

	Short Tons	%	% of Respective State Total
Kalama, Washington	11.55	0.00	100.00
Portland, Oregon	1,644,967.07	98.70	100.00
Unknown	21,651.84	1.30	-
Total	1,666,630.46	100.00	-

* Total does not sum to 100% due to rounding

DRY BULK

	Short Tons	%	% of Respective State Total
Alder, Montana	14,838.05	8.39	100.00
Brooks, Oregon	300.19	0.17	0.34
Grey Bull, Wyoming	9,074.00	5.13	18.05
Lovell, Wyoming	41,206.33	23.30	81.95
Oregon, All Other Cities	15,459.13	8.74	17.20
Pocatello, Idaho	16,844.26	9.52	100.00
Portland, Oregon	69,170.34	39.11	76.95
Veneta, Oregon	4,954.94	2.80	5.51
Washington, Eastern NOS	5,013.16	2.83	100.00
Total	176,860.40	99.99*	-

CONTAINERIZED

	Short Tons	%	% of Respective State Total
Alabama NOS	2.45	0.00	100.00
Albany, Oregon	4,364.12	1.51	2.17
Allendale, Idaho	171.86	0.06	1.92
Amity, Oregon	16.80	0.01	0.01
Anacortes, Washington	172.65	0.06	0.33
Astoria, Oregon	107.10	0.04	0.05
Athena, Oregon	0.27	0.00	0.00
Aumsville, Oregon	11.08	0.00	0.01
Aurora, Oregon	840.51	0.29	0.42
Baker, Idaho	20.11	0.01	0.22
Beaverton, Oregon	568.12	0.20	0.28
Battle Ground, Washington	18.35	0.01	0.04
Belmont, Washington	22.00	0.01	0.04
Bend, Oregon	30.98	0.01	0.01
Billings, Montana	48.07	0.02	8.47
Billington, Washington	18.98	0.01	0.04
Bingen, Washington	75.50	0.03	0.14
Boise, Idaho	219.95	0.08	2.45
Bonner's Ferry, Idaho	49.25	0.02	0.55
Brooks, Oregon	14,368.92	4.99	7.16
Brownsville, Oregon	655.50	0.23	0.33
Buhl, Idaho	223.00	0.08	2.49
Caldwell, Idaho	164.05	0.06	1.83
Camas, Washington	2,254.82	0.78	4.33
Canby, Oregon	8.52	0.00	0.00
Carver, Oregon	173.77	0.06	0.09

* Total does not sum to 100% due to rounding

Containerized (continued)

	Short Tons	%	% of Respective State Total
Cedar Rapids, Iowa	40.03	0.01	100.00
Centralia, Washington	39.20	0.01	0.08
Charleston, Oregon	25.66	0.01	0.01
Chehalis, Washington	125.85	0.04	0.24
Clackamas, Oregon	0.59	0.00	0.00
Columbia City, Oregon	240.97	0.08	0.12
Colfax, Washington	142.66	0.05	0.27
Colton, Oregon	1.67	0.00	0.00
Connell, Washington	224.74	0.08	0.43
Coos Bay, Oregon	41.07	0.01	0.02
Corvallis, Oregon	322.31	0.11	0.16
Cottage Grove, Oregon	137.27	0.05	0.07
Craigmont, Idaho	11.00	0.00	0.12
Culp Creek, Oregon	218.07	0.08	0.11
Dallas, Oregon	2,469.48	0.86	1.23
Dayton, Washington	19.43	0.01	0.04
Dillard, Oregon	1.83	0.00	0.00
Dishman, Washington	12.86	0.00	0.02
Donald, Oregon	40.94	0.01	0.02
Dundee, Oregon	10.34	0.00	0.01
Estacada, Oregon	8.45	0.00	0.00
Eugene, Oregon	1,735.12	0.60	0.86
Fairfield, Washington	98.93	0.03	0.19
Filer, Idaho	455.99	0.16	5.09
Forest Grove, Oregon	6,003.34	2.08	2.99
Foster, Oregon	153.29	0.05	0.08
Ft. Wayne, Indiana	5.50	0.00	100.00
Gardner, Oregon	163.45	0.06	0.08
Garfield, Washington	658.66	0.23	1.26
Garibaldi, Oregon	31.40	0.01	0.02
Gaston, Oregon	2,316.02	0.80	1.15
Glendale, Oregon	43.64	0.02	0.02
Gold Hill, Oregon	3.41	0.00	0.00
Gonzales, California	0.35	0.00	0.31
Gooding, Idaho	5.60	0.00	0.06
Grandview, Washington	5.00	0.00	0.01
Grandville, Idaho	285.55	0.10	3.19
Grants Pass, Oregon	0.60	0.00	0.00
Great Falls, Montana	111.40	0.04	19.63
Gresham, Oregon	2.44	0.00	0.00
Grey Bull, Wyoming	1,201.67	0.42	100.00
Halsey, Oregon	511.86	0.18	0.25
Hammond, Oregon	224.19	0.08	0.11
Harrah, Washington	2.00	0.00	0.00
Harrisburg, Oregon	322.85	0.11	0.16
Harrisburg, Washington	2.53	0.00	0.00
Hazelton, Idaho	306.36	0.11	3.42
Hermiston, Oregon	6.54	0.00	0.00

Containerized (continued)

	Short Tons	%	% of Respective State Total
Hillsboro, Oregon	328.10	0.11	0.16
Homedale, Idaho	55.28	0.02	0.62
Hood River, Oregon	1,265.96	0.44	0.63
Hubbard, Oregon	42.23	0.01	0.02
Idaho, Northeastern NOS	307.15	0.11	3.43
Idaho Falls, Idaho	108.38	0.04	1.21
Illinois NOS	25.99	0.01	100.00
Independence, Oregon	64.41	0.02	0.03
Ironton, Utah	2.22	0.00	1.61
Jefferson, Oregon	2,531.85	0.88	1.26
Jerome, Idaho	473.44	0.16	5.28
Kalama, Washington	351.95	0.12	0.68
Kendrick, Idaho	158.16	0.05	1.76
Kennewick, Washington	199.49	0.07	0.38
Kimberly, Idaho	818.38	0.28	9.13
Ketchikan, Arkansas	43.82	0.02	8.98
Kirkland, Washington	0.38	0.00	0.00
La Grande, Oregon	0.77	0.00	0.00
Lake Oswego, Oregon	241.20	0.08	0.12
Lapwai, Idaho	55.12	0.02	0.61
La Vern, Minnesota	18.00	0.01	74.23
Lebanon, New Hampshire	507.50	0.18	100.00
Lebanon, Oregon	656.00	0.23	0.33
Lewiston, Idaho	266.73	0.09	2.98
Linnton, Oregon	191.23	0.07	0.10
Longview, Washington	3,302.02	1.15	6.33
Los Angeles, California	5.50	0.00	4.89
Lowden, Washington	21.06	0.01	0.04
Madras, Oregon	272.75	0.09	0.14
Mapleton, Oregon	117.25	0.04	0.06
Marsine, Idaho	182.95	0.06	2.04
McMinnville, Oregon	70.87	0.02	0.04
Medford, Oregon	31.07	0.01	0.02
Metolius, Oregon	23.92	0.01	0.01
Michigan, NOS	3.77	0.00	100.00
Milner, Idaho	5.60	0.00	0.06
Milton Freewater, Oregon	515.13	0.18	0.26
Milwaukie, Oregon	205.81	0.07	0.10
Minneapolis, Minnesota	5.29	0.00	21.81
Minnesota NOS	0.64	0.00	2.64
Missoula, Montana	22.81	0.01	4.02
Molalla, Oregon	313.14	0.11	0.16
Monmouth, Oregon	60.29	0.02	0.03
Monroe, Oregon	28.96	0.01	0.01
Moscow, Idaho	855.08	0.30	9.54
Moses Lake, Washington	10.00	0.00	0.02
Mountlake Terr, Washington	129.52	0.04	0.25
Moxee City, Washington	1.95	0.00	0.00

Containerized (continued)

	Short Tons	%	% of Respective State Total
Mount Angel, Oregon	7.56	0.00	0.00
Myrtle Point, Oregon	2.51	0.00	0.00
Nampa, Idaho	647.17	0.22	7.22
Neal Creek, Oregon	235.02	0.08	0.12
Nevada NOS	68.81	0.02	100.00
Newberg, Oregon	759.47	0.26	0.38
Newport, Oregon	123.14	0.04	0.06
Newark, New Jersey	20.86	0.01	100.00
Nezperce, Idaho	45.09	0.02	0.50
North Bend, Oregon	0.44	0.00	0.00
Nyssa, Oregon	949.65	0.33	0.47
Notus, Idaho	20.24	0.01	0.23
Oakland, California	19.47	0.01	17.31
Oaksdale, Washington	111.62	0.04	0.21
Ocean Park, Washington	1.50	0.00	0.00
Odell, Oregon	145.75	0.05	0.07
Ogden, Utah	122.15	0.04	88.81
Ontario, Oregon	514.84	0.18	0.26
Oregon, All Other Cities	648.21	0.22	0.32
Othello, Washington	193.28	0.07	0.37
Palouse, Washington	103.60	0.04	0.20
Parma, Idaho	286.02	0.10	3.19
Pasco, Washington	2,101.07	0.73	4.03
Payette, Idaho	214.93	0.07	2.40
Pendleton, Oregon	154.28	0.05	0.08
Pennsylvania NOS	33.12	0.01	100.00
Phoenix, Arizona	447.49	0.16	100.00
Pocatello, Idaho	147.40	0.05	1.64
Pomeroy, Washington	94.12	0.03	0.18
Port Orford, Oregon	110.55	0.04	0.06
Portland, Oregon	106,757.74	37.05	53.16
Potlatch, Washington	0.04	0.00	0.00
Powers, Oregon	5.93	0.00	0.00
Progress, Oregon	130.86	0.05	0.07
Pullman, Washington	1.70	0.00	0.00
Quincy, Washington	21.61	0.01	0.04
Rainier, Washington	571.32	0.20	1.10
Randle, Washington	44.09	0.02	0.08
Rathbrum, Idaho	0.42	0.00	0.00
Redmond, Oregon	47.59	0.02	0.02
Renton, Washington	2.69	0.00	0.01
Rickreall, Oregon	94.76	0.03	0.05
Riddle, Oregon	1,306.79	0.45	0.65
Ridgefield, Washington	97.54	0.03	0.19
Roseburg, Oregon	333.40	0.12	0.17
Saginaw, Oregon	467.43	0.16	0.23
Salem, Oregon	2,568.79	0.89	1.28
Salt Lake City, Utah	13.17	0.00	9.58

Containerized (continued)

	Short Tons	%	% of Respective State Total
San Francisco, California	87.13	0.03	77.48
Scappoose, Oregon	3.00	0.00	0.00
Seattle, Washington	560.23	0.19	1.07
Selah, Washington	43.03	0.01	0.08
Shaniko, Oregon	1,060.00	0.37	0.53
Shedd, Oregon	526.09	0.18	0.26
Shelly, Idaho	37.00	0.01	0.41
Sheridan, Oregon	22.17	0.01	0.01
Sherwood, Oregon	1,130.40	0.39	0.56
Silverton, Oregon	127.80	0.04	0.06
Spokane, Washington	1,703.64	0.59	3.27
Springfield, Oregon	20,343.24	7.06	10.13
St. Helens, Oregon	1,798.54	0.62	0.90
Stanfield, Oregon	19.19	0.01	0.01
Stayton, Oregon	205.47	0.07	0.10
St. John, Washington	19.76	0.01	0.04
St. Paul, Oregon	5.50	0.00	0.00
Stuttgart, Arkansas	443.92	0.15	91.02
Sublimity, Oregon	5.50	0.00	0.00
Sunal, Nebraska	116.64	0.04	100.00
Sunnyside, Washington	31.36	0.01	0.06
Summer, Washington	338.00	0.12	0.65
Sweet Home, Oregon	822.58	0.29	0.41
Tacoma, Washington	61.78	0.02	0.12
Tangent, Oregon	1,790.45	0.62	0.89
Tennessee NOS	159.89	0.06	100.00
Texas NOS	175.47	0.06	100.00
The Dalles, Oregon	8,120.81	2.82	4.04
Three Forks, Montana	385.22	0.13	67.88
Tigard, Oregon	140.44	0.05	0.07
Tillamook, Oregon	4,899.07	1.70	2.44
Tilma, Washington	51.75	0.02	0.10
Toppenish, Washington	924.86	0.32	1.77
Touchet, Washington	37.55	0.01	0.07
Trentwood, Washington	43.77	0.02	0.08
Troutdale, Oregon	879.61	0.31	0.44
Troy, Idaho	417.03	0.14	4.65
Tualatin, Oregon	21.08	0.01	0.01
Twin Falls, Idaho	1,932.28	0.67	21.55
Underwood, Washington	26.92	0.01	0.05
Vancouver, Washington	35,836.85	12.44	68.74
Virginia NOS	124.92	0.04	100.00
Walla Walla, Washington	428.24	0.15	0.82
Wapato, Washington	179.22	0.06	0.34
Warrenton, Oregon	132.78	0.05	0.07
Washington, Eastern NOS	376.22	0.13	0.72

Containerized (continued)

	Short Tons	%	% of Respective State Total
Washington, D.C.	15.50	0.01	100.00
Washougal, Washington	6.25	0.00	0.01
Wauna, Oregon	3.90	0.00	0.00
Wayzata, Minnesota	0.32	0.00	1.32
Wenatchee, Washington	19.20	0.01	0.04
West Linn, Oregon	0.20	0.00	0.00
Weston, Oregon	224.90	0.08	0.11
Wilder, Idaho	18.70	0.01	0.21
Wilsonville, Oregon	17.31	0.01	0.01
Wisconsin NOS	38.18	0.01	100.00
Yakima, Washington	189.60	0.07	0.36
Canada	80.27	0.03	100.00
Unknown	21,858.13	7.58	-
Total	288.171.94	99.99*	

LOGS

	Short Tons	%	% of Respective State Total
Eugene, Oregon	92.24	0.03	0.04
Independence, Oregon	20.83	0.01	0.01
Longview, Washington	74.58	0.03	1.36
Milwaukie, Oregon	10.08	0.00	0.00
North Plains, Oregon	622.99	0.24	0.27
Oregon, All Other Cities	52,387.60	19.80	22.74
Portland, Oregon	176,814.57	66.84	76.74
Ridgefield, Washington	213.96	0.08	3.90
Salem, Oregon	22.40	0.01	0.01
Sheridan, Oregon	438.75	0.17	0.19
Vancouver, Washington	5,156.38	1.95	93.86
Washington, Eastern NOS	48.56	0.02	0.88
Unknown	28,623.02	10.82	-
Total	264,525.96	100.00	-

* Total does not sum to 100% due to rounding.

BREAKBULK

	Short Tons	%	% of Respective State Total
Albany, Oregon	8,285.13	2.19	2.82
Amboy, Washington	1,254.87	0.33	2.18
Amity, Oregon	5.50	0.00	0.00
Anacortes, Washington	1,179.99	0.31	2.05
Arcata, California	2.97	0.00	0.34
Ashland, Oregon	40.07	0.01	0.01
Arkansas NOS	46.21	0.01	100.00
Astoria, Oregon	1,730.25	0.46	0.59
Athena, Oregon	7.40	0.00	0.00
Baker, Idaho	2.15	0.00	0.03
Banks, Oregon	24.45	0.01	0.01
Beaverton, Oregon	1,173.75	0.31	0.40
Battle Ground, Washington	28.33	0.01	0.05
Belle Fourche, South Dakota	185.50	0.05	100.00
Belmont, Washington	183.70	0.05	0.32
Bend, Oregon	176.15	0.05	0.06
Bingen, Washington	494.77	0.13	0.86
Black Eagle, Montana	0.23	0.00	0.01
Blackfoot, Idaho	2.24	0.00	0.03
Blue Lake, California	70.90	0.02	8.17
Boise, Idaho	129.65	0.03	1.55
Boones Ferry, Idaho	94.05	0.02	1.13
Boring, Oregon	404.80	0.11	0.14
Bremerton, Washington	35.94	0.01	0.06
Brookings, Oregon	816.67	0.22	0.28
Brooks, Oregon	73.16	0.02	0.02
Buhl, Idaho	231.76	0.06	2.78
Caldwell, Idaho	28.46	0.01	0.34
California NOS	287.36	0.08	33.10
Camas, Washington	10,699.31	2.82	18.57
Canby, Oregon	20.70	0.01	0.01
Carlton, Oregon	0.84	0.00	0.00
Carver, Oregon	4,356.23	1.15	1.49
Cascadia, Oregon	21.45	0.01	0.01
Charleston, Oregon	4.04	0.00	0.00
Chehalis, Washington	398.08	0.11	0.69
Cherry Hills, New Jersey	10.31	0.00	100.00
Chelan, Washington	41.40	0.01	0.07
Chelatchie, Washington	996.48	0.26	1.73
Chicago, Illinois	21.10	0.01	15.02
Clackamas, Oregon	880.50	0.23	0.30
Cody, Wyoming	5,956.04	1.57	92.18
Colfax, Washington	110.11	0.03	0.19
Concord, Maine	0.02	0.00	100.00

Breakbulk (continued)

	Short Tons	%	% of Respective State Total
Connell, Washington	5.36	0.00	0.01
Coos Bay, Oregon	728.66	0.19	0.25
Coquille, Oregon	59.10	0.02	0.02
Cosmopolis, Washington	207.79	0.05	0.36
Corvallis, Oregon	8,583.94	2.27	2.93
Cottage Grove, Oregon	225.71	0.06	0.08
Craigmont, Idaho	444.64	0.02	5.33
Cowiche, Washington	40.09	0.01	0.07
Culp Creek, Oregon	1,343.89	0.35	0.46
Dallas, Oregon	11,698.53	3.09	3.99
Dallas, Texas	114.98	0.03	89.37
Danville, Illinois	1.94	0.00	1.38
Dayton, Washington	7.00	0.00	0.01
Dexter, Oregon	1,808.47	0.48	0.62
Dillard, Oregon	310.00	0.08	0.11
Dishman, Washington	7.23	0.00	0.01
Donald, Oregon	10.33	0.00	0.00
Dundee, Oregon	41.19	0.01	0.01
Dunham, Montana	40.00	0.01	2.34
Emmett, Idaho	18.40	0.00	0.22
Empire, Oregon	111.49	0.03	0.04
Estacada, Oregon	4,603.72	1.21	1.57
Eugene, Oregon	14,734.98	3.89	5.02
Filer, Idaho	606.76	0.16	7.27
Forest Grove, Oregon	904.68	0.24	0.31
Foster, Oregon	3,306.47	0.87	1.13
Fresno, California	22.02	0.01	2.54
Gardner, Oregon	1,512.56	0.40	0.52
Garfield, Washington	3,919.42	1.03	6.80
Garibaldi, Oregon	240.64	0.06	0.08
Gaston, Oregon	47.74	0.01	0.02
Gervais, Oregon	6.84	0.00	0.00
Gladstone, Oregon	11.44	0.00	0.00
Glendale, Oregon	61.13	0.02	0.02
Gold Beach, Oregon	496.69	0.13	0.17
Gold Hill, Oregon	1.01	0.00	0.00
Goldendale, Washington	65.87	0.02	0.11
Goshen, Oregon	495.00	0.13	0.17
Grand Ronde, Oregon	1,649.27	0.44	0.56
Grandview, Washington	21.81	0.01	0.04
Grandville, Idaho	86.82	0.02	1.04
Grants Pass, Oregon	856.41	0.23	0.29
Great Falls, Montana	243.82	0.06	14.29
Gresham, Oregon	57.09	0.02	0.02
Griggs, Oregon	2,695.79	0.71	0.92
Halsey, Oregon	831.14	0.22	0.28
Hammond, Oregon	54.92	0.01	0.02

Breakbulk (continued)

	Short Tons	%	% of Respective State Total
Harrah, Washington	2.70	0.00	0.00
Harrisburg, Oregon	159.06	0.04	0.05
Harrisburg, Washington	10.01	0.00	0.02
Hazelton, Idaho	366.91	0.10	4.39
Helena, Montana	2.53	0.00	0.15
Hillsboro, Oregon	109.81	0.03	0.04
Hood River, Oregon	5,995.69	1.58	2.04
Hoquiam, Washington	1,385.01	0.37	2.40
Houma, Louisiana	1.50	0.00	100.00
Hubbard, Oregon	21.55	0.01	0.01
Idaho, Northeastern NOS	19.32	0.01	0.23
Idaho Falls, Idaho	24.80	0.01	0.30
Illinois NOS	31.89	0.01	22.70
Imbler, Oregon	20.20	0.01	0.01
Iowa NOS	20.98	0.01	100.00
Ironton, Utah	1,545.90	0.41	52.75
Jasper, Oregon	854.29	0.23	0.29
Jerome, Idaho	109.42	0.03	1.31
Junction City, Oregon	2,788.01	0.74	0.95
Kalama, Washington	1,554.04	0.41	2.70
Kansas City, Missouri	0.26	0.00	100.00
Kellogg, Idaho	39.96	0.01	0.48
Kelso, Washington	3.50	0.00	0.01
Kendrick, Idaho	997.44	0.26	11.95
Kent, Washington	13.24	0.00	0.03
Kimberly, Idaho	448.79	0.12	5.38
La Grande, Oregon	6.78	0.00	0.00
Lake Oswego, Oregon	520.88	0.14	0.18
Lapwai, Idaho	100.75	0.03	1.21
Las Vegas, Nevada	203.38	0.05	91.77
Lebanon, New Hampshire	161.98	0.04	100.00
Lebanon, Oregon	10,663.00	2.81	3.64
Lewiston, Idaho	829.19	0.22	9.93
Libby, Montana	406.89	0.11	23.85
Liberal, Oregon	312.56	0.08	0.11
Linnton, Oregon	191.46	0.05	0.07
Longview, Texas	13.67	0.00	10.62
Longview, Washington	3,602.44	0.95	6.25
Los Angeles, California	1.59	0.00	0.18
Lowden, Washington	47.77	0.01	0.08
Lyons, Oregon	13.42	0.00	0.00
Madras, Oregon	157.67	0.04	0.05
Malaga, Washington	198.99	0.05	0.35
Maltby, Washington	1.15	0.00	0.00
Mapleton, Oregon	1,244.80	0.33	0.42
McMinnville, Oregon	2,210.28	0.58	0.75
Medford, Oregon	3,297.00	0.87	1.12

Breakbulk (continued)

	Short Tons	%	% of Respective State Total
Metolius, Oregon	89.97	0.02	0.03
Merlin, Oregon	0.34	0.00	0.00
Michigan NOS	29.77	0.01	100.00
Mill City, Oregon	58.31	0.02	0.02
Milton Freewater, Oregon	159.35	0.04	0.05
Milwaukee, Wisconsin	3.06	0.00	65.11
Milwaukie, Oregon	773.39	0.20	0.26
Minneapolis, Minnesota	11.27	0.00	100.00
Mississippi, NOS	46.21	0.01	100.00
Molalla, Oregon	29,938.89	7.90	10.21
Monroe, Oregon	310.48	0.08	0.11
Moscow, Idaho	912.22	0.24	10.93
Moses Lake, Washington	22.48	0.01	0.04
Mountlake Terr, Washington	25.41	0.01	0.04
Mount Angel, Oregon	4.76	0.00	0.00
Mount Vernon, Washington	1.22	0.00	0.00
Myrtle Creek, Oregon	7.92	0.00	0.00
Myrtle Point, Oregon	79.26	0.02	0.03
Nampa, Idaho	215.53	0.06	2.58
Neal Creek, Oregon	164.70	0.04	0.06
Nevada NOS	18.24	0.00	8.23
Newberg, Oregon	252.93	0.07	0.09
Newport, Oregon	14.80	0.00	0.01
Nezperce, Idaho	68.52	0.02	0.82
North Bend, Oregon	116.35	0.03	0.04
North Plains, Oregon	647.67	0.17	0.22
Norwalk Connecticut	1.32	0.00	100.00
Nyssa, Oregon	29.75	0.01	0.01
Oak Grove, Oregon	73.49	0.02	0.03
Oakridge, Oregon	112.50	0.03	0.04
Oaksdale, Washington	117.67	0.05	0.31
Ocean Park, Washington	0.40	0.00	0.00
Odell, Oregon	404.57	0.11	0.14
Ohio NOS	2.25	0.00	100.00
Olympia, Washington	914.99	0.24	1.59
Oregon, All Other Cities	5,723.24	1.51	1.95
Oregon City, Oregon	1,102.57	0.29	0.38
Othello, Washington	57.31	0.02	0.10
Packwood, Washington	695.46	0.18	1.21
Palouse, Washington	395.57	0.10	0.69
Parkdale, Oregon	19.20	0.01	0.01
Pasco, Washington	16.16	0.00	0.03
Payette, Idaho	149.11	0.04	1.79
Pedee, Oregon	59.65	0.02	0.02
Pendleton, Oregon	1,093.38	0.29	0.37
Pennsylvania NOS	198.93	0.05	100.00
Philomath, Oregon	23.10	0.01	0.01

Breakbulk (continued)

	Short Tons	%	% of Respective State Total
Pocatello, Idaho	26.47	0.01	0.32
Pomeroy, Washington	12.30	0.00	0.02
Port Angeles, Washington	3,206.91	0.85	5.57
Port Gamble, Washington	143.61	0.04	0.25
Port Orford, Oregon	118.40	0.03	0.04
Portland, Oregon	50,898.52	13.43	17.35
Prinveville, Oregon	37.25	0.01	0.01
Powers, Oregon	0.34	0.00	0.00
Progress, Oregon	16.97	0.00	0.01
Provo, Utah	1,376.94	0.36	46.98
Pullman, Washington	50.35	0.01	0.09
Quincy, Washington	28.13	0.01	0.05
Rainier, Washington	95.03	0.03	0.16
Randle, Washington	250.20	0.07	0.43
Redding, California	47.49	0.01	5.47
Redmond, Oregon	1,637.53	0.43	0.56
Reedsport, Oregon	1,749.24	0.46	0.60
Renton, Washington	0.03	0.00	0.00
Rickreall, Oregon	33.30	0.01	0.01
Riddle, Oregon	7,297.32	1.93	2.49
Ridgefield, Washington	4,478.95	1.18	7.77
Rigby, Idaho	25.06	0.01	0.30
Roseburg, Oregon	1,477.62	0.39	0.50
Saginaw, Oregon	174.93	0.05	0.06
Salem, Oregon	1,626.24	0.43	0.55
San Francisco, California	3.50	0.00	0.40
San Jose, California	1.47	0.00	0.17
Sandy, Oregon	0.18	0.00	0.00
Seattle, Washington	845.58	0.22	1.47
Selah, Washington	32.81	0.01	0.06
Shedd, Oregon	137.12	0.04	0.05
Shelly, Idaho	30.03	0.01	0.36
Shelton, Washington	276.61	0.07	0.48
Sheridan, Oregon	243.37	0.06	0.08
Sherwood, Oregon	86.93	0.02	0.03
Silverton, Oregon	96.80	0.03	0.03
Snohomish, Washington	6.79	0.00	0.01
Soda Springs, Idaho	2.35	0.00	0.03
Southbend, Washington	14.40	0.00	0.02
Spokane, Washington	5,242.15	1.38	9.10
Springfield, Oregon	39,523.65	10.43	13.47
Springfield, Illinois	85.55	0.02	60.90
St. Helens, Oregon	19,151.68	5.05	6.53
Steptoe, Washington	14.10	0.00	0.02
Stayton, Oregon	186.56	0.05	0.06
Stockton, California	1.88	0.00	0.22
Sunnyside, Washington	32.48	0.01	0.06

Breakbulk (continued)

	Short Tons	%	% of Respective State Total
Sweet Home, Oregon	7,217.83	1.90	2.46
Tacoma, Washington	1,560.43	0.41	2.71
Tangent, Oregon	861.02	0.23	0.29
Tekoa, Washington	220.50	0.06	0.38
The Dalles, Oregon	5,231.72	1.38	1.78
Three Forks, Montana	1,012.34	0.27	59.35
Tigard, Oregon	2,120.50	0.56	0.72
Tillamook, Oregon	1,411.87	0.37	0.48
Tilma, Washington	356.38	0.09	0.62
Toledo, Oregon	1,842.65	0.49	0.63
Toppenish, Washington	1,062.62	0.28	1.84
Trentwood, Washington	32.00	0.01	0.06
Troy, Idaho	1,305.15	0.34	15.63
Tualatin, Oregon	329.20	0.09	0.11
Tucson, Arizona	3.93	0.00	100.00
Twin Falls, Idaho	1,033.50	0.27	12.38
Underwood, Washington	395.60	0.10	0.69
Utah NOS	7.85	0.00	0.27
Vancouver, British Columbia	123.17	0.03	100.00
Vancouver, Washington	7,957.22	2.10	13.81
Veneta, Oregon	1,028.56	0.27	0.35
Walla Walla, Washington	16.52	0.00	0.03
Wallula, Washington	28.08	0.01	0.05
Wapato, Washington	121.06	0.03	0.21
Warm Springs, Oregon	355.24	0.09	0.12
Warrenton, Oregon	190.73	0.05	0.07
Washington, Eastern NOS	1,010.04	0.27	1.75
Washougal, Washington	798.48	0.21	1.39
Wauna, Oregon	1,006.16	0.27	0.34
Weed, California	429.08	0.11	49.42
West Linn, Oregon	1,786.11	0.47	0.61
Wheeler, Oregon	4.88	0.00	0.00
Willamina, Oregon	83.55	0.02	0.03
Wilsonville, Oregon	2.22	0.00	0.00
Winlock, Washington	28.12	0.01	0.05
Wisconsin NOS	1.64	0.00	34.89
Woodburn, Oregon	25.26	0.01	0.01
Woodland, Washington	1.06	0.00	0.00
Wyoming NOS	505.00	0.13	7.82
Yakima, Washington	465.86	0.12	0.81
Zillah, Washington	2.30	0.00	0.00
Canada, Except Vancouver B.C.	10.82	0.00	100.00
Unknown	6,331.85	1.67	-
Total	378,935.00	99.99*	

* Total does not sum to 100% due to rounding.

APPENDIX C

CITY DESTINATIONS OF IMPORTS THROUGH PORT OF PORTLAND FACILITIES 1973

Abbreviations: NOS - Not otherwise specified
NEC - Not elsewhere classified

BULK

	Short Tons	%	% of Respective State Total
Portland, Oregon	194,560.20	99.34	100.00
Tacoma, Washington	815.70	0.42	99.93
Vancouver, Washington	0.56	0.00	0.07
Unknown	477.05	0.24	-
Total	195,853.51	100.00	-

CONTAINERIZED

	Short Tons	%	% of Respective State Total
Albany, Oregon	169.22	0.28	0.38
Aloha, Oregon	4.25	0.01	0.01
Ashland, Oregon	0.09	0.00	0.00
Astoria, Oregon	1,896.41	3.13	4.21
Athena, Oregon	4.70	0.01	0.01
Atlantic City, New Jersey	4.63	0.01	7.67
Aurora, Oregon	6.40	0.01	0.01
Beaverton, Oregon	1,166.08	1.92	2.59
Bend, Oregon	0.52	0.00	0.00
Billings, Montana	38.65	0.06	48.43
Boise, Idaho	233.68	0.39	80.46
Bozeman, Montana	0.10	0.00	0.13
Brooks, Oregon	39.05	0.06	0.09
Caldwell, Idaho	10.71	0.02	3.69
California NOS	2.83	0.00	2.28
Camas, Washington	229.48	0.38	2.30

Containerized (continued)

	Short Tons	%	% of Respective State Total
Canby, Oregon	68.78	0.11	0.15
Carlton, Oregon	0.90	0.00	0.00
Cascadia, Oregon	0.50	0.00	0.00
Charleston, Oregon	21.30	0.04	0.05
Chicago, Illinois	420.10	0.69	13.81
Clackamas, Oregon	58.06	0.10	0.13
Cleveland, Ohio	78.42	0.13	99.28
Coos Bay, Oregon	11.37	0.02	0.03
Corvallis, Oregon	89.29	0.15	0.20
Dallas, Oregon	17.58	0.03	0.04
Dallas, Texas	204.97	0.34	75.12
Downey, California	1.96	0.00	1.58
Du Bois, Pennsylvania	0.11	0.00	3.24
Dundee, Oregon	4.11	0.01	0.01
Eugene, Oregon	717.93	1.18	1.59
Forest Grove, Oregon	76.88	0.13	0.17
Franklin Park, Illinois	174.22	0.29	5.73
Gardena, California	1.20	0.00	0.97
Gladstone, Oregon	2.15	0.00	0.00
Goldendale, Washington	982.60	1.62	9.85
Grants Pass, Oregon	433.39	0.71	0.96
Grey Bull, Wyoming	12.41	0.02	100.00
Halsey, Oregon	10.51	0.02	0.02
Harrisburg, Oregon	13.78	0.02	0.03
Helena, Montana	41.05	0.07	51.44
Hillsboro, Oregon	609.98	1.01	1.35
Hood River, Oregon	34.80	0.06	0.08
Idaho, Northeastern NOS	0.22	0.00	0.08
Illinois NOS	241.66	0.40	7.94
Joseph, Oregon	0.06	0.00	0.00
Junction City, Oregon	0.17	0.00	0.00
King Salmon, Alaska	43.56	0.07	100.00
La Grande, Oregon	17.42	0.03	0.04
Lake Oswego, Oregon	5.26	0.01	0.01
Lincolnwood, Illinois	320.81	0.53	10.54
Longview, Texas	63.36	0.10	23.22
Longview, Washington	5,622.71	9.27	56.35
Los Angeles, California	5.71	0.01	4.59
McMinnville, Oregon	217.97	0.36	0.48
Medford, Oregon	52.73	0.09	0.12
Michigan NOS	222.32	0.37	100.00
Milwaukee, Wisconsin	63.63	0.10	99.64
Milwaukie, Oregon	734.87	1.21	1.63
Minneapolis, Minnesota	14.43	0.02	100.00
Nampa, Idaho	3.74	0.01	1.29
New York, New York	147.14	0.24	59.93
New Jersey NOS	33.48	0.06	55.49
Newberg, Oregon	57.18	0.09	0.13

Containerized (continued)

	Short Tons	%	% of Respective State Total
Newport, Oregon	7.52	0.01	0.02
New York NOS	98.37	0.16	40.07
North Bend, Oregon	0.96	0.00	0.00
Nyssa, Oregon	0.06	0.00	0.00
Oregon, All Other Cities	3.21	0.01	0.01
Oregon City, Oregon	0.22	0.00	0.00
Paramus, New Jersey	22.22	0.04	36.83
Pendleton, Oregon	12.84	0.02	0.03
Petaluna, California	1.55	0.00	1.25
Philadelphia, Pennsylvania	3.29	0.01	96.76
Pocatello, Idaho	8.05	0.01	2.77
Port Angeles, Washington	0.12	0.00	0.00
Portland, Oregon	35,356.87	58.30	78.50
Progress, Oregon	14.88	0.02	0.03
Rainier, Washington	0.07	0.00	0.00
Reedsport, Oregon	1.60	0.00	0.00
Rice Lake, Wisconsin	0.23	0.00	0.36
Riddle, Oregon	40.50	0.07	0.09
Ridgefield, Washington	16.59	0.03	0.17
Roseburg, Oregon	204.30	0.34	0.45
Rupert, Idaho	1.72	0.00	0.59
Salem, Oregon	259.10	0.43	0.58
Salt Lake City, Utah	50.93	0.08	100.00
San Antonio, Texas	4.52	0.01	1.66
San Francisco, California	111.02	0.18	89.34
Scappoose, Oregon	6.75	0.01	0.01
Seattle, Washington	47.59	0.08	0.48
Sherwood, Oregon	40.13	0.07	0.09
Sisters, Oregon	10.14	0.02	0.02
South Holland, Illinois	1,886.15	3.11	61.98
Spokane, Washington	33.47	0.06	0.34
Sparks, Nevada	2.21	0.00	100.00
Springfield, Oregon	953.32	1.57	2.12
Stevenson, Washington	0.24	0.00	0.00
Sweet Home, Oregon	3.75	0.01	0.01
Tacoma, Washington	226.29	0.37	2.27
Tangent, Oregon	77.44	0.13	0.17
Tennessee NOS	9.11	0.02	100.00
The Dalles, Oregon	1,108.78	1.83	2.46
Tigard, Oregon	193.22	0.32	0.43
Tualatin, Oregon	23.11	0.04	0.05
Twin Falls, Idaho	32.30	0.05	11.12
Umpqua, Oregon	0.07	0.00	0.00
Union Gap, Washington	6.30	0.01	0.06
Urbandale, Iowa	3.56	0.01	100.00
Vancouver, Washington	2,777.94	4.58	27.84
Vernon, Kansas	13.69	0.02	100.00

Containerized (continued)

	Short Tons	%	% of Respective State Total
Walla Walla, Washington	7.67	0.01	0.08
Warrenton, Oregon	21.83	0.04	0.05
Washington, Eastern NOS	5.68	0.01	0.06
Washougal, Washington	3.53	0.01	0.04
Wilbur, Oregon	121.15	0.20	0.27
Wilsonville, Oregon	26.61	0.04	0.06
Woodburn, Oregon	9.43	0.02	0.02
Yakima, Washington	17.48	0.03	0.18
Youngtown, Ohio	0.57	0.00	0.72
Canada	44.29	0.07	100.00
Unknown	950.58	1.57	-
Total	60,648.67	99.99*	

STEEL

Aberdeen, Washington	148.88	0.05	1.13
Albany, Oregon	4.40	0.00	0.00
Aurora, Oregon	3,290.18	1.16	1.29
Beaverton, Oregon	662.28	0.23	0.26
Bend, Oregon	12.00	0.00	0.00
Boise, Idaho	1,816.49	0.64	40.17
Bothell, Washington	135.35	0.05	1.03
Caldwell, Idaho	149.24	0.05	3.30
California, NOS	555.40	0.20	43.03
Canby, Oregon	33.49	0.01	0.01
Centralia, Washington	164.23	0.06	1.25
Chehalis, Washington	45.05	0.02	0.34
Clackamas, Oregon	2,731.42	0.96	0.07
Cornelius, Oregon	29.74	0.01	0.01
Corvallis, Oregon	21.93	0.01	0.01
Dallas, Oregon	81.34	0.03	0.03
Edmonds, Washington	21.91	0.01	0.17
Eugene, Oregon	15,154.85	5.35	5.95
Everett, Washington	9.69	0.00	0.07
Glendale, Oregon	19.50	0.01	0.01
Great Falls, Montana	542.87	0.19	87.07
Green River, Wyoming	0.03	0.00	100.00
Gresham, Oregon	487.76	0.17	0.19
Helena, Montana	27.34	0.01	4.38
Hermiston, Oregon	11.44	0.00	0.00
Hillsboro, Oregon	3.76	0.00	0.00
Idaho Falls, Idaho	107.22	0.04	2.37
Kent, Washington	69.69	0.02	0.03
Klamath Falls, Oregon	892.12	0.31	0.35

* Total does not sum to 100% due to rounding.

Steel (continued)

	Short Tons	%	% of Respective State Total
Lebanon, Oregon	61.37	0.02	0.02
Long Beach, California	202.14	0.07	15.66
Longview, Washington	692.26	0.24	5.27
Mabton, Washington	65.97	0.02	0.50
McMinnville, Oregon	41.66	0.01	0.02
Medford, Oregon	229.12	0.08	0.09
Milwaukie, Oregon	203.28	0.07	0.08
Missoula, Montana	53.30	0.02	8.55
Moses Lake, Washington	22.96	0.01	0.17
Nampa, Idaho	370.49	0.13	8.19
New York, NOS	23.08	0.01	100.00
North Bend, Oregon	1,137.33	0.40	0.45
Nyssa, Oregon	2.26	0.00	0.00
Oakland, California	252.75	0.09	19.58
Olympia, Washington	1.00	0.00	0.01
Oregon, All Other Cities	5.71	0.00	0.00
Oregon City, Oregon	25.89	0.01	0.01
Ostrander, Washington	118.03	0.04	0.90
Pasco, Washington	43.27	0.02	0.33
Payette, Idaho	347.56	0.12	7.69
Pomeroy, Washington	10.99	0.00	0.09
Port Westward, Oregon	265.85	0.09	0.10
Portland, Oregon	216,774.46	76.47	85.07
Provo, Utah	136.50	0.05	86.34
Renton, Washington	44.75	0.02	0.34
Roseburg, Oregon	1,249.91	0.44	0.49
Salem, Oregon	7,558.92	2.67	2.97
Salt Lake City, Utah	21.59	0.01	13.66
San Francisco, California	77.95	0.03	6.04
San Jose, California	64.85	0.02	5.02
San Mateo, California	36.58	0.01	2.83
Santa Paula, California	101.17	0.04	7.84
Scappoose, Oregon	925.71	0.33	0.36
Seattle, Washington	2,023.54	0.71	15.41
Sherwood, Oregon	22.76	0.01	0.01
South Holland, Illinois	8.58	0.00	100.00
Spokane, Washington	793.31	0.28	6.04
Sunnyside, Washington	121.05	0.04	0.92
Tacoma, Washington	281.60	0.10	2.15
Tigard, Oregon	2,651.60	0.94	1.04
Tualatin, Oregon	213.37	0.08	0.08
Twin Falls, Idaho	1,730.86	0.61	38.28
Vancouver, Washington	1,520.69	0.54	11.58
Walla Walla, Washington	137.03	0.05	1.04
Washington, Eastern NOS	60.81	0.02	0.46
Washougal, Washington	6,381.54	2.25	48.61

Steel (continued)

	Short Tons	%	% of Respective State Total
Yakima, Washington	214.40	0.08	1.63
Canada	31.61	0.01	100.00
Unknown	8,878.67	3.13	-
Total	283,469.68	99.99*	

AUTOMOBILES

Battle Ground, Washington	174.82	0.48	21.04
Nyssa, Oregon	2.49	0.01	0.01
Portland, Oregon	34,382.24	93.98	96.31
Seattle, Washington	656.09	1.79	78.96
Tigard, Oregon	1,315.42	3.60	3.68
Unknown	55.12	0.15	-
Total	36,586.18	100.01*	-

BREAKBULK

Aberdeen, Washington	101.51	0.11	0.84
Agate Beach, Oregon	6.54	0.01	0.01
Albany, Oregon	2,798.81	3.00	3.76
Alsip, Illinois	1.66	0.00	1.64
Amity, Oregon	11.71	0.01	0.02
Arkansas, NOS	1.99	0.00	100.00
Astoria, Oregon	259.96	0.28	0.35
Athena, Oregon	70.48	0.08	0.09
Beaverton, Oregon	519.57	0.56	0.70
Battle Ground, Washington	233.42	0.25	1.92
Bend, Oregon	29.96	0.03	0.04
Billings, Montana	77.50	0.08	28.10
Boise, Idaho	834.69	0.89	44.24
Bozeman, Montana	43.17	0.05	15.65
Burlingame, California	0.10	0.00	0.02
Burns, Oregon	33.21	0.04	0.04
Caldwell, Idaho	189.84	0.20	10.06
California, NOS	74.85	0.08	17.30
Camas, Washington	52.88	0.06	0.44
Canby, Oregon	381.11	0.41	0.51
Carlton, Oregon	6.36	0.01	0.01
Centralia, Washington	84.74	0.09	0.70
Chehalis, Washington	40.33	0.04	0.33

* Total does not sum to 100% due to rounding.

Breakbulk (continued)

	Short Tons	%	% of Respective State Total
Chicago, Illinois	16.33	0.02	16.14
Clackamas, Oregon	506.36	0.54	0.68
Clatskanie, Oregon	8.01	0.01	0.01
Cleveland, Ohio	119.56	0.13	90.51
Coos Bay, Oregon	55.96	0.06	0.08
Corvallis, Oregon	11.58	0.01	0.02
Dallas, Oregon	33.07	0.04	0.04
Dallas, Texas	2.01	0.00	2.83
Denver, Colorado	4.59	0.00	100.00
Donald, Oregon	9.15	0.01	0.01
Downey, California	10.10	0.01	2.33
Dundee, Oregon	48.72	0.05	0.07
Eugene, Oregon	961.10	1.03	1.29
Eureka, Utah	16.66	0.02	6.97
Everett, Washington	25.00	0.03	0.21
Forest Grove, Oregon	539.50	0.58	0.72
Franklin Park, Illinois	18.26	0.02	18.05
Gaston, Oregon	26.53	0.03	0.04
Gladstone, Oregon	2.04	0.00	0.00
Goldendale, Washington	578.39	0.62	4.76
Grants Pass, Oregon	11.80	0.01	0.02
Great Falls, Montana	132.91	0.14	48.19
Gresham, Oregon	34.71	0.04	0.05
Harrisburg, Oregon	307.56	0.33	0.41
Hermiston, Oregon	24.55	0.03	0.03
Hillsboro, Oregon	82.42	0.09	0.11
Hoquiam, Washington	8.13	0.01	0.01
Hubbard, Oregon	6.88	0.01	0.01
Idaho, Northeastern NOS	172.98	0.19	9.17
Idaho Falls, Idaho	159.46	0.17	8.45
Illinois NOS	0.25	0.00	0.25
Junction City, Oregon	1.22	0.00	0.00
Kalama, Washington	3.71	0.00	0.03
Kalispell, Montana	1.22	0.00	0.44
Kennewick, Washington	2.05	0.00	0.02
Kent, Washington	1.85	0.00	0.02
Klamath Falls, Oregon	290.07	0.31	0.39
La Grande, Oregon	18.84	0.02	0.03
Lake Grove, Oregon	0.11	0.00	0.00
Lake Oswego, Oregon	118.90	0.13	0.16
Lebanon, Oregon	60.91	0.07	0.08
Lewiston, Idaho	7.22	0.01	0.38
Lincolnwood, Illinois	0.83	0.00	0.82
Longview, Washington	1,420.54	1.52	11.70
Los Angeles, California	137.28	0.15	31.72
Louisiana NOS	38.77	0.04	100.00
Mabton, Washington	5.85	0.01	0.05

Breakbulk (continued)

	Short Tons	%	% of Respective State Total
Maryland NOS	112.41	0.12	100.00
McMinnville, Oregon	109.13	0.12	0.15
Mead, Washington	6.68	0.01	0.05
Medford, Oregon	323.63	0.35	0.43
Michigan, NOS	1.77	0.00	100.00
Milwaukee, Wisconsin	1.10	0.00	100.00
Milwaukie, Oregon	243.72	0.20	0.33
Minneapolis, Minnesota	0.69	0.00	1.83
Minnesota NOS	36.93	0.04	98.17
Montana NOS	21.00	0.02	7.61
Moxee City, Washington	5.85	0.01	0.05
Nampa, Idaho	47.61	0.15	2.52
New York, New York	0.43	0.00	100.00
Newberg, Oregon	1.13	0.00	0.00
Newport, Oregon	236.00	0.25	0.32
North Bend, Oregon	1.41	0.00	0.00
Nyssa, Oregon	4.09	0.00	0.01
Oakland, Oregon	27.67	0.03	0.04
Ogden, Utah	6.05	0.01	2.53
Ohio NOS	12.53	0.01	9.49
Omaha, Nebraska	243.11	0.26	100.00
Ontario, Oregon	95.00	0.10	0.13
Oregon, All Other Cities	51.99	0.06	0.07
Oregon City, Oregon	25.74	0.03	0.03
Palmer, Alaska	14.00	0.02	100.00
Pendleton, Oregon	90.81	0.10	0.12
Pocatello, Idaho	5.25	0.10	0.03
Portland, Oregon	60,211.74	64.56	80.81
Progress, Oregon	20.63	0.02	0.03
Prosser, Washington	1.79	0.00	0.01
Providence, Rhode Island	0.01	0.00	100.00
Pullman, Washington	6.40	0.01	0.05
Rainier, Washington	53.05	0.06	0.04
Redding, California	0.07	0.00	0.02
Redmond, Oregon	77.35	0.08	0.10
Reno, Nevada	1,015.54	1.09	13.22
Reedsport, Oregon	3.16	0.00	0.00
Richland, Washington	2.15	0.00	0.02
Roseburg, Oregon	61.36	0.07	0.08
Rupert, Idaho	0.99	0.00	0.05
Salem, Oregon	2,615.31	2.80	3.51
Salt Lake City, Utah	216.36	0.23	90.50
San Rafeal, California	98.97	0.11	22.87
Santa Paula, California	98.72	0.11	22.81
Scappoose, Oregon	25.07	0.03	0.03
Seattle, Washington	550.33	0.59	4.53
Sherwood, Oregon	56.44	0.06	0.08
Silverton, Oregon	11.37	0.01	0.02

Breakbulk (continued)

	Short Tons	%	% of Respective State Total
South Dakota NOS	2.92	0.00	100.00
South Holland, Illinois	63.85	0.07	63.11
Spokane, Washington	124.04	0.13	1.02
Sparks, Nevada	371.37	0.40	26.78
Springfield, Oregon	14.22	0.02	0.02
Stayton, Oregon	314.19	0.34	0.42
Stevenson, Washington	0.16	0.00	0.00
St. Paul, Oregon	1.38	0.00	0.00
Stimson, Oregon	2.41	0.00	0.00
Stockton, California	12.65	0.01	2.92
Sunnyside, Washington	3.78	0.00	0.03
Sweet Home, Oregon	1.16	0.00	0.00
Tacoma, Washington	51.13	0.05	0.42
Tangent, Oregon	160.52	0.17	0.22
Temple, Texas	5.93	0.01	8.36
Tennessee NOS	9.04	0.01	100.00
The Dalles, Oregon	2,060.97	2.21	2.77
Tigard, Oregon	128.36	0.14	0.17
Tillamook, Oregon	132.81	0.14	0.18
Toledo, Oregon	57.34	0.06	0.08
Toppenish, Washington	561.44	0.60	4.62
Tualatin, Oregon	34.80	0.04	0.05
Twin Falls, Idaho	468.51	0.50	24.83
Umpqua, Oregon	0.47	0.00	0.00
Union Gap, Washington	1.45	0.00	0.01
Vancouver, Washington	7,191.10	7.71	59.21
Vernon, Kansas	1.65	0.00	100.00
Waco, Texas	62.97	0.07	88.80
Walla Walla, Washington	12.32	0.01	0.10
Washington, Eastern NOS	217.64	0.23	1.79
Washougal, Washington	479.75	0.51	3.94
White City, Oregon	0.02	0.00	0.00
Willamina, Oregon	17.64	0.02	0.02
Wilbur, Oregon	6.50	0.01	0.01
Woodenville, Washington	19.60	0.02	0.16
Yachats, Oregon	9.83	0.01	0.01
Yakima, Washington	298.90	0.32	2.46
Canada	30.95	0.03	100.00
Unknown	1,586.01	1.70	-
Total	93,270.60	100.00	-

APPENDIX D

PORT OF PORTLAND 1973 EXPORTERS AND IMPORTERS
(100 tons or more in any quarter)

EXPORTERS

Acker Export Lumber Co.
1220 S.W. Morrison
Portland, Oregon 97205

Acme Trading and Supply Co.
4322 N.W. Yeon
Portland, Oregon 97210

Active Equipment Co., Inc.
2765 N.W. Nicolai
Portland, Oregon 97210

Agripac Inc.
P.O. Box 5346
Salem, Oregon 97304

Alcoa International
5201 S.W. Westgate Dr.
Portland, Oregon 97221

Alder Creek Lumber Co.
Rt. 1 Box 530
Burlington, Oregon 97231

Associated Meat Packers
P.O. Box 17195
Portland, Oregon 97203

Berger and Plate Co. of Oregon
Route 2, Box 48
Harrisburg, Oregon 97446

Blue Line Exchange, Inc.
Box 37
Portland, Oregon 97043

Boise-Cascade Corp.
1600 S.W. 4th Ave.
Portland, Oregon 97201

Caffall Bros. Forest Products
5405 N. Lagoon
Portland, Oregon 97217

Cahen Trading Co.
P.O. Box 17006
Portland, Oregon 97214

Calbag Metals
2495 N.W. Nicolai
Portland, Oregon 97210

Cargill, Inc.
1000 World Trade Bldg.
333 S.W. Oak
Portland, Oregon 97204

Coast Packing Co., Inc.
P.O. Box 11203
Portland, Oregon 97211

Columbia Wool Scouring
2030 N. Columbia Blvd.
Portland, Oregon 97217

Consolidated Fibers
1601 N. Columbia Blvd.
Portland, Oregon 97217

Dant and Russell Inc.
1221 S.W. Yamhill
Portland, Oregon 97205

D & M Products, Inc.
11320 N.E. Marx
Portland, Oregon 97220

Dow Chemical Co.
305 Crenshaw Blvd.
Torrance, California 90503

Empire Metals Co.
1304 N.W. Johnson
Portland, Oregon 97209

General Mills
2828 S.W. Corbett
Portland, Oregon 97201

Gold Rey Forest Products
3500 S.W. Cedar Hills Blvd.
Beaverton, Oregon 97005

Great Western Malting Co.
Foot of W. 11th
Vancouver, Washington 98660

Halton Tractor Co.
4421 N.E. Columbia Blvd.
Portland, Oregon 97218

Hercules, Inc.
3366 N.W. Yeon
Portland, Oregon 97210

Independent Paper Stock Co.
1315 N.W. Overton
Portland, Oregon 97209

International Paper Co.
Box 579
Longview, Washington 98632

Kanematsu Gosho U.S.A.
707 S.W. Washington
Portland, Oregon 97205

Kasho, Inc.
1 California
San Francisco, California
94111

Kerr Grain
First National Bank Tower
1300 S.W. 5th Ave.
Portland, Oregon 97201

Linnton Plywood Assn.
10504 N.W. St. Helens Rd.
Portland, Oregon 97231

M & C Lumber Products Inc.
9020 N. Bradford
Portland, Oregon 97203

McCall Oil Co.
1935 S.E. Powell Blvd.
Portland, Oregon 97202

McCormick & Baxter Co.
6900 N. Edgewater
Portland, Oregon 97203

Mindel, David & Sons Inc.
3520 E. Vernon Ave.
Los Angeles, California
90058

Nez Perce Rochdale Co.
Nez Perce, Idaho 83543

Normarc, Inc.
P.O. Box 238
Tangent, Oregon 97389

Northwest Organic Products
Rt. 1
Aurora, Oregon 97002

Northwest Paper Fibers
2625-A N.W. Industrial
Portland, Oregon 97210

Oregon Commodities
1007 Corbett Blvd.
430 S.W. Morrison
Portland, Oregon 97204

Pacific Hide and Fur Depot
8 - 21st Ave. S.
Nampa, Idaho 83651

Patrick Lumber Co.
825 Terminal Sales Bldg.
1220 S.W. Morrison
Portland, Oregon 97205

Peavey Company
1100 World Trade Bldg.
333 S.W. Oak
Portland, Oregon 97204

Peerless Trailer & Truck
18205 S.W. Boones Ferry Rd.
Tigard, Oregon 97223

Pope & Talbot Inc.
1700 S.W. 4th Ave.
Portland, Oregon 97201

Portland Rendering Co.
P.O. Box 17201
Portland, Oregon 97217

Publishers Paper Co.
419 Main
Oregon City, Oregon 97045

Ross Equipment Inc.
9522 N.E. Sandy Blvd.
Portland, Oregon 97220

Southwest Hide Company
309 S. 25th
Boise, Idaho 83706

Teledyne Service Co.
1605 N.W. Everett
Portland, Oregon 97209

Terminal Flour Mills
Municipal Terminal #4
Portland, Oregon 97202

U.S. Plywood
1122 N.E. 122nd
Portland, Oregon 97229

West Coast Orient Co.
5403 N. Lagoon Ave.
Portland, Oregon 97217

Wilbur-Ellis Co.
P.O. Box 8838
Portland, Oregon 97208

IMPORTERS

Airco Welding Products
1325 N.W. Kearney
Portland, Oregon 97209

Alaska Copper & Brass
2440 S.E. Raymond
Portland, Oregon 97201

Alaska Steel Company
2750 S.W. Moody
Portland, Oregon 97201

Allied Chemical Corp
1410 S.W. Marlow
Portland, Oregon 97225

American Honda Motor Co., Inc.
6215 N.E. 92nd Dr.
Portland, Oregon 97220

American Steel, Inc.
4033 N.W. Yeon
Portland, Oregon 97210

American Steel & Supply
888 Garfield
Eugene, Oregon 97402

Atlas Iron Works
4600 N.E. 138th
Portland, Oregon 97230

Balfour Guthrie Trade Div.
731 S.W. Oak
Portland, Oregon 97204

Barnes, R.A., Inc.
2000 Columbia Way
Vancouver, Washington
98661

Beall Pipe & Tank Co.
12005 N. Burgard Rd.
Portland, Oregon 97203

George Boldt & Co.
8750 S.W. Bohmann Parkway
Portland, Oregon 97223

Bonneville Power Admin.
1002 N.E. Holladay
Portland, Oregon 97232

Boyd Coffee Company
19730 N.E. Sandy Blvd.
Portland, Oregon 97230

Bridgstone Tire
2210 N.E. Riverside Way
Portland, Oregon 97211

British Leyland
4860 S.W. Scholls Ferry Rd.
Portland, Oregon 97225

British Motor Company
1638 W. Burnside
Portland, Oregon 97209

Brumley Donaldson
Sylvan Bldg., 2035 S.W. 58th
Portland, Oregon 97221

Buick Motor Division
P.O. Box 25300
Portland, Oregon 97229

Burns Bros. Imports
81 S.E. Yamhill
Portland, Oregon 97204

Cal-Auto, Inc.
2005 N.E. Union
Portland, Oregon 97212

Cal Roof Wholesale
110 S.E. Taylor
Portland, Oregon 97214

Cascade Corporation
5319 S.W. Westgate Dr.
Portland, Oregon 97221

Chin's Import-Export
1633 N.E. 42nd
Portland, Oregon 97213

Columbia Warehouse
6710 N. Catlin
Portland, Oregon 97203

Consolidated Supply
2300 N.W. 26th
Portland, Oregon 97210

Continental Parts
Commonwealth Building
421 S.W. 6th Ave.
Portland, Oregon 97204

Convoy Company
3900 N.W. Yeon
Portland, Oregon 97210

Copeland Wholesale
119 S.E. Main
Portland, Oregon 97214

Cord Agency
P.O. Box 19063
Portland, Oregon 97219

David Cordage Co.
677 N. Tillamook
Portland, Oregon 97227

John Deere
2100 N.E. 181st Ave.
Portland, Oregon 97230

W.C. Delbrueck & Co.
2170 N.W. Raleigh
Portland, Oregon 97210

Del Monte Corp.
1425 N.E. Irving
Portland, Oregon 97227

Elixir Industry
P.O. Box 203
Aurora, Oregon 97002

Empire Building Material
9255 N.E. Halsey
Portland, Oregon 97220

Familian N.W. Inc.
2121 N. Columbia Blvd.
Portland, Oregon 97217

Farmers Union Central
Cenex 80 S.E. Taylor
Portland, Oregon 97214

Far West Steel
P.O. Box 632
Eugene, Oregon 97401

Ford Motor Co.
14880 S.W. 72nd
Portland, Oregon 97223

Fort Hill Lumber
2041 S.W. 58th
Portland, Oregon 97221

Fought & Co., Inc.
14255 S.W. 72nd
Tigard, Oregon 97223

Fred Meyer, Inc.
3800 S.E. 22nd
Portland, Oregon 97202

Galvanizers Co.
2406 N.W. 30th
Portland, Oregon 97210

Gear Reducer Sales
Terminal Sales Bldg.
1220 S.W. Morrison
Portland, Oregon 97205

General Electric
Sales Division
2929 N.W. 29th
Portland, Oregon 97210

General Metalcraft, Inc.
4701 S.E. 24th Ave.
Portland, Oregon 97202

Gilmore Steel Corp.
6161 N.W. 61st Ave.
Portland, Oregon 97203

Giusti, Al Wine
66 S.E. Morrison
Portland, Oregon 97214

Golby Bag Co.
815 N.W. 16th
Portland, Oregon 97209

Gray Company, Inc.
805 N.W. 14th
Portland, Oregon 97209

Green Transfer & Storage
2425 N.W. 23rd Place
Portland, Oregon 97210

Grinnel of Oregon
3240 N.W. 29th
Portland, Oregon 97210

Hall Tool Co.
1724 S.E. Grand
Portland, Oregon 97214

Hearth Craft, Inc.
7945 N.E. Alberta
Portland, Oregon 97218

Hoffman Motors
375 Park Avenue
New York, N.Y 10022

Holland Bulb Co.
10420 S.E. 82nd
Portland, Oregon 97266

Industrial Export Co.
Board of Trade Building
310 S.W. 4th Ave.
Portland, Oregon 97204

Interstate Manufacturing
8319 S.E. Otty Rd.
Portland, Oregon 97266

Interstate Tractor
& Equipment Co.
2855 N.W. Front Avenue
Portland, Oregon 97210

Kaiser Cement & Gypsum Corp.
3510 S.W. Bond
Portland, Oregon 97201

Kay Sales
9800 S.E. Stark
Portland, Oregon 97216

La Grande Industrial Supply
2620 S.W. 1st
Portland, Oregon 97201

Lane Forging & Supply
9140 S.W. 57th
Portland, Oregon 97219

Letts Industries, Inc.
2524 N.E. Riverside Way
Portland, Oregon 97211

Libby McNeill & Libby
200 South Michigan
Chicago, Illinois 60604

The Lunch Company, Inc.
6000 N.E. Union
Portland, Oregon 97211

Marcrest Pacific
24724 Wilmington Avenue
Wilmington, California
90745

Martin Marieta
P.O. Box 7711
The Dalles, Oregon 97058

Massey Ferguson
8303 N.E. Killingsworth
Portland, Oregon 97220

Master Fence Fittings
2020 N.E. 194th
Portland, Oregon 97230

Meier & Frank
Att: Nealond Howard
621 S.W. 5th Ave.
Portland, Oregon 97204

Meyers Sales Co.
Coleman Bldg.
811 First
Seattle, Washington
98104

Michelin Tire Corp.
4240 N.W. Yeon
Portland, Oregon 97210

Mitsubishi International
205 Commonwealth Bldg.
421 S.W. 6th
Portland, Oregon 97204

M.J.B.
2801 N.W. Nela
Portland, Oregon 97210

Moore Dry Kiln Co.
P.O. Box 4208
Portland, Oregon 97208

Morris P. Kirk & Sons
5909 N.W. 61st
Portland, Oregon 97210

Ted Nelson Co.
14280 S.W. 72nd
Tigard, Oregon 97209

New York Merchandise
1900 N.W. 22nd
Portland, Oregon 97210

Nissan Motor Corp.
9575 S.W. Scholls Ferry Rd.
Portland, Oregon 97223

Norcrest China Co.
55 W. Burnside
Portland, Oregon 97209

Norpac Growers, Inc.
P.O. Box 203
Dundee, Oregon 97115

Oregon Glass
2170 N.W. Raleigh
Portland, Oregon 97210

O.L.C.C.
9201 S.E. McLoughlin Blvd.
Milwaukie, Oregon 97222

Oregon Metallurgical Corp.
P.O. Box 580
Albany, Oregon 97321

Oregon Metal Slithers, Inc.
2245 N.W. Suffolk
Portland, Oregon 97210

Pacific Carbide & Alloy
N. Columbia Blvd. & Hurst
Portland, Oregon 97203

Pacific Fence & Wire
2235 S.E. 11th
Portland, Oregon 97214

Pacific Metal Co.
3400 S.W. Bond
Portland, Oregon 97201

Pacific Steel Warehouse
3865 N.W. St. Helens Rd.
Portland, Oregon 97210

Pak-Well Paper Products
2517 Mailwell Drive
Milwaukie, Oregon 97222

Peerless Pacific
625 N. Thompson
Portland, Oregon 97227

Perma Flora Import-Export
733 N.W. Everett
Portland, Oregon 97209

Pettibone Westrac
3103 N.W. St. Helens Rd.
Portland, Oregon 97210

Plumbers Supply Co.
3500 S.E. 22nd
Portland, Oregon 97202

Rope Rigging Loft
2355 N.W. 21st Place
Portland, Oregon 97210

Portland Wire & Iron Works
4644 S.E. 17th
Portland, Oregon 97214

Port Services Co.
9125 N. Bradford
Portland, Oregon 97203

Precon Products
240 W. Los Angeles
St. Simi Valley, Calif.
93065

Preferred Import Co.
1137 S.E. Union Ave.
Portland, Oregon 97214

San Jose Steel Co.
723 N. Tillamook
Portland, Oregon 97227

Schermerhoen Brothers
2336 N.W. 21st
Portland, Oregon 97209

Spada Distributing
1137 S.E. 12th
Portland, Oregon 97214

Sprouse Reitz Co., Inc.
1411 S.W. Morrison
Portland, Oregon 97205

Standard Supply Co.
934 S.E. 6th
Portland, Oregon 97214

Standard Steel Warehouse
3441 N.W. Guam
Portland, Oregon 97210

Stauffer Chemical Co.
4429 N. Suttle Road
North Portland, Oregon
97217

Steel Fabricators, Inc.
1353 S. Redland Rd.
Oregon City, Oregon 97045

Steel Products Co.
4000 N.W. St. Helens Rd.
Portland, Oregon 97210

Steel Products of Oregon
4000 N.W. St. Helens Rd.
Portland, Oregon 97210

Steel Specialties, Inc.
8520 N. Kerby
Portland, Oregon 97217

Subaru Northwest, Inc.
809 N.E. Lombard
Portland, Oregon 97211

Town Concrete Pipe, Inc.
755 N.E. Columbia Blvd.
Portland, Oregon 97211

Toyota
6111 N.E. 87th
Portland, Oregon 97220

Tricon, Inc.
3311 Andover Park E
Seattle, Washington 98188

Tumac Lumber Co.
806 S.W. Broadway
Portland, Oregon 97205

Union Carbide Corp.
11920 N. Burgard Rd.
Portland, Oregon 97203

UNIQ Dist. Co., Inc.
3435 S.E. 17th
Portland, Oregon 97202

USCO Service Co.
2734 S.E. Raymond
Portland, Oregon 97202

Valley Rolling Mills, Inc.
2025 Hyacinth N.E.
Salem, Oregon 97303

Viking Automatic Sprinkler
3245 N.W. Front
Portland, Oregon 97210

Viking Industries
7737 N.E. Killingsworth
Portland, Oregon 97218

Wade, R.M., Co.
10025 S.W. Allen Blvd.
Beaverton, Oregon 97005

WESCO Sales
8301 N.E. Halsey
Portland, Oregon 97220

West Coast Wire Pope
& Rigging, Inc.
2201 N.W. 20th
Portland, Oregon 97209

Western Import Co.
6635 N. Baltimore
Portland, Oregon 97203

Western Overhead Door
5511 S.E. 26th
Portland, Oregon 97202

Wheelsport Dist.,
2053 N.W. Upshur
Portland, Oregon 97209

White Stag Manufacturing
5100 S.E. Harney Dr.
Portland, Oregon 97222

Winter Wolff & Co., Inc.
2035 S.W. 58th
Portland, Oregon 97221

Woodburg & Co.
5851 N. Lagoon Ave.
Portland, Oregon 97217

Yokohama Tire Corp.
10603 N. Lombard
Portland, Oregon 97203

Zehrung Corp.
2201 N.W. 20th Ave.
Portland, Oregon 97209

IMPORTERS AND EXPORTERS

Bingham Willamette
2800 N.W. Front
Portland, Oregon 97210

Centennial Mills
P.O. Box 3773
Portland, Oregon 97210

Chase Bag Co.
2550 N.W. Nicolai
Portland, Oregon 97210

Continental Can Co.
1618 S.W. 1st Ave.
Portland, Oregon 97201

Crown Zellerbach Corp.
1500 S.W. 1st Ave.
Portland, Oregon 97201

ESCO
2141 N.W. 25th Ave.
Portland, Oregon 97210

FMC Corp.
4350 N.W. Front
Portland, Oregon 97210

Friedman Bag Co., Inc.
1040 N.E. 44th Ave.
Portland, Oregon 97213

Hyster Co.
2902 N.E. Clackamas
Portland, Oregon 97232

Nabisco
100 N.E. Columbia Blvd.
Portland, Oregon 97211

Niedemeyer Martin Co.
1727 N.E. 11th Ave.
Portland, Oregon 97212

North Pacific Lumber Co.
1505 S.E. Gideon
Portland, Oregon 97202

Pacific Molasses Co.
Municipal Terminal #4
Portland, Oregon 97202

Pacific Supply Corp.
P.O. Box 3588
Portland, Oregon 97208

Portland Fish Co.
301 N.W. 3rd Ave.
Portland, Oregon 97209

Reynolds Aluminum Supply
323 S.E. Division Place
Portland, Oregon 97202

Rhodia/Chipman Chemical
6200 N.W. St. Helens Rd.
Portland, Oregon 97210

Schnitzer Steel Products
3300 N.W. Yeon
Portland, Oregon 97210

Standard Steel and Tube Supply
2211 N.W. Front
Portland, Oregon 97209

Wagner Mining Equipment
4424 N.E. 158th Ave.
Portland, Oregon 97230

Weyerhaeuser Co.
5350 S.W. 107th Ave.
Beaverton, Oregon 97005

Zidell Explorations
3121 S.W. Moody
Portland, Oregon 97201

APPENDIX E

EXPORT QUESTIONNAIRE

The headings shown below pertain to specific types of commodity movement. Please indicate the city and state of origin, and the estimated percentage, of your exports from that city that moved through Port of Portland facilities (Terminals 1, 2 and/or 4) during calendar year 1973. This need be done only for the circled column headings.

City and State of Origin (or nearest City and State	Grain (Wheat and Barley) % by city and state	Dry Bulk (other than grain) % by city and state	Liquid[1] Bulk % by city and state	Containerized Cargo[2] % by city and state	Logs % by city and state	Breakbulk General Cargo (except logs) % by city and state
Total All Cities Per Facility Group	100%	100%	100%	100%	100%	100%

[1]Liquid Bulk is defined as tallow, tall oil and molasses
[2]Cargo is classified containerized if it was loaded on a ship in a container

IMPORT QUESTIONNAIRE

The headings shown below pertain to specific types of commodity movement. Please indicate the city and state of destination, and the estimated percentage, of your imports to that city that moved through Port of Portland facilities (Terminals 1, 2 and/or 4) during calendar year 1973. This need be done only for the circled column headings.

City and State of Destination (or nearest City and State	Bulk % by city and state	Containerized Cargo[1] % by city and state	Autos[2] % by city and state	Steel[3] % by city and state	Breakbulk General Cargo (except Autos and Steel) % by city and state
Total All Cities Per Facility Group	100%	100%	100%	100%	100%

[1]Cargo is classified containerized if it was unloaded from a ship in a container
[2]New and used automobiles
[3]Breakbulk steel is defined as iron bars, iron sheets, steel flats and bars, steel beams, angles and channels, steel coils, steel pipe and tubing, steel sheet and plate

APPENDIX F

STATE ORIGINS OF EXPORTS FROM PORT OF PORTLAND FACILITIES 1973 (including sample results-excluding logs)

LIQUID BULK

	Short Tons	%
Idaho	708.42	3.05
Montana	882.81	3.79
Oregon	17,479.88	75.14
Washington	3,060.66	13.16
Unknown	1,131.08	4.86
Total	23,262.85	100.00

GRAIN

	Short Tons	%
Colorado	164,199.91	9.85
Idaho	114,939.93	6.90
Montana	544,827.70	32.69
North Dakota	98,519.95	5.91
Oregon	344,819.79	20.69
Washington	377,671.34	22.66
Unknown	21,651.84	1.30
Total	1,666,630.46	100.00

DRY BULK

	Short Tons	%
Colorado	4,440.36	2.51
Idaho	22,128.59	12.51
Montana	31,660.86	17.91
North Dakota	2,663.14	1.51

Dry Bulk (continued)

	Short Tons	%
Oregon	46,113.29	26.07
Washington	19,573.83	11.06
Wyoming	50,280.33	28.43
Total	176,860.40	100.00

CONTAINERIZED

	Short Tons	%
Alabama	2.45	0.00
Arizona	447.49	0.16
Arkansas	487.74	0.17
California	209.12	0.17
Canada	80.27	0.03
Idaho	12,463.69	4.33
Illinois	25.99	0.01
Indiana	5.50	0.00
Iowa	40.03	0.01
Kansas	19.05	0.01
Michigan	3.77	0.00
Minnesota	24.25	0.01
Missouri	0.95	0.00
Montana	1,270.93	0.44
Nebraska	116.64	0.04
New Hampshire	507.50	0.18
New Jersey	20.86	0.01
Nevada	68.81	0.02
Oregon	190,116.47	65.97
Pennsylvania	33.12	0.01
Tennessee	159.89	0.06
Texas	175.47	0.06
Utah	137.54	0.05
Virginia	124.92	0.04
Washington	58,516.01	20.30
Washington, D.C.	15.50	0.01
Wisconsin	38.18	0.01
Wyoming	1,201.67	0.42
Unknown	21,858.13	7.58
Total	288,171.94	100.00

BREAKBULK

	Short Tons	%
Arizona	3.93	0.00
Arkansas	46.21	0.01
California	893.92	0.24
Canada	133.99	0.24
Connecticut	1.32	0.00
Idaho	8,410.17	2.22
Illinois	140.48	0.04
Iowa	20.98	0.01
Louisiana	1.50	0.00
Maine	0.02	0.00
Michigan	29.77	0.01
Minnesota	11.27	0.00
Mississippi	46.21	0.01
Missouri	5.62	0.00
Montana	1,705.81	0.45
New Hampshire	161.98	0.04
New Jersey	10.31	0.00
Nevada	221.62	0.06
Ohio	2.25	0.00
Oregon	292,864.36	77.29
Pennsylvania	198.93	0.05
South Dakota	185.50	0.05
Texas	128.65	0.03
Utah	2,930.69	0.77
Washington	57,981.92	15.30
Wisconsin	4.70	0.00
Wyoming	6,461.04	1.71
Unknown	6,331.85	1.67

ALL EXPORT FACILITY GROUPS

	Short Tons	%
Alabama	2.45	0.00
Arizona	451.42	0.02
Arkansas	533.95	0.02
California	1,103.04	0.04
Canada	214.26	0.01
Colorado	168,640.27	6.66
Connecticut	1.32	0.00
Idaho	158,650.80	6.26
Illinois	166.47	0.01
Indiana	5.50	0.00
Iowa	61.01	0.00

All Export Facility Groups (continued)

	Short Tons	%
Kansas	19.05	0.00
Louisiana	1.50	0.00
Maine	0.02	0.00
Michigan	33.54	0.00
Minnesota	35.52	0.00
Mississippi	46.21	0.00
Missouri	6.57	0.00
Montana	580,348.11	22.90
Nebraska	116.64	0.00
New Hampshire	669.48	0.03
New Jersey	31.17	0.00
Nevada	290.43	0.01
North Dakota	101,183.09	3.99
Ohio	2.25	0.00
Oregon	891,393.79	35.18
Pennsylvania	232.05	0.01
South Dakota	185.50	0.01
Tennessee	159.89	0.01
Texas	304.12	0.01
Utah	3,068.23	0.12
Virginia	124.92	0.00
Washington	516,803.76	20.40
Washington, D.C.	15.50	0.00
Wisconsin	42.88	0.00
Wyoming	57,943.04	2.29
Unknown	50,972.90	2.01
Total	2,533,860.65	99.99*

* Total does not sum to 100% due to rounding.

APPENDIX G

STATE DESTINATIONS OF IMPORTS THROUGH PORT OF PORTLAND FACILITIES 1973 (including sample results)

BULK

	Short Tons	%
Oregon	176,172.14	89.95
Washington	19,204.32	9.81
Unknown	477.05	0.24
Total	195,853.51	100.00

STEEL

	Short Tons	%
California	1,506.00	0.53
Canada	157.94	0.06
Idaho	6,824.46	2.41
Illinois	8.85	0.00
Montana	813.02	0.29
New York	23.08	0.01
Oregon	242,622.46	85.58
Utah	185.71	0.07
Washington	22,449.83	7.92
Wyoming	0.03	0.00
Unknown	8,878.67	3.13
Total	283,469.68	100.00

AUTOMOBILES

	Short Tons	%
Alaska	2,774.81	7.58
Hawaii	31.36	0.09
Idaho	4,339.28	11.86

Automobiles (continued)

	Short Tons	%
Montana	20.91	0.06
Oregon	12,220.50	33.40
Utah	75.72	0.21
Washington	17,068.48	46.65
Unknown	55.12	0.15
Total	36,586.18	100.00

CONTAINERIZED

	Short Tons	%
Alaska	125.51	0.21
California	1,323.90	2.18
Canada	44.29	0.07
Idaho	375.67	0.62
Illinois	7,488.07	12.35
Iowa	3.56	0.01
Kansas	13.69	0.02
Michigan	226.60	0.37
Minnesota	14.43	0.02
Montana	81.22	0.13
Nevada	2.21	0.00
New Jersey	60.33	0.10
New York	3,600.19	5.94
Ohio	78.99	0.13
Oregon	33,387.41	55.05
Pennsylvania	3.40	0.01
Tennessee	9.11	0.02
Texas	1,742.59	2.87
Utah	50.93	0.08
Washington	10,989.72	18.12
Wisconsin	63.86	0.11
Wyoming	12.41	0.02
Unknown	950.58	1.57
Total	60,648.67	100.00

BREAKBULK

	Short Tons	%
Alaska	31.69	0.03
Arkansas	1.99	0.00

Breakbulk (continued)

	Short Tons	%
California	1,293.91	1.39
Canada	30.95	0.03
Colorado	4.59	0.00
Idaho	2,740.80	2.94
Illinois	2,793.18	2.99
Kansas	1.65	0.00
Louisiana	38.77	0.04
Maryland	112.41	0.12
Michigan	7.53	0.01
Minnesota	37.62	0.04
Montana	275.80	0.30
Nebraska	243.11	0.26
Nevada	1,458.40	1.56
New York	2,024.10	2.17
Ohio	132.09	0.14
Oregon	63,978.10	68.60
Rhode Island	0.01	0.00
South Dakota	2.92	0.00
Tennessee	9.04	0.01
Texas	491.74	0.53
Utah	239.07	0.26
Washington	15,734.02	16.87
Wisconsin	1.10	0.00
Unknown	1,586.01	1.70
Total	93,270.60	99.99*

ALL IMPORT FACILITY GROUPS

	Short Tons	%
Alaska	2,932.01	0.44
Arkansas	1.99	0.00
California	4,123.81	0.62
Canada	233.18	0.03
Colorado	4.59	0.00
Hawaii	31.36	0.00
Idaho	14,280.21	2.13
Illinois	10,289.83	1.54
Iowa	3.56	0.00
Kansas	15.34	0.00
Louisiana	38.77	0.01
Maryland	112.41	0.02

* Total does not sum to 100% due to rounding.

All Import Facility Groups (continued)

	Short Tons	%
Michigan	234.13	0.03
Minnesota	52.05	0.01
Montana	1,190.95	0.18
Nebraska	243.11	0.04
Nevada	1,460.61	0.22
New Jersey	60.33	0.01
New York	5,647.37	0.84
Ohio	211.08	0.03
Oregon	528,380.61	78.88
Pennsylvania	3.40	0.00
Rhode Island	0.01	0.00
South Dakota	2.92	0.00
Tennessee	18.15	0.00
Texas	2,234.33	0.33
Utah	551.43	0.08
Washington	85,446.37	12.76
Wisconsin	64.96	0.01
Wyoming	12.44	0.00
Unknown	11,947.43	1.78
Total	669,828.69	99.99*

* Total does not sum to 100% due to rounding.