

# Redwood Marine Terminal Feasibility Study

## Task 2 – Market Demand, Final Draft Report



**Submitted to:**

**The Humboldt Bay Harbor, Recreation,  
and Conservation District**



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## List of Acronyms and Abbreviations

AAPA	American Association of Port Authorities
ABAG	Association of Bay Area Governments
BNSF	Burlington Northern Santa Fe Railroad
CAGR	Compound Annual Growth Rate
Caltrans	California Department of Transportation
CCA	California Coastal Act
CCC	California Coastal Commission
CCCC	California Climate Change Center
CCDoTT	Center for Commercial Deployment of Transportation Technologies, Cal State University of Long Beach
CCP	Container Consolidation Points
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
COB	Container-on-barge
CSZ	Cascadia Subduction Zone
CTC	California Transportation Commission
DHS	Department of Homeland Security
District	Humboldt Bay Harbor, Recreation, and Conservation District
DLA	Defense Logistics Agency
DVD	Direct Vendor Delivery
DWT	Deadweight tons
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESHA	Environmentally sensitive habitat area
FPR	First Point of Rest
FRA	Federal Railroad Administration
FTZ	Foreign Trade Zone
GDP	Gross Domestic Product
GPM	Gallons per Minute
HBMWD	Humboldt Bay Municipal Water District
HOST	Hawaii Ocean Science and Technology Park
ILWU	International Longshore and Warehouse Union
JIT	Just-in-time
KPRA	Kingpin-to-rear-axle
kVA	1,000 volt-amperes
LA/LB	Ports of Los Angeles and Long Beach
LOA	Vessel length-over-all
LTL	Less-than-truckload
M&R	Maintenance and Repair
MARAD	U.S. Maritime Administration
MGD	Million Gallons per Day
MLB	Mini-landbridge
MLLW	Mean Lower Low Water

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MPC	Maximum Practical Capacity
MT	Metric Tons
MTSA	Maritime Transportation Security Act, 2002
NAWC	North America West Coast
NCRA	North Coast Railroad Authority
NELHA	Natural Energy Laboratory of Hawaii Authority
NOAA	National Oceanic and Atmospheric Administration
NWI	National Wetland Inventory
NWP Co	Northwestern Pacific Railroad Co.
ONR	Office of Naval Research
PCTC	Pure car and truck carrier
PG&E	Pacific Gas and Electric Company
PNW	Pacific Northwest
POV	Privately Owned Vehicle
RMG	Rail Mounted Gantry
Roro	Roll-on/Roll-off
RRF	Ready Reserve Force
RTG	Rubber Tired Gantry
S.R.	State Route
SACOG	Sacramento Area Council of Governments
SLC	State Lands Commission
SMART	Sonoma-Marin Area Rail Transit
STAA	Surface Transportation Assistance Act
TEU	Twenty-foot equivalent unit
UP	Union Pacific Railroad
USACE	U.S. Army Corp of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USWC	U.S. West Coast

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## 1. Executive Summary

### 1.1 Study Background and Scope

The Humboldt Bay Harbor, Recreation, and Conservation District (District) retained TranSystems to conduct the Redwood Marine Terminal Feasibility Study for evaluation of best uses for this important Port asset. The Study was funded by a grant from the County of Humboldt through its Headwaters Community Investment Fund. The Redwood Marine Terminal was acquired by the District in phases beginning with Berth 1 in 2004 and Berth 2 in 2006, and presents an opportunity for the District to attract new business and stimulate local economic development. The Feasibility Study comprises four tasks as follows:

- **Task 1 - Assessment Phase**
  - A physical evaluation of the existing Redwood Terminal to determine capability of the site to support container, breakbulk, cruise and other terminal operations, and to provide the baseline for determining future infrastructure and facility requirements associated with alternatives proposed in subsequent tasks.
- **Task 2 – Market Demand**
  - Analysis of current and potential cargo flows in the breakbulk, bulk, container and cruise sectors and any other opportunities that may arise during the study.
- **Task 3 – Evaluation Phase**
  - Determine and describe future improvements at the Redwood Terminal required to support market demand identified in Task 2.
- **Task 4 - Recommendations**
  - Based on the results of Tasks 1 through 3, recommendations will be presented on the two most attractive terminal development opportunities (with alternatives if appropriate).

This report provides the analysis, findings and conclusions of Task 2, the market demand evaluation of the Redwood Marine Terminal. The analysis was conducted through a blend of site visits by TranSystems' staff, an interview survey of shippers, service providers and public agencies, an examination of current international trade flows with origins and / or destinations in the Humboldt County area, and a review of historical and projected economic activity in the Humboldt Bay region. Given the absence of significant cargo activity in the region today, emphasis was placed on research with companies inside and outside the region to identify potential new cargo and other activities that could be accommodated at the Redwood Marine Terminal.

### 1.2 Findings and Conclusions

The Task 1 Report "Assessment Phase" found that the Redwood Marine Terminal has sufficient land acreage and waterfront property to support development of modern cargo terminal operations, based on the site visits and analysis of facilities conducted by the project team. However, the terminal infrastructure (berths, utilities, etc.) requires modernization to accommodate cargo operations. In addition, large scale terminal improvements would require restoration of rail service to the Redwood Marine Terminal site. The Task 2 report follows on these findings by exploring market opportunities that could support modernization of the Redwood Marine Terminal. The findings and conclusions of the Market Demand study are based on interviews with a representative sample of organizations:

- Shipping Lines and Terminal Operators
- Shippers
- Barge Operators
- Cruise Shipping Lines

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- Ports in the San Francisco Bay Area
  - Local and Other Government Agencies
  - Non-cargo Organizations

The interview survey is supported by analysis of trends in major cargo sectors and in the West Coast port market. The results of this analysis are two proposed market development strategies for the Redwood Marine Terminal as described below.

### **Short to Medium Term Market Strategy**

In the market survey, a number of short to medium term opportunities were identified which could potentially provide commercial business for the Redwood Marine Terminal and revenues to support pursuit of medium to long term port development as well as the District's recreation and conservation missions. The opportunities, which are not rail dependent, are:

- Project cargo
- Bulk cargo
- Cruise market
- Container-on-barge

The cruise, project cargo and local bulk cargo opportunities currently offer greater prospects than the container-on-barge service, which at present may be unattractive due to limited cargo volumes and the competitive cost of truck service between Oakland and Humboldt Bay. Container-on-barge service may become more viable in the future if the cost of trucking increases due to environmental regulations and highway congestion issues, including new and enforceable future regulations to limit truck emissions, and companies interested in developing barge service can overcome high stevedoring costs at the Port of Oakland and access to a suitable terminal in the Oakland area.

These opportunities suggest that initial development at the Redwood Marine Terminal should focus on a multipurpose berth suitable for docking cruise vessels, handling multipurpose cargo ships, barges and other vessel types. Appropriate storage area would be offered based on specific shipper requirements. Initial terminal infrastructure would be developed so it can be integrated into any future expansions. Terminal equipment consistent with the District's environmental requirements would be provided by the stevedoring company contracted to provide vessel stevedoring and terminal services.

Non-cargo uses could also be developed if they do not disrupt immediate and longer terminal development at the Redwood Marine Terminal. Some of these non-cargo uses may support maritime uses such as historical complex that could be an attraction for cruise passengers.

The above market strategy should be pursued in conjunction with and parallel to the medium to long term market strategy described below.

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### Medium to Long Term Market Strategy

A number of industry trends will support the need for investment in new terminal capacity on the US West Coast over the next decade and beyond, and will create opportunities for secondary ports to expand their market presence. These trends and opportunities are summarized below:

- The container shipping industry is expected to face West Coast port capacity constraints in the 2015 to 2020 period based on a review of existing container ports and confirmed new terminal projects.
- As major West Coast container ports seek new container terminal capacity within their property boundaries, they may replace existing automotive terminals with container terminal operations, which typically generate higher cargo density per acre and higher lease revenues for the port authority. Automotive terminal operators are likely to seek new terminal sites at secondary ports along the West Coast.
- Studies are taking place on the feasibility of operating coastal short sea shipping services for domestic freight, either using ro-ro barges or ships, which would operate on routes between the major West Coast population centers but may also call at secondary ports.
- Other cargo sectors – breakbulk and bulk – may also seek new terminal facilities at secondary ports due to the difficulty securing land at the major ports.
- Secondary ports will have to offer good rail and highway connections to population centers on the West Coast and further inland.
- Environmental constraints related to local cargo truck traffic (pollution, traffic congestion) and long term expansion of local cargo traffic at major West Coast ports may slow ability to expand intermodal rail traffic. This is expected to support interest in the development of secondary ports and new port locations for intermodal rail cargo.
- The private sector (terminal operators, investment funds, etc.) is showing greater interest in the development, management and operation of transportation infrastructure including ports, railroads and warehousing. This participation can take different forms including full private sector control and public-private partnerships.
- The timeframe for major terminal development can be 10 years or more from the initial concept through the various evaluation and planning stages (environmental reviews, permits, negotiations with terminal operators, construction, etc.) to completion of the terminal. This timeframe is reasonably consistent for major ports expanding their capacity and for secondary ports developing a major new terminal business.

Humboldt Bay must compete with other secondary ports and potential new port locations for investment, each location having advantages and disadvantages. In order to be considered by terminal operators and investors, the District would need to pursue the following market strategy:

- Commit to a sustained multi-year effort to market the Redwood Marine Terminal given that terminal projects, including competing for investment, can take upwards of 10 years from concept to completion.
- Raise the industry profile of Humboldt Bay amongst the cargo shipping industry (terminal operators, shipping lines, shippers, etc.). The shipping industry community has very poor awareness of the port

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and the rail corridor, and this lack of knowledge is currently a significant weakness for the port compared to other potential locations for investment on the West Coast.

- The availability of a functional and efficient rail corridor between Humboldt Bay and the transcontinental rail system is a requirement to be considered for major terminal investment by the private sector (terminal operators, shipping lines, etc.). The District must have a coordinated development strategy with the Management of the rail corridor. Part of this strategy should include a full evaluation of the rail corridor, including cost of construction to meet standards for intermodal rail service and environmental impacts, which is then available to potential terminal operators and investors.
- Investigate environmental requirements and permits that would support terminal development and investment including evaluation of dredging deeper at the berth and enlarging the turning basin.
- Pursue potential funding support from the State, including under California Proposition 1B, the transportation bond measure passed by California voters in November 2006.

The above strategy is expected to improve the opportunities available to Humboldt Bay but the port will still remain in a very competitive investment environment. Potential for success will require a sustained multi-year commitment on the part of the District. The medium to long term market strategy could run in conjunction with and parallel to the short to medium term market strategy described earlier.

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## 2. Humboldt Bay Background

### 2.1 District Mission

The District's mission is to manage Humboldt Bay for commercial and recreational uses, while protecting the natural resources of Humboldt Bay. As stated in the Humboldt Bay Management Plan, May 2007:

“In order to efficiently balance the variety of uses in Humboldt Bay, the State of California established the Humboldt Bay Harbor, Recreation and Conservation District (District) in 1970. The enabling legislation may be found in the California Harbors and Navigation Code, Appendix II. The statutory purpose of the District is to manage Humboldt Bay for the promotion of commerce, navigation, fisheries, recreation, and the protection of natural resources, and to acquire, construct, maintain, operate, develop, and regulate harbor works. The important point in this statement of purposes is the balance among potentially conflicting uses of Humboldt Bay, which the District continually strives to achieve, and which the Humboldt Bay Management Plan is intended to facilitate.”

In addition, the District's role is to also support local, regional and state-wide requirements for commercial port facilities. As stated in California Public Resources Code (Section 30701):

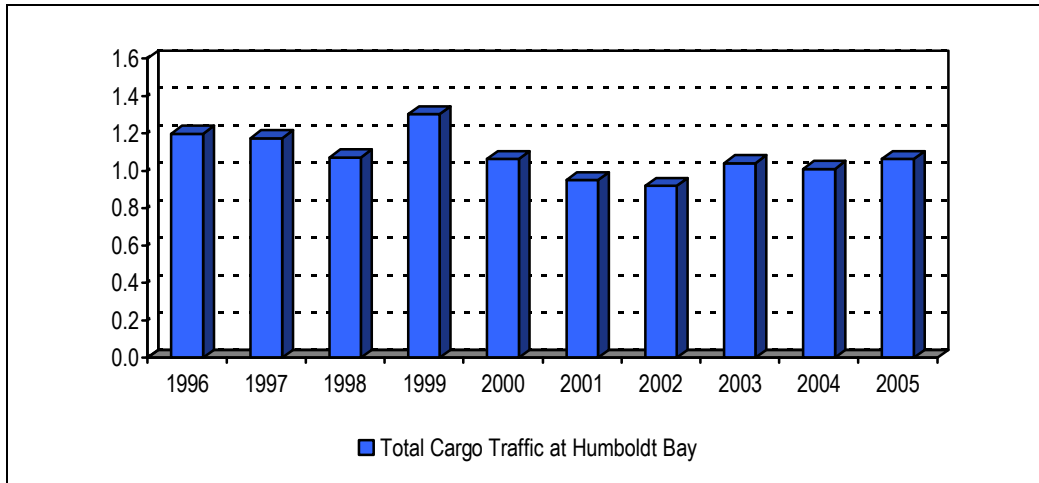
“The Legislature finds and declares that:

- (a) The ports of the State of California, including the Humboldt Bay Harbor, Recreation, and Conservation District, constitute one of the state's primary economic and coastal resources and are an essential element of the national maritime industry.
- (b) The location of the commercial port districts within the State of California, including the Humboldt Bay Harbor, Recreation, and Conservation District, are well established, and for many years such areas have been devoted to transportation and commercial, industrial, and manufacturing uses consistent with federal, state, and local regulations. Coastal planning requires no change in the number or location of the established commercial port districts. Existing ports, including the Humboldt Bay Harbor, Recreation, and Conservation District, shall be encouraged to modernize and construct necessary facilities within their boundaries in order to minimize or eliminate the necessity for future dredging and filling to create new ports in new areas of the state.” (Source: [www.leginfo.ca.gov](http://www.leginfo.ca.gov))

## 2.2 Humboldt Bay Cargo Traffic

Humboldt Bay is an active port and handles cargo for the regional economy. During the period from 1996 to 2005, Humboldt Bay handled around 1 million short tons per year of cargo (Figure 2.1). The cargo is a mixture of domestic coastwise traffic, exports to Asia, and trade with Canada. Coastwise movements are inbound shipments of petroleum products for local consumption, and inbound and outbound movements of forest products. Forest products are shipped to and from Canada, and to Asia.

**Figure 2-1: Total Cargo Traffic at Humboldt Bay**



Note: The US Army Corp of Engineers has not yet released its data for 2006 and 2007.

Source: US Army Corp of Engineers "Waterborne Commerce Statistics"

## 2.3 Previous Studies

A number of previous studies have been prepared to evaluate the District's mission and its cargo market opportunities. A list of the main studies is presented in Table 2.1. The study of interest is the Revitalization Plan conducted in 2003, which included an assessment of the cargo market potential for Humboldt Bay. Selected conclusions of the Revitalization Plan are discussed during the evaluation of specific market sectors in later sections of the Task 2 report.

**Table 2-1: Previous Studies on Humboldt Bay**

Date	Plans and Reports
November 2007	Humboldt Bay Strategic Plan
May 2007	Humboldt Bay Management Plan
February 2003	Port of Humboldt Bay Harbor Revitalization Plan
April 1995	Final Feasibility Report for Navigation Improvements
March 1994	Economic Impact of Harbor Deepening and Port Development
November 1993	Humboldt Bay Cargo Market Assessment

Source: Humboldt Bay Harbor, Recreation, and Conservation District

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## 3. Market Survey

### 3.1 Introduction

TranSystems conducted a survey of companies and organizations to determine interest in using an upgraded Redwood Marine Terminal and to identify market sectors that could be served by the facility. The survey targeted local companies that are moving freight in and out of the region, companies outside the region that move cargo through ports, and companies that are active in the development, management and operation of cargo terminals. The survey comprised in-person and telephone interviews with entities in the following categories:

- Container Shipping Lines and Terminal Operators
- Shippers
- Barge Operators
- Cruise Shipping Lines
- Ports in the San Francisco Bay Area
- Local and Other Government Agencies
- Non-cargo Organizations

A list of organizations is provided in Section 2.9.

### 3.2 Container Shipping Lines and Terminal Operators

Container shipping lines and private terminal operators were interviewed for their opinions on trends in the container market and other cargo sectors, and on the feasibility of new cargo terminal operations at the Redwood Marine Terminal. The following observations were made:

- A primary finding was the lack of knowledge amongst interviewees that a deep-water port with available waterfront land and a potential for rail service was located at Humboldt Bay. This finding was also true for other non-local interviewees – shippers, etc. This lack of awareness placed some limitations on the respondents' ability to provide more informed opinions on how Humboldt Bay could be developed. Raising the profile of Humboldt Bay amongst shipping lines, terminal operators and shippers must be a first step for the District.
- Container shipping lines and terminal operators will focus the majority of their investments at the existing major West Coast ports until such time as these ports can no longer accommodate growth. They will continue to evaluate potential terminal sites and in some cases make investments at secondary ports or new locations (Coos Bay, Everett, WA, Prince Rupert, BC, Mexico, etc.) given the need for new capacity on the US West Coast in the medium to long term. Humboldt Bay must compete against these other locations for investment.
- The local and regional market does not generate sufficient container cargo to support a container terminal; therefore any terminal development would be driven by intermodal container traffic, containers moving by rail to and from interior points of the country, or other cargo types moving in and out by rail. Any development at Humboldt Bay will require a functional and reliable rail corridor for terminal development.
- The involvement of a major railroad (Union Pacific Railroad and/or BNSF Railroad) is important for terminal development. Railroads are increasingly interested in “hook and haul” operations where full unit trains are moved directly from on-dock or near-dock intermodal rail yards to inland destinations without intermediate stops. A terminal at Humboldt Bay would require service by a major railroad.

- Considerable investment will be required to develop a new container terminal involving preparation of land, development of berths, storage yard, on-dock intermodal yard, dredging and support services. Large scale investment will be required to develop intermodal rail infrastructure at the port and along the North Coast rail corridor.
- Humboldt Bay has several strengths:
  - Large amounts of relatively less expensive land for terminal development based on the public and private land parcels available on the Samoa Peninsula.
  - Sufficient waterfront property to develop a multi-berth facility.
  - Adequate vessel draft which could be dredged deeper to accommodate the post-panamax vessels deployed in the transpacific container trade.
  - Shorter distance from ocean to ship berth in comparison with many existing major and secondary ports.
  - An uncongested port that can accommodate growth in ship traffic.

### 3.3 PCTC Shipping Lines

Shipping lines that operate pure car truck carriers (PCTC) were interviewed to determine the type of port infrastructure they require to service their vessels. The vessels are up to 660 feet in length and have a draft of up to 33 feet. These dimensions make relatively shallow draft ports suitable for PCTC vessels. However, an important requirement is that the port is not constrained by air draft, which is the clearance under road or rail bridges that cross over the shipping channel. Medium to large PCTCs, in particular the larger vessels under construction today, require an air draft of 150 feet and higher. In addition, some shipping lines will only select a port if all the vessels in its fleet can enter the port. In the San Francisco Bay area, a number of the smaller ports have suitable channel draft for PCTCs but have air draft constraints that restrict their ability to enter or expand into the auto/ro-ro market – Sacramento, Stockton, Benicia and Redwood City. One shipping line stated it had considered calling at Stockton but did not do so because Stockton could not receive the largest vessels in the shipping lines fleet.

### 3.4 Shippers

Shippers were interviewed to determine the amount of containerized freight moving in and out of the Humboldt County region, and to understand their interest in using container-on-barge (COB) service between Humboldt Bay and Oakland. In addition, shippers of bulk cargo and project cargo were also interviewed to evaluate their terminal needs.

The largest identified shipper of containerized cargo in the area is Evergreen Pulp, which produces unbleached wood pulp for export to its parent company in China and to other international markets. The company ships about 19,000 metric tons (MT) of pulp per month to markets in Asia. Of the total, approximately 14,000 MT of non-containerized pulp are loaded onto breakbulk vessels at the Fairhaven Dock, a privately-owned dock located a short distance south of the pulp mill. Currently one breakbulk vessel calls per month with stevedoring services provided by SSA Pacific, a west coast private stevedoring company that employs workers of the International Longshore and Warehouse Union (ILWU). The remaining 5,000 MT of pulp is exported in containers (between 250 and 300 containers per month), which are trucked to the Port of Oakland for loading onto container ships bound for Asia. The round trip truck charge is around \$800 per container, which covers trucking the empty container from Oakland to the pulp mill and return of the loaded container by truck to Oakland.

As the largest exporter of containerized cargo in the area, Evergreen Pulp would be a prime target for COB service. The company is interested in COB service if it can offer lower transportation cost to and from Oakland. Use of barge would allow Evergreen to avoid highway weight restrictions (80,000 pounds per truck including tractor, trailer and container) which limit cargo loads to 20.3 metric tons per 40-foot container. A 40-foot

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container moving by barge could be loaded to approximately 26.5 metric tons of pulp thus reducing the transportation cost per ton of cargo. The company would have to be convinced that a service can provide consistently reliable and cost competitive service. The viability of container-on-barge service is discussed in Section 9.3 of this report.

Green Diamond Lumber (a division of Simpson Lumber) and Pacific Lumber Company are two other shippers in the forest products industry. Green Diamond Lumber moves a small volume of international exports by dry van trailer to the Port of Portland, Oregon. Here the lumber is transferred to containers for shipment to Japan; about 10-15 containers per year. Domestic markets in California and other western states are nearly all served by truck. The company sends 8-9 truckloads per day over the highway towards Redding for connection to interstate highways. If the company requires rail service to domestic markets then it trucks cargo to Redding for loading to railcar. Pacific Lumber Company exports about 30 container loads per month through the Port of Portland. Export product is moved by flatbed truck into Oregon and then transferred into containers.

McClellan Mountain Spring Water bottles spring water for shipment to domestic markets. The company has tentatively explored the potential for exporting bottled water to Asia. A significant challenge is securing a stable supply of empty containers from Oakland. The company is interested in the potential for COB service that would allow it to position empty containers from Oakland and return loaded containers.

A number of smaller shippers were identified with assistance from the local economic development agencies in Eureka and Humboldt County. These companies offer limited opportunity or no international cargo for a COB service for the following reasons:

- Shipments are small and time sensitive, and moved by less-than-truckload (LTL) service.
- Small volumes of import and export freight that, at the most may, generate 1-2 containers per week.

The local economic development agencies - Eureka Redevelopment Agency and Humboldt County Economic Development Division – advised that the overall profile of companies located in the region is weighted towards small businesses generating limited quantities of international and domestic freight. Companies that ship refrigerated products from the region to domestic markets (for example, the San Francisco Bay Area) use refrigerated vans, and observed that the time sensitive nature of these refrigerated products may not be suited to a COB service.

Container shipping lines pointed out that very little international container cargo moves to and from the Humboldt County area due to the region's small population and limited manufacturing base. Apart from the limited amount of container freight, container shipping lines stated that an important obstacle to COB service would be stevedoring charges at Oakland. The container shipping lines observed that larger shippers are present to the east around Redding, and points to the south and north of Redding. These locations are best served by truck to and from Oakland, as truck drayage to Humboldt Bay to connect with a barge service to Oakland would be prohibitively expensive.

DG Fairhaven Power LLC is an 18 MW renewable energy biomass power generation facility located to the south of the Redwood Marine Terminal. The plant produces energy by burning hog fuel (saw dust and bark trimmings). Local suppliers provide over 70% of the annual hog fuel requirement and the balance is imported from British Columbia by barge. The company receives about 1 barge per month, which is discharged at Fields Landing on the east side of Humboldt Bay and then trucked to the plant. Each barge load is 5,000 to 5,600 tons or about 200 truck loads. Relocating barge discharge to the Redwood Marine Terminal would lower the company's truck costs from terminal to plant. In addition, the company may be interested in using Warehouse 14 at the Redwood dock for storing and drying hog fuel, which would require rehabilitation to seal the building's floor and to repair storm damage. The company's primary goal is sustaining adequate supplies for its plant; however, the company may also have an interest in purchasing additional fuel and selling it to other end-users in the area.

Shell Renewables is investigating the development of a wind farm on property located 30 miles south of Eureka. The proposed project would begin construction around 2010 and would require the shipment of large and heavy components (Table 3.1) to the project site.

**Table 3-1: Project Cargo Example**

Wind Turbine Component	Height (feet)	Width (feet)	Length (feet)	Weight (ton)
Nacelle	14.3	10.8	33.1	82.7
Blade	6.6	11.2	12.8	7.0
Hub	11.4	10.8	10.8	26.5
Tower Base	13.5	13.5	36.4	59.5
Tower Lower-Mid	12.8	12.8	55.8	68.3
Tower Upper-Mid	11.5	11.5	78.4	61.7
Tower Top	9.2	9.2	80.0	47.4

Source: TranSystems derived from Shell Renewables

Many of these components are too large to be transported into the area by Highways 101 and 299, and the most suitable option is to transport the components by ship or barge to the Port of Humboldt Bay and then by road to the project site. Components sourced overseas could be delivered directly to Humboldt Bay by chartered multipurpose ships with onboard cranes. US suppliers could deliver components to a West Coast port and then use a barge to Humboldt Bay. Terminal requirements are the availability of a suitable berth for both vessels and barges, equipment for lifting large and heavy components, and storage space. The proposed wind farm is an example of the type of local development project that could be supported by the availability of modern terminal facilities at the Redwood Marine Terminal. However, project cargo does not normally provide a stable flow of business that would support terminal development on its own and is usually part of a multipurpose terminal handling different types of cargo.

Sims Metal and Schnitzer Steel Industries are the two leading exporters of recycled ferrous and non-ferrous metals off the US West Coast to Asian and other markets. Exports are shipped in bulk vessels of up to 45,000 deadweight tons (DWT) and in containers. The trade has grown significantly in recent years due to demand for recycled metals from the global steel industry. The companies operate export facilities along the West Coast, including three at ports in the San Francisco Bay at Richmond (Sims), Redwood City (Sims) and Oakland (Schnitzer Steel). Collection and processing centers are operated at inland locations around California. These centers receive metal for recycling from California and neighboring states. Currently, metals for recycling from Northern California are trucked at considerable expense down to the San Francisco Bay Area for processing and export. There may be an opportunity for the District to market Humboldt Bay to these companies as an export center for recycled metals from Northern California. Humboldt Bay has sufficient channel draft and width to accommodate the bulk vessel sizes used for exports. However, the volumes of recycled metals out of Northern California are currently limited by the small population base. The opportunity may be longer term, related to population growth and expansion of recycling activity (into areas such as plastics) and also the potential pressure on existing terminals in the San Francisco Bay Area from alternative land uses (for example, cargo activities that generate higher revenues per acre).

Aggregates are mined in Humboldt County and consumed by the local market. Barge shipments to the San Francisco Bay Area have been looked at in the past but environmental constraints have prevented the expansion of production that would facilitate such shipments<sup>1</sup>. The proposed quarry at Island Mountain, Trinity County is another potential source of aggregates that could be shipped through Humboldt Bay. The main transportation infrastructure requirements would be the re-opening of the rail connection between Island

<sup>1</sup> Source: Interviews

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Mountain and the port. The Port has sufficient waterfront land to provide storage for aggregates and adequate channel depth to accommodate outbound shipments by barge or bulk ship.

### 3.5 Barge Operators

Five tug and barge companies were interviewed for comments on the feasibility of operating container-on-barge (COB) service between Humboldt Bay and Oakland, and barge service for non-containerized cargo. Four of the five companies operate on the U.S. West Coast and the fifth operates on the U.S. East Coast. The latter was interviewed because the company currently operates COB service between ports on the East Coast and so provides a suitable current benchmark of operating and market requirements for COB service. TranSystems also interviewed Seaworthy Systems, Inc., a marine engineering and naval architecture firm that is working with the Port of Oakland on the feasibility of COB service between Oakland and Sacramento. COB service was also discussed with shippers, container shipping lines and port authorities.

Barge operators are interested in the concept of COB service between Humboldt Bay and Oakland; however, they are concerned about the availability of sufficient freight to support long-term viability of a service. The principal cost concern relates to stevedoring charges at Oakland for lift-on/lift-off barges and the solution may be a roll-on/roll-off (ro-ro) barge operating model.

A range of barge options were suggested by respondents:

- Non-geared barge, which requires the installation of a crane or other equipment at the Redwood Marine Terminal for discharging and loading the barge.
- Geared barge, which has an on-board crane for container handling. However, an on-board crane is likely to be less productive than a terminal crane.
- Roro deck barge, which eliminates the need for a crane at Humboldt Bay.

The barge operators stated that the most feasible operating model is likely to be driven by the stevedoring costs of each option. Geared and non-geared barges are likely to incur higher stevedoring costs at Oakland than ro-ro barge. A recent feasibility study on COB service between Oakland and Sacramento found the ro-ro barge to offer a lower cost option for container handling, with the ro-ro stevedoring cost 25% to 50% of the lift-on/lift-off stevedoring cost.

Three barge sizes were mentioned by barge operators as suitable for a COB service:

- Small 1,100-4,000 deadweight (dwt) barges
- Medium 5000-6000 dwt barges
- Large 7,500+ dwt barges.

Small and medium sized barges could handle 50 and 200 containers, respectively, per voyage. Some respondents viewed large barges less favorably because it was unclear how much product would move at one time. Furthermore, the advantage of using smaller barges is that smaller tugs burning less fuel are required to tow them. The high cost of diesel fuel is a consideration when considering the sizes of barge and tug for the service.

Navigation of Humboldt Bay was not a concern for any respondent in light of the large breakbulk vessels that currently call there and past movement of barges in and out of the Bay. This view was confirmed by discussions with the Humboldt Bay Bar Pilots. A minor issue was that fog in that area sometimes causes minor delays, however this was not seen by respondents as an impediment to service.

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All the barge operators stated that discharging directly to a container terminal in Oakland would not cause any significant challenge. The number of discharge terminals in a given voyage should be limited to one or two, as multiple terminal calls/barge moves would erode any cost advantages that the barge operations might present. A single small terminal for barge service at Oakland may be worthwhile if a network of barge services is developed with Oakland as the hub (Oakland-Sacramento, Oakland-Humboldt Bay, etc.). The concept of a dedicated terminal was the preferred strategy in the recent Oakland-Sacramento COB study because it would provide dedicated berthing for ro-ro barge service and avoid conflict with deep-sea container terminal operations.

Respondents provided some general guidance on barge service costs, however they qualified their responses by stating that detailed cost analysis would be required based on cargo availability, service frequency, barge size, and terminal negotiations in Oakland. Respondents pointed out the service viability would be considered on a per ton cost rather than a per container cost since barge service allows the shipper to avoid the highway weight limitations on containers. A shipper could load a maximum 26.5 metric tons per 40-ft container when using barge service but only 20.3 metric tons per 40-ft container when using highway transport.<sup>2</sup>

Respondents offered some indicative costs for barge service:

- The round trip barging charge per container would be \$400, assuming a 5,000 DWT barge carrying 200 containers per voyage.
- Based on East Coast experience of barges calling at container terminals, lift-on/lift-off stevedoring charges could be 15% to 25% lower than those for container ships (currently around \$300 per lift) because the move (barge to terminal or terminal to barge) is not a through move (for example, from containership out the terminal gate).
- Barges could be fitted with cell guides to save on container lashing costs; however, this suggestion assumes a long term, dedicated service between Humboldt Bay and Oakland.

The East Coast provides a case study for the competitiveness of lift-on/lift-off COB service. Barge rates are competitive with East Coast truck service and shippers normally select barges over trucks for high volume moves or heavy loads. Over a similar distance as Humboldt Bay to Oakland, 244 nautical miles, East Coast COB services charge rates of about \$600 per loaded container plus \$350 for empty container repositioning, for a total round-trip cost of \$950. These are all-in rates that include: origin terminal stack to crane, crane loading to barge, barge transport, barge discharge by crane, crane to destination terminal stack. COB service on the East Coast benefits from the generally lower stevedoring costs at most East Coast ports and the high volume of containers moving on the East Coast barge lanes.

Discussion of the economics of a Humboldt Bay to Oakland COB service is presented in Section 9.3 of this report. Barge operators also stated there would be no impediments to the movement of barges carrying project cargo, breakbulk cargo, and bulk cargo in and out of Humboldt Bay.

### 3.6 Cruise Shipping Lines

The major cruise shipping lines are willing to evaluate Humboldt Bay as a potential port of call. They apply the following key criteria in port selection:

- Channel, turning basin and berth able to accommodate cruise vessels. The vessels calling on the US West Coast are from 500 feet to 970 feet in length and require draft (including under keel clearance) of about 33 feet at low tide, which is important so they can arrive and depart on any tide without the need to wait for high tide. The completed vessel simulation study showed that Humboldt Bay could accommodate vessels up to 950 feet in length; enlargement of the turning basin may be required for larger cruise ships.

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<sup>2</sup> From an interview with an exporter of containerized cargo

- Sufficient local attractions for passengers within a reasonable distance of the port.
- Ability to accommodate a passenger “surge” of up to 3,000 people in an 8 hour period – tour guides, tour bus operators, restaurants, attractions, etc.

Cruise ships require limited support services during a short duration call. The primary criteria are a secure terminal area and adequate access to fresh water for replenishing the ship (about 500 tons of fresh water per short duration call). The vessels can maneuver without tug assistance but a tug would be expected to be on standby for safety and security reasons.

The most likely port calls relate to the redeployment cruises when cruise ships are being transferred to Alaska in the spring and from Alaska in the fall. There may be other opportunities for calls on other cruises but the sailing schedules are tight and the inclusion of secondary ports is limited. For example, cruises run from San Francisco to Alaska during the summer months but the goal is to get as far north from San Francisco as possible to maximize the number of Alaskan port calls. Cruise lines often like to offer balanced itineraries that include large cities such as Seattle or San Francisco, which currently has around 70 cruise vessel calls per year, and smaller out of the way ports. Humboldt Bay can learn from the experience of smaller ports such as Astoria, Oregon, Santa Barbara, California and Victoria, British Columbia.

### 3.7 Railroad

Interviews were held with the North Coast Railroad Authority (NCRA), the public agency tasked with management of the 300-mile rail corridor, and Northwestern Pacific Railroad Co (NWP Co), the company contracted to operate on the corridor south of Willits with an option to extend operations up to Eureka. Details on the rail corridor and the service restoration strategy were presented in the Task 1 report; the following discussion reiterates the major points.

NCRA is currently focused on restoration of the 142-mile rail line between Willits and Lombard (also known as the Russian River Division) using state and federal funds. Improvements are planned for grade crossings, signaling systems, bridges and other track work with the intention of introducing freight service on the line by the end of 2008. The intention is for NWP Co to then commence rail service on the Russian River Division, handling waste-by-rail, wine, and other carload commodities.

NCRA must conduct an EIR/EIS study on the Eel River section (Willits to Eureka), which could take 1 to 2 years to complete. NCRA did not advise when it expects to reopen the full rail corridor to Humboldt Bay, the corridor's restoration very much dependent on the identification of freight volumes that could support the significant capital investment. Such freight volumes would primarily be driven by new cargo activities at Humboldt Bay. Also, NCRA did not indicate the expected capacity of the full rail corridor (number of trains per day of capacity). A cargo terminal at Humboldt Bay would require a rail corridor that could support multiple inbound and outbound trains coordinated with ship arrival and departure schedules. Typically, a single line corridor, like that of the NCRA, requires a number of rail sidings to ensure smooth train flow and adequate corridor capacity to support a marine cargo terminal.

A challenge is the availability of funds for repairs and reconstruction of the damaged line. NCRA currently estimates it would cost \$151 million<sup>3</sup> and up to restore the full line, the lower end cost related to improvements sufficient for basic freight service. The NCRA cost estimates derive from the “Capital Assessment Report” prepared for the NCRA by Willdan/HNTB in 2002. TranSystems believes it would be reasonable for the District to support the NCRA's efforts to raise funds given that success of any major cargo terminal activities would be tied to the availability of a functional and reliable rail corridor serving the port.

<sup>3</sup> The cost of reopening the entire NCRA line is estimated at between \$151 million and \$500 million depending on the level of service and repairs, according to the NCRA Strategic Plan Update dated February 15, 2007.

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### 3.8 Regional Ports

Ports in the San Francisco Bay Area were interviewed to discuss market trends, barge feeder service and potential for synergies with Humboldt Bay.

The smaller ports – Redwood City, Stockton, etc. – are not considered direct competitors of Humboldt Bay. These ports are mainly focused on niche markets in the bulk and breakbulk cargo sectors. Cargo is typically generated by local markets within trucking distance of the port – for example, aggregates for construction and exports of agricultural products. The ports face constraints which limit their abilities to service large vessel trades – for example, land constraints (Redwood City) and channel draft constraints (Redwood City and Stockton). The ports are interested in feeder barge services that would connect with the container terminals of Oakland; however, the feeder barge concept still must be shown to be economically viable. The smaller ports are also interested in the potential of short sea coastal service that could create new business opportunities.

As Northern California’s major container port, Oakland’s primary strategic focus is on the development of its container terminal capacity, rail connections, and mitigation of environmental impacts on neighboring communities. The Port is working with BNSF and UP railroads to improve intermodal rail capacity on the two key corridors serving the port – over the Donner Pass (UP line) and Tehachapi Pass (BNSF line). While the port is interested in working with the smaller ports in Northern California on business development (for example, Oakland’s strategic alliance with the Port of Sacramento), full development of its own container handling capacity will remain Oakland’s priority.

The interviews indicate two areas where Humboldt Bay should coordinate activities:

- Potential of short sea shipping service for Northern California’s smaller ports
- Enhancement of rail corridors serving the Port of Oakland given that any future cargo terminal at Humboldt Bay would use the same rail corridors to service inland markets.

### 3.9 Non-Cargo Activities

TranSystems interviewed a small number of companies and organizations that are interested in using property within the Redwood Marine Terminal for non-cargo uses. TranSystems recommends that non-cargo uses be considered as an integrated part of site development and if they make a positive contribution to the overall economics of the site. Revenues from non-cargo uses could provide some funds toward broader development of cargo activities in Humboldt Bay, as well as support the District’s important recreation and conservation missions.

The Timber Heritage Association is an IRS 501(c)(3) non-profit corporation with the mission of creating a logging and timber heritage museum.<sup>4</sup> The Association currently uses the Roundhouse and neighboring sheds, located on the Redwood Marine Terminal, for the storage of historical artifacts under a short-term lease with the District. The Association is interested in a long-term lease of these facilities for the proposed timber heritage museum. TranSystems believes that operation of a museum or other cultural activities at these properties will not interfere with the long-term development of the Redwood facility. However, the District should consider the development of cultural uses within the broader strategy of pursuing cruise line business. For example, the structures could be restored to incorporate a passenger receiving facility and associated services, along with a museum and other cultural uses to provide an attractive shore excursion for cruise passengers.

The City of Eureka has investigated the operation of a short haul tourist and excursion train around Humboldt Bay over track owned by the NCRA. The excursion train was the subject of a feasibility study conducted in 2003<sup>5</sup>, which addressed a number of development phases including Eureka-Samoa, with a terminus in the area

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<sup>4</sup> [www.timberheritage.org/](http://www.timberheritage.org/)

<sup>5</sup> “Humboldt Bay Shorthaul Tourist and Excursion Train Feasibility Study, May 2003”, Stone Consulting & Design Inc.

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of the Samoa Cookhouse and the Roundhouse, and later expansion between Eureka and South Fork. The study concluded the Eureka/Arcata and Humboldt County region has an excellent potential for a moderate level of tourist railroad activity. At the time, the excursion train did not consider the potential for integration with cruise shipping activities. While no evaluation has been undertaken in this study, TranSystems believes that an excursion train could potentially be an attractive activity for the cruise shipping industry, allowing passengers to disembark at Redwood Marine Terminal and board the excursion train around to Eureka, returning to Redwood Marine Terminal either by train or boat across the Bay. One of the most successful excursion trains in North America, the White Pass & Yukon<sup>6</sup> in Skagway, Alaska, is driven by the cruise shipping business. As with the proposed museum discussed above, the District should consider any proposals for an excursion train terminating on District property in the context of overall strategy for developing cruise business. In addition, operation of an excursion line over NCRA track should not interfere with any freight rail activities tied to cargo handling at the Redwood Marine Terminal.

The District has been approached by local companies that specialize in the commercial cultivation of oyster seedlings, clam spat and adult oysters. They are interested in the use of the Pre-Existing Cogeneration Plant Water Intake Berth located south of Warehouse 14 for production and processing. Requirements for the business include one acre of adjacent backland, three acres of submerged lands, and access to fresh water. A further area for consideration is a broader park concept, a center that provides facilities and services to companies in aquaculture and other maritime activities, that also is a location for research and education activities. A leading example is the Hawaii Ocean Science and Technology (HOST) Park, a research and commercial facility at Keahole Point, Hawaii, operated by the Natural Energy Laboratory of Hawaii Authority (NELHA)<sup>7</sup>. The District should consider aquaculture and related uses as potential sources of non-cargo revenues if they can be successfully integrated into overall development of the site.

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<sup>6</sup> [www.whitepassrailroad.com](http://www.whitepassrailroad.com)

<sup>7</sup> [www.nelha.org](http://www.nelha.org)

### 3.10 List of Organizations Interviewed

**Table 3-2: Interview List**

<p><b>Barge Operators</b>  Columbia Coastal  Foss Tugs  Oscar Niemeth Towing  Sause Brothers  Westar Marine Services</p> <p><b>Container Shipping Lines</b>  APL  China Shipping  Matson Navigation  Hapag Lloyd</p> <p><b>Cruise Shipping Lines</b>  Norwegian Cruise Lines  Princess Cruises</p> <p><b>RoRo/PCTC Shipping Lines</b>  Shipping Line 1 (confidential, name withheld)  Shipping Line 2 (confidential, name withheld)</p> <p><b>Ports</b>  Port of Oakland  Port of Redwood City  Port of Richmond  Port of San Francisco  Port of Stockton</p> <p><b>Rail</b>  North Coast Railroad Authority  Northwestern Pacific Railroad Company</p> <p><b>Stevedores and Terminal Operators</b>  MTC Holdings  Pasha Stevedoring &amp; Terminals  SSA Pacific  Terminal Operator (confidential, name withheld)</p>	<p><b>Shippers</b>  CPR Aquatic  Eureka Ready Mix  Evergreen Pulp  GD Fairhaven Power LLC  Green Diamond Lumber (Division of Simpson Lumber)  Humboldt Bay Oyster Co  Humboldt Creamery  Kuiper Mariculture Inc  McClellan Mountain Spring Water  Marimba One  Pacific Lumber Company  Schnitzer Steel Industries  Shell Renewables  Sims Metal</p> <p><b>Local and Other Government Agencies</b>  Eureka Redevelopment Agency (including Foreign Trade Zone)  Humboldt County Economic Development Division  U.S. Maritime Administration (MARAD)</p> <p><b>Cultural</b>  Timber Heritage Association</p> <p><b>Property Owners</b>  DANCO  Kramer Properties Inc</p> <p><b>Engineering</b>  Seaworthy Systems Inc. (barge related)  Stone Consulting &amp; Design (tourist railroad related)</p>
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Source: TranSystems

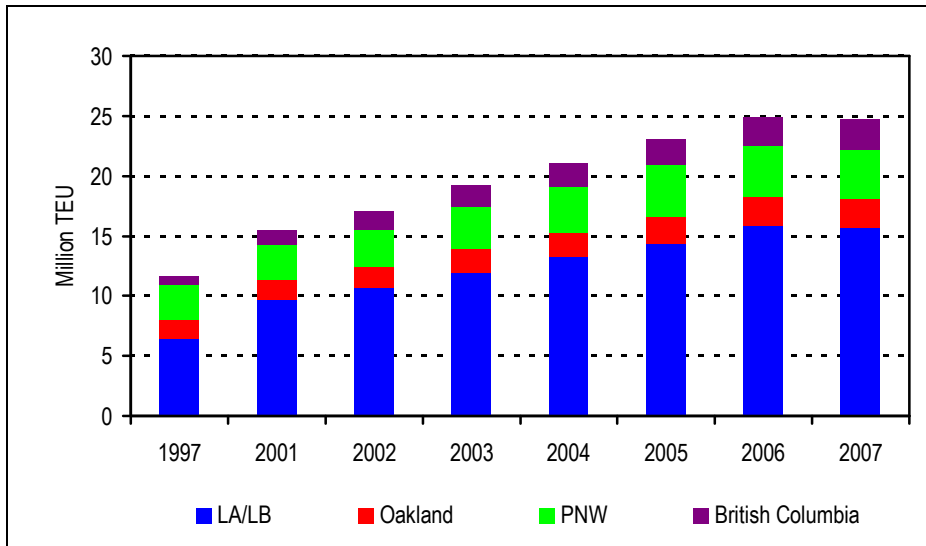
## 4. Container Market

### 4.1 Historical Trends

Historical statistics on total port throughput, international loaded imports and international loaded exports are presented in Table 4.1 at the end of this section. The data is summarized in Figures 4.1, 4.2 and 4.3, with major trends described below.

Total port throughput of US West Coast ports increased from 10.94 million TEU<sup>8</sup> in 1997 to 22.23 million TEU in 2007, a compound annual growth rate (CAGR) of 7.5%. The highest growth occurred in Southern California at the ports of Los Angeles and Long Beach (LA/LB), which saw a 10-year CAGR of 9.4%. LA/LB growth was more than twice the rate of Oakland (10-year CAGR of 4.6%) and the Pacific Northwest (10-year CAGR of 3.8%). Ports in British Columbia experienced strong growth with a 10-year CAGR of 12.0%. Total port throughput of North America West Coast ports declined by 0.5% in 2007 due to weakness in the US import sector and a fall in the number of empty containers handled by ports, which offset the strong growth in US exports.

**Figure 4-1: Total Container Throughput of North America West Coast Ports**

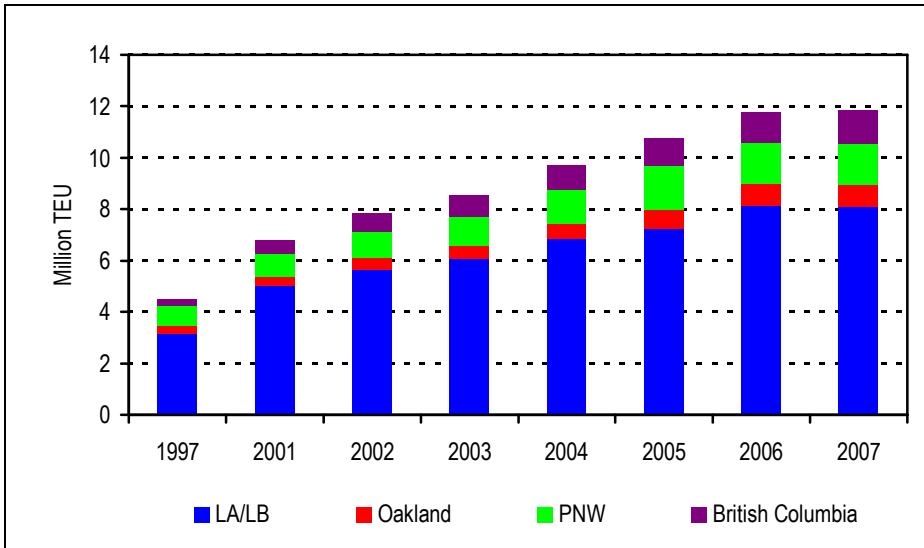


Source: Port Authority Statistics

International loaded container imports through US West Coast ports increased from 4.23 million TEU in 1997 to 10.54 million TEU in 2007, a CAGR of 9.6%. All port regions experienced strong growth - Southern California (10-year CAGR of 10.0%), Oakland (10.1%) and PNW (7.5%). Ports in British Columbia recorded a 10-year CAGR of 16.2%, which was due to growth in Canada's trade with Asia and investment in new container terminal capacity at Vancouver.

<sup>8</sup> TEU = twenty foot equivalent unit, a standard unit of measure of volume in the container trades

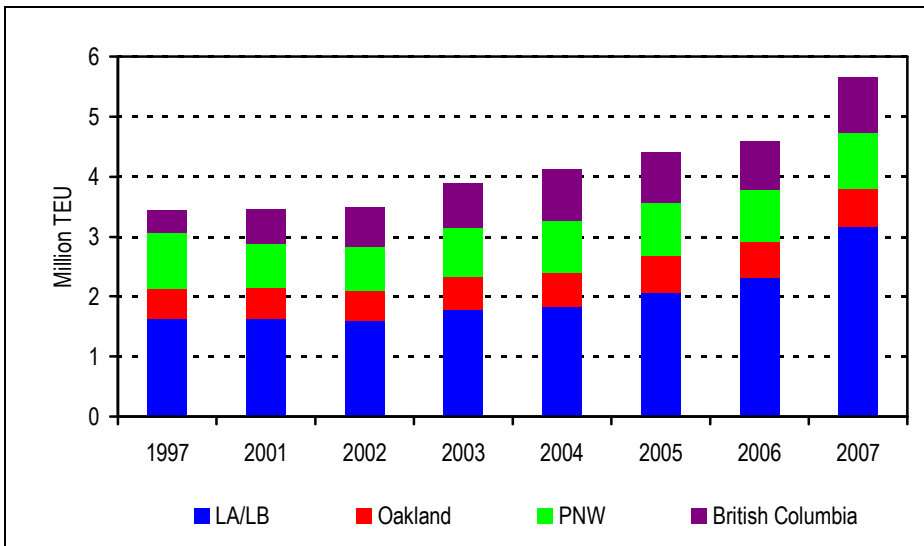
**Figure 4-2: International Loaded Container Imports of North America West Coast Ports**



Source: Port Authority Statistics and JOC Piers

International loaded container exports through US West Coast ports increased from 3.06 million TEU in 1997 to 4.73 million TEU in 2007, a CAGR of 2.1%. The highest growth occurred at the ports of Los Angeles and Long Beach (LA/LB), which saw a 10-year CAGR of 3.6%. The lower growth rates for exports compared to imports are due to the economic trends of the past 5 to 10 years when strong economic growth and the relocation of manufacturing overseas supported expansion of imports from Asia, and the strong US dollar exchange rates placed a constraint on US exports. In 2007, there was a significant change in growth rates as US imports stalled but US exports surged based on strong Asian demand for US products and weaker US dollar exchange rates. US containerized exports through West Coast ports were 26% higher than in 2006. Ports in British Columbia experienced strong growth with a 10-year CAGR of 8.2%, due to the containerization of breakbulk cargo (for example, forest products) and demand for commodities (forest products, specialty grains, etc.) in Asia.

**Figure 4-3: International Loaded Container Exports of North America West Coast Ports**



Source: Port Authority Statistics and JOC Piers

Over the past decade, the faster growth of Southern Californian ports reflects several factors. The large and growing population base in the Los Angeles basin and surrounding regions (Arizona, Southern Nevada, etc.) supported a large import trade from Asia. The expansion of transload activity (transferring cargo from international containers to domestic equipment for onward distribution), which favored Southern California's extensive logistics infrastructure (warehousing, etc.) and its abundant availability of 48-ft and 53-ft domestic equipment. Railroad investment in the intermodal corridors linking Southern California with inland population centers supported LA/LB as a major gateway for discretionary intermodal cargo. In late 2004 and in 2005, some discretionary intermodal cargo was diverted away from LA/LB to ports in the Pacific Northwest (PNW) due to congestion in LA/LB. However, container shipping lines returned this cargo to LA/LB in 2006 once the congestion problems in LA/LB were corrected through recruitment of additional labor, changes to terminal operations and improved management of rail equipment.

The slower growth of total port throughput at PNW ports and at Oakland also reflects the larger share of throughput accounted for by the slower growing US domestic trade with Hawaii and Alaska. In the PNW, the port of Portland has struggled to grow its container business due to its location up the Columbia River, which places restrictions on ship size and adds costs to each vessel call, even though the port has excess terminal and intermodal capacity.

Over the past decade, growth at US West Coast ports was dampened somewhat by the expansion of all-water vessel service via the Panama Canal to US East Coast ports that captured some of the growth in US imports from Asia. The growth of all-water service was fueled by the construction of distribution centers close to ports on the US East Coast, the increased volume of low-value commodities shipped from Asia that were suited to the lower cost and slower transit time of all-water service, and deterioration in the reliability of mini-landbridge (MLB) intermodal rail service from the West Coast.

**Table 4-1: Historical West Coast Port Container Throughput**

Million TEU	1997	2002	2003	2004	2005	2006	2007	CAGR 97-07	CAGR 02-07
<b>Total Port Throughput</b>									
LA/LB	6.46	10.69	11.98	13.25	14.33	15.89	15.68	9.4%	8.3%
Oakland	1.53	1.71	1.92	2.04	2.27	2.39	2.39	4.6%	7.0%
Pacific Northwest <sup>1</sup>	2.95	3.17	3.57	3.85	4.32	4.28	4.16	3.8%	6.2%
<b>Total US West Coast</b>	<b>10.94</b>	<b>15.57</b>	<b>17.47</b>	<b>19.14</b>	<b>20.92</b>	<b>22.56</b>	<b>22.23</b>	<b>7.5%</b>	<b>7.7%</b>
British Columbia	0.74	1.56	1.79	1.98	2.14	2.30	2.51	12.0%	8.1%
<b>Total NA West Coast</b>	<b>11.68</b>	<b>17.12</b>	<b>19.26</b>	<b>21.13</b>	<b>23.06</b>	<b>24.86</b>	<b>24.74</b>	<b>7.8%</b>	<b>7.7%</b>
<b>Loaded Imports</b>									
LA/LB	3.15	5.64	6.07	6.84	7.23	8.16	8.11	10.0%	7.7%
Oakland	0.31	0.46	0.50	0.60	0.75	0.81	0.83	10.1%	11.6%
Pacific Northwest <sup>1</sup>	0.78	1.04	1.14	1.35	1.72	1.61	1.60	7.5%	9.0%
<b>Total US West Coast</b>	<b>4.23</b>	<b>7.15</b>	<b>7.72</b>	<b>8.79</b>	<b>9.70</b>	<b>10.57</b>	<b>10.54</b>	<b>9.6%</b>	<b>8.1%</b>
British Columbia	0.26	0.73	0.84	0.94	1.06	1.17	1.29	16.2%	9.7%
<b>Total NA West Coast</b>	<b>4.49</b>	<b>7.88</b>	<b>8.55</b>	<b>9.72</b>	<b>10.76</b>	<b>11.73</b>	<b>11.83</b>	<b>10.1%</b>	<b>8.3%</b>
<b>Loaded Exports</b>									
LA/LB	1.62	1.60	1.78	1.83	2.07	2.32	3.18	3.6%	7.7%
Oakland	0.51	0.49	0.55	0.58	0.61	0.59	0.61	1.4%	3.9%
Pacific Northwest <sup>1</sup>	0.93	0.75	0.81	0.85	0.89	0.86	0.94	-0.8%	2.6%
<b>Total US West Coast</b>	<b>3.06</b>	<b>2.84</b>	<b>3.14</b>	<b>3.26</b>	<b>3.56</b>	<b>3.77</b>	<b>4.73</b>	<b>2.1%</b>	<b>5.8%</b>
British Columbia	0.37	0.65	0.75	0.86	0.84	0.81	0.93	8.2%	4.6%
<b>Total NA West Coast</b>	<b>3.43</b>	<b>3.49</b>	<b>3.88</b>	<b>4.12</b>	<b>4.41</b>	<b>4.58</b>	<b>5.66</b>	<b>2.9%</b>	<b>5.6%</b>

(1) Seattle, Tacoma and Portland.

Source: TranSystems derived from Port statistics and JOC Piers.

## 4.2 Forecast Methodology

TranSystems prepared a 20-year forecast through 2026 of West Coast port container throughput, using in-house container traffic forecast models. The forecasts are unconstrained; that is, they do not reflect capacity limitations or new terminal projects at ports in the region. The unconstrained forecasts are compared to port capacity in Section 4.5 of the report to determine potential future capacity constraints that may impact regional cargo throughput and terminal development needs.

TranSystems has developed quarterly time-series econometric models to produce US container import and export forecasts by origin or destination region. The modeling of US West Coast total port throughput involves a 4-step process.

### Step 1: Forecast of US Imports and Exports

In the import model, there are fifty-two equations in all – 13 commodity groups x 4 origin regions. In each equation, the quarterly TEU volume for each origin region-commodity is a function of a set of selected macroeconomic or industry-specific variables. The economic forecasting service, Moody's Economy.com provides the forecasts of the macroeconomic and industry-specific variables used in the model. The variables utilized in this analysis are:

- Real GDP
- Broad US Dollar Index of Real Exchange Rates
- Industrial Production Index
- Inventory Sales Ratio, Total and by Commodity Segment
- Short Term and Long Term Interest Rates
- Real Disposable Income
- Housing Starts (forecasts developed by TranSystems)
- Import Price Indexes by Commodity Segment

For imports, the independent variables explain a high percentage of the historical variation in TEU volumes by origin region and commodity and have proven very effective in forecasting TEU volume in projects conducted by TranSystems over the past several years. The world is divided into four origin and destination regions, respectively: Asia (North and Southeast), Europe, Latin America and Other. Table 4.2 lists the principal countries or continents that comprise each region. For imports, each region is then divided into twelve distinct commodity segments and one "all other" segment. These specific commodity groups are displayed in Table 4.3.

**Table 4-2: Regional Definitions**

Asia (Far East and Southeast)	Europe	Latin America	Other
China	North Europe	Central America	Indian Sub Continent
Hong Kong	East Europe	Caribbean	Middle East
Japan	Mediterranean Europe	South America	Near East
Taiwan			Australia
South Korea			New Zealand
Malaysia			Other Oceania
Indonesia			Africa
Philippines			Other Asia
Thailand			
Singapore			

Source: TranSystems

**Table 4-3: Container Commodity Segments for Import Model**

Auto Parts	Electronics	Footwear	Food Products
Forest Products	Furniture	Hardware/Lighting	Machinery / Parts
Mineral Products	Rubber Products	Textiles/Apparel	Toys
All Other			

Source: TranSystems

**Step 2: Forecast of US Exports**

A similar approach is taken for exports with the same regional definitions but with slightly different commodity segments. The specific export commodity groups are displayed in Table 4.4. The key driver variables for the export model are more limited and include:

- US broad dollar index
- World real GDP
- Region specific real GDP

Disaggregation by destination region generally led to time series of export TEU with a high level of random variation and this provided a poor basis for forecasting. By contrast, aggregation across all destination regions for each commodity group led to reasonably stable statistical relationships. Therefore, the statistical forecasts of exports are based on fourteen commodity-specific equations where, in each case, export TEU flows are aggregated across all destination regions. Forecasts of export flows by destination region are based on conservative trend-based projection of the share of each region for each commodity group.

**Table 4-4: Container Commodity Segments for Export Model**

Chemicals (excl resins)	Electronics	Logs & Lumber	Grain Products
Food Products (excl reefer and grain)	Machinery	Mineral Products	Paper Products
Refrigerated Products	Resins	Vehicles	Textiles/Apparel
Rubber/Plastic Products	All Other		

Source: TranSystems

**Step 3: Forecast by US Gateway Region**

The next step in the analysis is the forecast of the aggregate volumes by gateway port region – US East Coast, US West Coast, etc.

The first cut is to apply the historical shares of each of the origin region-commodity shares by gateway and develop forecasts of TEU volume by gateway. For example, a disproportionate amount of Furniture imports from Asia enter the US via ports in the South Atlantic gateway region. By contrast, imports of Machinery enter primarily through West Coast ports. If Furniture imports are forecasted to grow more rapidly than Machinery, this suggests more rapid growth for South Atlantic ports, other things equal. On the other hand, overall container volume from Asia enters mainly through West Coast ports, and the relatively rapid growth of Asia imports will tend to make West Coast port inbound traffic grow more rapidly than the East and Gulf Coast ports, which are more tied to the slower-growing Europe trade.

A similar methodology is utilized to create the forecast of US containerized exports by gateway. Changes in port shares of export TEU over time are explained by trends in commodity or destination region versus changes in preference for one port region over another.

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The first cut estimates of gateway shares are then adjusted for other significant trends that we anticipate will impact these present shares. For example, in recent years there has been an increasing preference for all-water service to the US East Coast rather than mini-landbridge (MLB) service from Asia. Incorporating this trend leads to higher forecasted shares for East and Gulf Coast ports than would be projected on the basis of historical origin region-commodity shares.

#### **Step 4: Unconstrained Forecast of Total Port Throughput**

TranSystems projected the total port throughput of the US West Coast by developing statistical relationships between the region's historical total port throughput and throughput of import and export loads (based on annual data from 1995-2006). Utilizing the developed equations, the forecast of total throughput was determined by entering the specific forecasts of import and export TEU for each year over the period 2007-2026.

In addition to the 4-step methodology for US West Coast port throughput, TranSystems also prepared a high level forecast of port throughput for British Columbia in order to assess the impact of port utilization in British Columbia on the region's ability to accommodate US intermodal rail cargo. The forecast methodology for British Columbia follows a similar process as that for the US West Coast, however at a less disaggregated level of detail. The models used to forecast containerized imports and exports were at an aggregate level, focused on total imports and exports due to the absence of data on individual origin/destination regions and commodities. Forecasts of the driver variables used in the models were provided by Economy.com.

The key variables for the import model are:

- Canada Real GDP
- Canadian Dollar relative to US Dollar and Rest-of-World

The key variables for the export model are:

- Real exchange rates
- World and region-specific real GDP

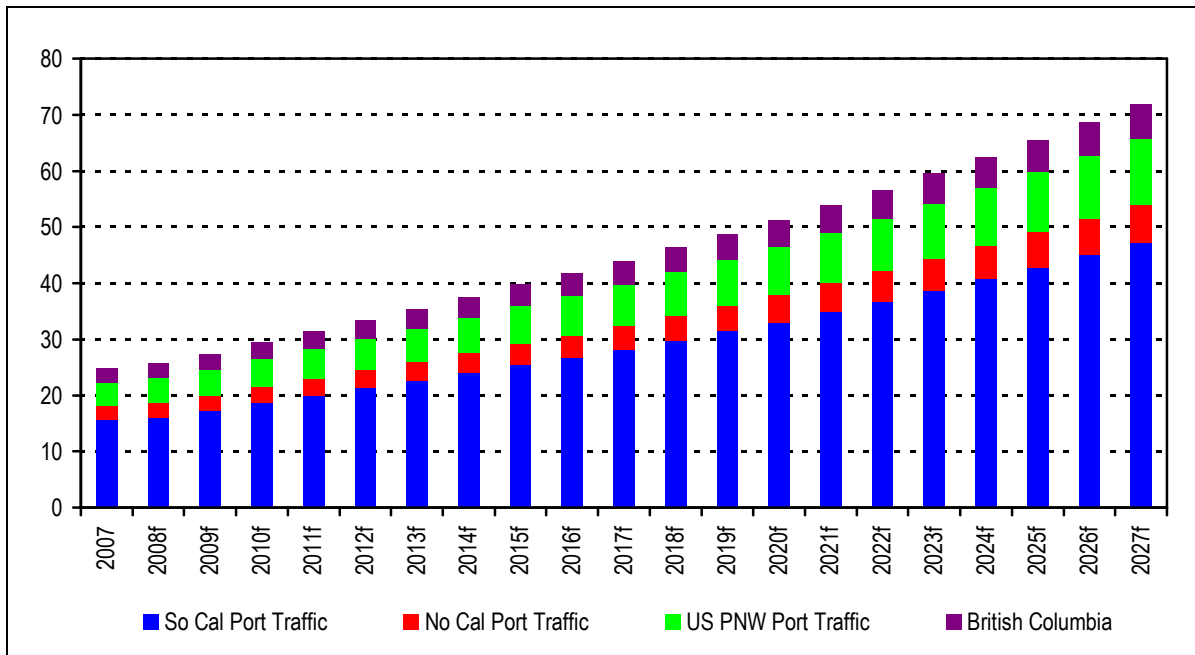
TranSystems projected the total throughput of British Columbia by developing statistical relationships between the region's historical total throughput and throughput of import and export loads (based on annual data from 1995-2006). Utilizing the developed equations, the forecast of total throughput was determined by entering the specific forecasts of import and export TEU for each year over the period 2007-2026.

### 4.3 Unconstrained Forecast of Port Container Throughput

The 20-year unconstrained forecasts of West Coast port throughput are presented in Table 4.5 and summarized in Figure 4.4.

Total US West Coast port throughput is forecast to increase from 22.23 million TEU in 2007 to 65.65 million TEU in 2027, a CAGR of 5.6%. The projected growth rate is significantly lower than the 7.5% CAGR seen in the period from 1997 to 2007. The lower projected growth is largely due to lower growth of the heavy import trade, and the stronger growth of exports being offset by lower growth of empty containers (that is, the export growth mostly absorbs empty containers rather than generating new traffic).

**Figure 4-4: Forecast of Port Throughput at North America West Coast Ports**



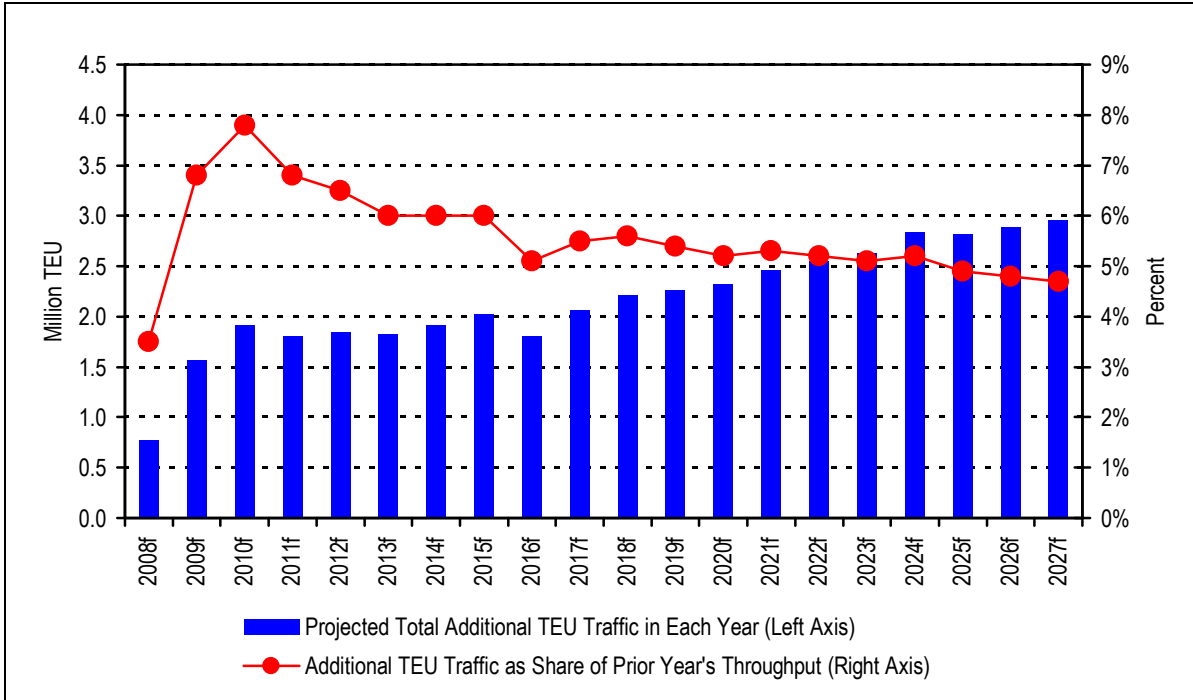
Source: TranSystems

Looking at the individual ports:

- LA/LB port throughput is forecast (unconstrained) to increase from 15.68 million TEU in 2007 to 47.20 million TEU in 2027, a CAGR of 5.7%.
- Oakland port throughput is forecast (unconstrained) to increase from 2.39 million TEU in 2006 to 6.82 million TEU in 2027, a CAGR of 5.4%.
- PNW port throughput is forecast (unconstrained) to increase from 4.16 million TEU in 2006 to 11.63 million TEU in 2027, a CAGR of 5.3%.

Figure 4.5 illustrates the projected additional TEU per year that could pass through US West Coast ports. The annual percentage growth in total throughput eases over the forecast period but the total annual additional TEU trends upwards running at 2-3 million additional TEU per year from 2017 to 2027. The ability of West Coast ports to accommodate this projected growth is addressed in Sections 4.4 and 4.5. Consideration is given to capacity developments at US West Coast ports, the impact of new terminal capacity due to come on-stream in Canada, proposed new projects in Mexico and expansion of the Panama Canal.

**Figure 4-5: Projected Additional TEU per Year at US West Coast Ports**



**Note:**

Source: TranSystems

**Table 4-5: Unconstrained Forecast of West Coast Port Container Throughput**

Million TEU	Total USWC Loaded Imports	No Cal Loaded Imports	So Cal Loaded Imports	PNW Loaded Imports	Total USWC Loaded Exports	No Cal Loaded Exports	So Cal Loaded Exports	PNW Loaded Exports	Total USWC Port Traffic	No Cal Port Traffic	So Cal Port Traffic	PNW Port Traffic	British Columbia Total
2007	10.54	0.83	8.11	1.60	4.73	0.61	3.18	0.94	22.23	2.39	15.68	4.16	2.51
<b>Forecast</b>													
2008	10.48	0.82	8.07	1.59	5.46	0.70	3.64	1.12	23.00	2.50	16.12	4.38	2.60
2009	11.24	0.88	8.66	1.70	5.96	0.76	3.98	1.21	24.56	2.66	17.24	4.65	2.78
2010	12.26	0.96	9.46	1.84	6.44	0.82	4.32	1.30	26.47	2.85	18.64	4.98	2.97
2011	13.24	1.04	10.22	1.98	6.94	0.88	4.66	1.40	28.27	3.03	19.95	5.29	3.15
2012	14.27	1.12	11.01	2.14	7.43	0.94	5.00	1.49	30.11	3.21	21.28	5.62	3.33
2013	15.30	1.20	11.80	2.30	7.92	1.00	5.34	1.58	31.93	3.40	22.59	5.94	3.51
2014	16.36	1.28	12.62	2.46	8.47	1.06	5.73	1.68	33.84	3.59	23.97	6.28	3.69
2015	17.53	1.38	13.52	2.63	9.04	1.13	6.12	1.78	35.85	3.79	25.44	6.63	3.86
2016	18.52	1.47	14.23	2.82	9.63	1.20	6.54	1.89	37.67	4.00	26.68	6.99	4.04
2017	19.72	1.57	15.14	3.00	10.24	1.27	6.97	2.00	39.73	4.21	28.16	7.36	4.22
2018	21.04	1.68	16.15	3.21	10.87	1.35	7.41	2.12	41.94	4.43	29.77	7.75	4.39
2019	22.40	1.80	17.19	3.42	11.53	1.42	7.87	2.24	44.21	4.66	31.40	8.15	4.57
2020	23.81	1.92	18.25	3.64	12.22	1.50	8.35	2.36	46.52	4.89	33.07	8.56	4.75
2021	25.33	2.04	19.42	3.87	12.93	1.58	8.85	2.49	48.98	5.14	34.86	8.98	4.93
2022	26.93	2.18	20.65	4.10	13.66	1.67	9.37	2.63	51.53	5.39	36.72	9.41	5.11
2023	28.61	2.32	21.94	4.35	14.42	1.75	9.91	2.76	54.16	5.66	38.65	9.85	5.30
2024	30.47	2.49	23.38	4.59	15.21	1.84	10.47	2.91	57.00	5.96	40.75	10.29	5.49
2025	32.30	2.65	24.80	4.85	16.03	1.93	11.05	3.05	59.81	6.24	42.83	10.73	5.68
2026	34.21	2.82	26.29	5.10	16.88	2.03	11.65	3.20	62.69	6.53	44.98	11.18	5.88
2027	36.19	2.99	27.84	5.36	17.77	2.13	12.28	3.36	65.65	6.82	47.20	11.63	6.09
<i>CAGR 07-17</i>	6.5%	6.6%	6.4%	6.5%	8.0%	7.6%	8.2%	7.9%	6.0%	5.8%	6.0%	5.9%	5.3%
<i>CAGR 07-27</i>	6.4%	6.6%	6.4%	6.2%	6.8%	6.4%	7.0%	6.6%	5.6%	5.4%	5.7%	5.3%	4.5%

Source: TranSystems

#### 4.4 Forecast Port Capacity

Current (2007) and forecast annual throughput capacity at West Coast container ports were arrived at through a review of existing container terminal facilities, analysis of reported expansions to existing terminals, proposed investments in new terminals, and estimates of facility capacity by TranSystems. The capacity review is independent of the container throughput forecasts.

Forecast annual throughput capacity of the **North America West Coast** (NAWC) is summarized in Table 4.6. The summary shows three capacity trends – Scenario 1 is based on no change to terminal productivity, Scenario 2 and 3 are based on higher productivity driven by improvements to terminal operations and management of containers. Based on current announced expansion plans at ports along the West Coast and current productivity ceilings, the region’s annual throughput capacity is projected to increase from 35 million TEU in 2007 to over 42 million TEU in 2017. On the basis that there are significant opportunities for terminal operators to boost terminal productivity, regional port capacity could be as high as 63 million TEU in 2017 (Scenario 3). While terminals may be able to boost productivity, the greater capacity risks are likely to lie with the inland transportation corridors serving the ports, which will require investments to meet growth in container traffic.

**Table 4-6: Forecast Annual Throughput Capacity by Port**

Estimated Million TEU	LA/LB	Oakland	PNW	Total USWC	British Columbia	Total NAWC
<b>Scenario 1: Port Capacity Forecast with Constant Productivity</b>						
2007	20.00	4.80	7.44	32.24	2.68	34.92
2012	20.00	4.80	9.55	34.35	5.10	39.45
2017	20.00	4.80	10.55	35.35	6.45	41.80
2022	20.00	4.80	10.55	35.35	7.58	42.93
2027	20.00	4.80	10.55	35.35	7.58	42.93
<b>Scenario 2: Port Capacity with 25% Terminal Productivity Improvement</b>						
2007	25.00	6.00	9.30	40.30	3.35	43.65
2012	25.00	6.00	11.94	42.94	6.38	49.31
2017	25.00	6.00	13.19	44.19	8.06	52.25
2022	25.00	6.00	13.19	44.19	9.48	53.66
2027	25.00	6.00	13.19	44.19	9.48	53.66
<b>Scenario 3: Port Capacity with 50% Terminal Productivity Improvement</b>						
2007	30.00	7.20	11.16	48.36	4.02	52.38
2012	30.00	7.20	14.33	51.53	7.65	59.18
2017	30.00	7.20	15.83	53.03	9.68	62.70
2022	30.00	7.20	15.83	53.03	11.37	64.40
2027	30.00	7.20	15.83	53.03	11.37	64.40

Source: TranSystems

**LA/LB** is estimated to currently have annual capacity to handle around 20 million TEU based on existing terminal acreage, terminal operations and intermodal rail facilities. LA/LB has limited room to expand terminal acreage and will have to pursue improvements to terminal operations to manage forecast traffic growth. Over the long term, it is reasonable to assume that terminal operators in LA/LB can boost throughput above 6,000 TEU per gross terminal acre by applying extended gate hours, extra shifts, new technologies, greater density yard operations, etc. In addition, LA/LB is expected to pursue development of new on-dock and near-dock intermodal rail capacity to support growth of intact intermodal container traffic. A main conclusion of the Ports’ rail study<sup>9</sup> was that during the 2010 to 2015 period domestic and transload freight is expected to occupy all existing off-dock capacity (downtown yards), and direct intermodal freight will have to be all handled by on-dock and near-

<sup>9</sup> San Pedro Bay Ports Rail Study Update, Executive Summary, December 2006

dock yards. During this period LA/LB could face intermodal capacity shortfalls which are likely to be addressed by some or all of the following new intermodal rail facilities (current status and proposed intermodal capacity):

- LA Terminal Island Intermodal Facility (conceptual, 1.4 million TEU)
- LB Pier T Mole Expansion (conceptual, 1.1 million TEU)
- BNSF Southern California Intermodal Gateway (submittal of harbor development permit, 1.8 million TEU)
- UP ICTF Expansion (conceptual, 1.9 million TEU)

Both railroads are addressing environmental concerns by planning green terminals and the truck drayage issue may be overcome by utilization of clean technologies for trucking or alternative transport technologies. Even if one or more of these projects proceeds, the various permitting and environmental reviews are likely to impose lengthy timelines for completion. The railroads are investing in double, and in some cases triple tracking of their main transcontinental routes out of LA/LB. The rail system within the LA Basin presents a challenge for the growth of intermodal cargo. The Alameda Corridor has excess capacity but further east the so-called Alameda Corridor East is inadequately structured to accommodate growth and planned investment in grade improvements, etc. has tended to stall. The overall conclusion is that LA/LB will likely face capacity issues midway through the next decade or later and alternative routings will be required to handle some of the growth of intermodal cargo flows. One scenario is that an increasing share of the growth of intact intermodal rail cargo is handled by the PNW, Oakland, new terminal locations on the West Coast, and the expanded Panama Canal, while LA/LB continues to capture most of the growth of non-intact (transload) intermodal rail cargo.

Annual throughput capacity at **Oakland** is currently estimated at 4.80 million based on current terminal acreage and an expansion at the Port's berth 24. Productivity improvements would allow the port to handle additional traffic. The principal constraints at the port are with the existing rail system – yards and inland connections – which are estimated to restrict the Port's ability to maximize use of terminal capacity. A new intermodal yard is proposed for the Oakland Army Base site, which will add intermodal cargo capacity. The remaining major constraints are on the BNSF and UP rail systems in the East Bay, UP's mainline over the Donner Pass, and BNSF's mainline over the Tehachapi Pass. The principal rail capacity gain would be the Donner Pass route, which requires increasing the height of tunnels and snow sheds to accommodate double stack trains, and double tracking of short sections to improve train flows. The Port of Oakland is in discussions with the railroads to make improvements to these rail corridors and has sought funding from the State of California for investment in rail capacity and other port improvements. These improvements are likely to be made in the medium term and would allow Oakland to expand its presence in the intermodal market.

In the **PNW**, Tacoma is currently the primary focus for expansion. Tacoma will see a significant expansion of capacity due to the recently announced new terminal for NYK (1.8 million TEU) and plans by SSA to develop its own terminal (1.0+ million TEU) on tribal lands. Both terminals are scheduled to open in the 2012/2013 timeframe. Tacoma is also likely to make incremental improvements to existing terminals and expand intermodal lift capacity; and the port has acreage for further terminal development. Tacoma is attractive because it is an established port with available land for development, services a significant local market, and has excellent intermodal rail facilities at the port. Seattle faces a land constraint and future additions to capacity will center on operational improvements at the port's terminals. Portland has underutilized capacity due to difficulties in maintaining a stable volume of business; the port's location up the Columbia River places restrictions on vessel size. The PNW's annual throughput capacity is currently estimated at 7.44 million TEU and it is projected to reach 10.55 million TEU in 2022, based on announced terminal developments. Improvements to terminal productivity could further boost capacity within the current and planned terminal acreage.

The PNW capacity analysis excludes any new capacity at secondary ports in the PNW. Projects at these ports are in the proposal stage and face challenges to development. These secondary ports face similar challenges as those at Humboldt Bay including investment in a rail corridor, in some cases dredging, absence of a local market

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and dependence on capturing intermodal rail cargo. The Port of Coos Bay is seeking to attract a private terminal operator to develop a new container terminal. The proposed facility could provide up to 2 million TEU of capacity on 275 acres of land and would focus on the movement of intermodal rail cargo. The State government is considering the provision of state funds over the next six years to assist with dredging the channel from 37 feet to 51 feet, and for other channel improvements. Significant investment is also needed to upgrade the rail connection between Coos Bay and Eugene, OR to handle intermodal container trains. Central Oregon and Pacific Railroad, the short line operator and part of RailAmerica Inc, recently stopped service on the line between Coos Bay and Eugene due to safety concerns with some of the line's tunnels. The Port of Everett, located 25 miles north of Seattle on the Puget Sound, is currently developing a new master plan in which there will be provision for some new container capacity, however this port is somewhat constrained by surrounding residential communities.

**British Columbia** is expected to see a significant increase in annual throughput capacity based on planned projects at Vancouver and Prince Rupert. Regional capacity is currently estimated at 2.68 million TEU and is projected to reach 7.58 million TEU by 2022. Again, improvements to terminal productivity could significantly boost throughput capacity. The growth of capacity will come from expansion of Deltaport in Vancouver and new capacity at Prince Rupert, which recently opened the first phase of its new terminal. The Prince Rupert project is strongly supported by the Canadian National (CN) Railroad, which has invested funds to upgrade its rail connection to the port thus allowing CN to offer intermodal rail service from Prince Rupert to Eastern Canada and the US Midwest. As the closest port to Asian markets, Prince Rupert is offering a faster transit time to US Midwest markets compared to routes over US West coast ports. In the longer term, a second container terminal is proposed for Prince Rupert that would offer 1.5 to 2.0 million TEU of capacity. Since this second project is only at the conceptual stage, it is excluded from the capacity analysis presented in this report.

There are two further elements to the regional capacity analysis. The expansion of the **Panama Canal**, scheduled for completion around 2015, will create new market dynamics as shipping lines can then deploy vessels of up to 12,600 TEU in all-water services from Asia to the US East and Gulf coasts. This is expected to support the continued long-term growth of all-water service as a share of US imports. The expanded Canal may act as one of a number of relief valves (other being new terminals at other locations) for potential capacity constraints in Southern California and dampen the transfer of intermodal cargo to other port regions on the West Coast. Investment in terminals along the US Gulf coast – at Houston, Mobile and other locations – will support interest amongst shippers in using all-water services. There is also interest in the development of all-water services via the Suez Canal to US East Coast ports for cargo from Southeast Asia.

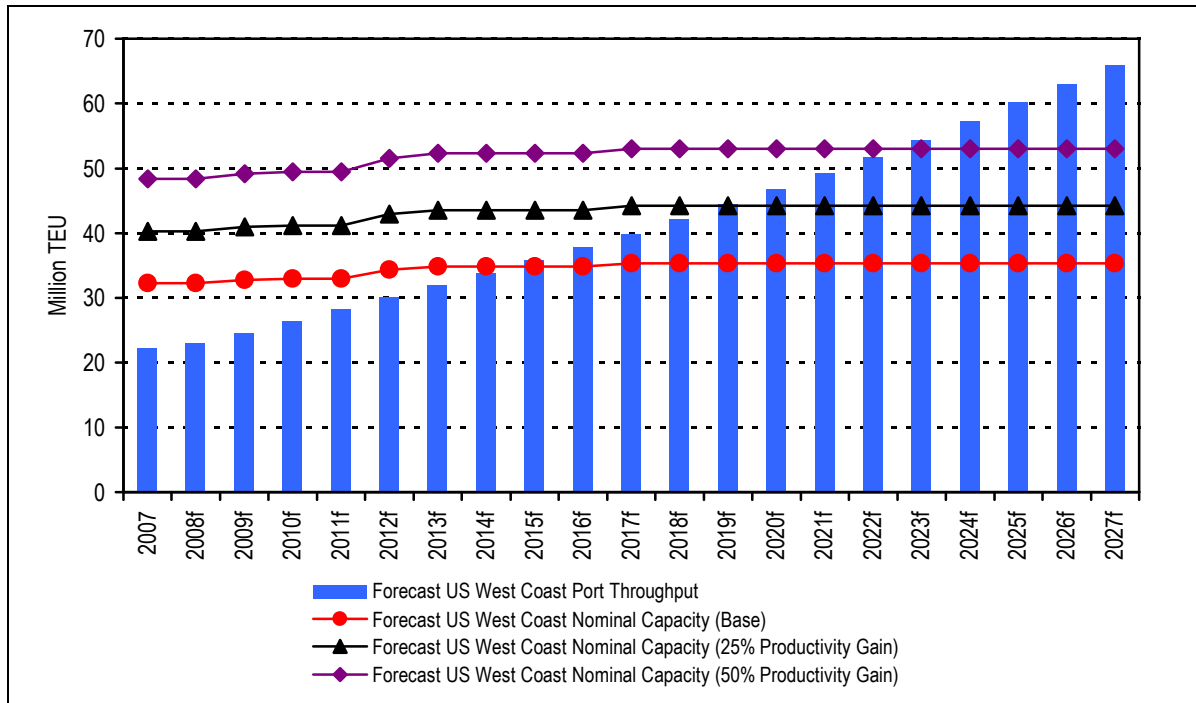
The routing of US bound cargo via ports in **Mexico** is another option to the Southern California gateway. Investment is taking place at Lazaro Cardenas to provide new container terminal and intermodal capacity, which will primarily service the Mexican market but may also be used to move US bound freight. The Kansas City Southern Railroad (KCS) controls the rail corridor from Lazaro Cardenas to the Mexican-US border. Challenges include the additional sailing time from Asia to Lazaro Cardenas compared to Southern California, the growth of Mexico's international container trade, which will absorb much of the new port capacity, and shippers' concerns over cargo security moving through Mexico. The proposed Punta Colonet project, south of Ensenada, involves construction of new container terminals and a rail corridor to the US border where it would connect with the UP railroad. This project faces challenges including cost, environmental concerns, and the need for cooperation from the US railroads.

#### 4.5 Forecast Port Utilization

The unconstrained forecasts of US West Coast port container throughput are compared with the forecasts of annual throughput capacity to determine the direction in throughput/capacity balances (port utilization). The results, presented in Table 4.7 and summarized in Figure 4.6, provide guidance to future terminal capacity requirements and investment opportunities.

In the medium to long term, it is expected that terminal operators will be able to increase terminal productivity through operational improvements, technology, longer operating hours, etc. Therefore, forecast port utilization under Scenario 2 (Table 4.7) is viewed as a more likely outcome with the possibility of even better productivity gains (Scenario 3). This indicates that LA/LB will face capacity constraints between 2015 and 2020. Other ports will be able to accommodate some diversion of container traffic from LA/LB. In addition, the expanded Panama Canal will also have a role in absorbing some traffic. However, with US West Coast regional port utilization approaching 100% in the 2015 to 2020 period, the region is expected to need new terminal capacity in this timeframe.

**Figure 4-6: Forecast US West Coast Port Throughput and Nominal Capacity**



Source: TranSystems

An important consideration is the most economically efficient level of capacity utilization at a terminal. When looking at a specific container terminal, TranSystems measures sustainable capacity, which approximates the economically most profitable level of terminal productivity and utilization. TranSystems has usually found sustainable capacity to be 75% of a terminal's maximum practical capacity and for terminals that are growing rapidly, a sustained period above 75% is an indication a terminal should begin planning and building new capacity in order to adequately accommodate growth and remain at the most profitable operating level. It is difficult to translate sustainable capacity to a macro regional analysis since each container terminal has unique operating conditions that can influence its own level of sustainable capacity. However, it is reasonable for this analysis of West Coast capacity to state that as capacity utilization approaches the 75% to 80% level consideration must be given to the planning and development of new terminal capacity. This would further support the need for investments to bring new capacity on-stream in the 2015 to 2020 timeframe, possibly sooner if significant productivity improvements at existing ports fail to emerge.

**Table 4-7: Forecast of West Coast Port Utilization**

Million TEU	LA/LB	Oakland	PNW	Total USWC	British Columbia	Total NAWC
<b>Scenario 1: Forecast of Port Utilization with Constant Productivity</b>						
2007	78%	50%	56%	69%	94%	71%
2012	106%	67%	59%	88%	65%	85%
2017	142%	88%	70%	113%	65%	106%
2022	185%	112%	89%	146%	67%	132%
2027	238%	142%	110%	187%	80%	168%
<b>Scenario 2: Forecast of Port Utilization with 25% Terminal Productivity Improvement</b>						
2007	63%	40%	45%	55%	75%	57%
2012	85%	54%	47%	70%	52%	68%
2017	113%	70%	56%	90%	52%	84%
2022	148%	90%	71%	117%	54%	106%
2027	190%	114%	88%	149%	64%	134%
<b>Scenario 3: Forecast of Port Utilization with 50% Terminal Productivity Improvement</b>						
2007	52%	33%	37%	46%	62%	47%
2012	71%	45%	39%	58%	44%	57%
2017	94%	58%	47%	75%	44%	70%
2022	123%	75%	59%	98%	45%	88%
2027	158%	95%	73%	124%	54%	112%

Source: TranSystems

#### 4.6 Secondary Ports

A review of secondary US West Coast ports was conducted to determine their relative strengths and weaknesses. The review addresses:

- Shipping channel and distance from open sea
- Sailing distance from Asia
- Inland rail distance

Table 4.8 shows the shipping channel draft and distance to open sea for secondary ports, and also Oakland and Portland.

**Table 4-8: Shipping Channel Comparison**

	Channel Draft	Distance from Open Sea (Nautical Miles)	Round Trip Distance per Port Call (Nautical Miles)
Humboldt Bay, CA	38 feet	5.8	11.6
Richmond, CA	38 feet <sup>1</sup>	10.0	20.0
Coos Bay, OR	37 feet	15.2	30.4
Grays Harbor, WA	36 feet	16.0	32.0
Everett, WA	40 feet	75.0	150.0
<b>Active Container Ports</b>			
Oakland, CA	50 feet <sup>3</sup>	11.0	22.0
Portland, OR	40 feet <sup>2</sup>	103.5	207.0

1. Draft of inner channel; the outer harbor channel is 45 feet.
2. Dredging underway to 43 feet
3. Multi-year deepening program to 50 feet is expected to be complete in June 2009

Source: US Army Corp of Engineers and Port Authorities

All the secondary ports have drafts in the 36-foot to 40-foot range. Humboldt Bay has the shortest distance to open sea than the other secondary ports. This will benefit a shipping line because it reduces the need for slow steaming during arrival and departure at port, and speeds up port turnaround time. The distance to open sea is three times greater at Coos Bay, OR and Grays Harbor, OR, twice as long at Richmond in the San Francisco Bay, and twelve times longer at Everett, WA. Humboldt Bay also has an advantage over the established container ports of Oakland and Portland.

Table 4.9 shows the sailing distance and transit time from Shanghai to the secondary ports, and to the ports of Oakland and Portland. Coos Bay, Grays Harbor and Everett have a slight advantage over Humboldt Bay but in no case is the advantage greater than 8 hours (at a sailing speed of 24 knots for a transpacific container ship). The analysis does not account for slow steaming time in the approach to port discussed earlier, which would reduce the advantage of Coos Bay, Grays Harbor and Everett.

**Table 4-9: Sailing Distance Comparison**

	Nautical Miles From Shanghai	Difference from Humboldt Bay (Nautical Miles)	Difference from Humboldt Bay (Hours @ 24 Knots)*
Humboldt Bay, CA	5,210		
Richmond, CA	5,390	180	+8*
Coos Bay, OR	5,126	-84	-4*
Grays Harbor, WA	5,019	-191	-8*
Everett, WA	5,076	-134	-6*
<b>Active Container Ports</b>			
Oakland, CA	5,391	181	+8*
Portland, OR	5,133	-77	-3*

\* Excludes impact of slow sailing due to further distance from open sea, which is a disadvantage for the port.  
Source: TranSystems derived from Netpas port distances database

Table 4.10 shows the rail distances from secondary ports to major inland rail destinations. Humboldt Bay is closer than most of the other secondary ports to Kansas City and Memphis, and furthest from Chicago. The distance advantages and disadvantages are not too significant as they only amount to several hundred miles. Humboldt Bay and Coos Bay require reopening of their rail carriers, while Grays Harbor would require upgrades to its operating rail corridor. Everett has an excellent rail connection but has limited land for expansion compared to the other secondary ports. Richmond is well positioned for rail since it is served by the same corridors as Oakland but it also has limited land for development.

**Table 4-10: Rail Distance Comparison**

Port	Rail Distance to Major Inland Destinations (Miles)			Difference from Humboldt Bay (Miles)		
	Chicago	Kansas City	Memphis	Chicago	Kansas City	Memphis
Humboldt Bay, CA	2,791	2,354	2,680			
Richmond, CA*	2,491	2,054	2,380	-300	-300	-300
Coos Bay, OR	2,457	2,565	2,906	-334	+211	+226
Grays Harbor, WA	2,461	2,569	2,910	-330	+215	+230
Everett, WA	2,286	2,395	2,735	-505	+41	+55
<b>Active Container Ports</b>						
Oakland, CA	2,491	2,054	2,380	-300	-300	-300
Portland, OR	2,232	2,340	2,681	-559	-14	+1

\* Assumes same distance as Oakland.  
Source: TranSystems derived from US Rail Desktop

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## 4.7 Terminal Requirements

Container terminal operators and container shipping lines are interested in container terminal sites that offer:

- A large amount of available land (50 acres plus) for current development and future expansion
- Deep-water berths and channel for container ships
- Provision of on-dock or near-dock intermodal rail service
- Efficient connections to intermodal rail corridors
- Surrounding support services such as container maintenance, empty storage, etc.
- Surrounding cargo logistics services and warehousing (if there is a local cargo function) including a free trade zone
- A cooperative port management and local community environment
- Port security in compliance with local, state and federal requirements
- Minimum divergence of the port from main shipping lanes

Recent project examples on the West Coast provide an indication of the scope of facility preferred by terminal operators and container shipping lines. They include:

- A new container terminal at Tacoma for the container shipping line NYK. The terminal will cover 168 acres and provide two deep-water berths with capacity of 1.4 to 1.8 million TEU. Intermodal rail capacity will be integrated into the terminal.
- A new container terminal at Tacoma proposed by SSA Marine on 180 acres of land, which will have two deep-water berths and capacity of 1.0+ million TEU. Intermodal rail capacity will be integrated into the terminal.
- Deltaport 2 is a proposed new 3-berth container terminal at Vancouver, British Columbia. The terminal will offer 1.9 million TEU of capacity when fully constructed on new landfill.
- Prince Rupert recently opened a new 58-acre terminal with on-dock rail that will offer 0.5 million TEU of capacity. Later phases will extend the terminal to a total of 165 acres and 2 million TEU of capacity.

The scale of site preferred by container terminal operators and container shipping lines is important in evaluating such a use at the Redwood Marine Terminal. With only 80 acres of land and accounting for poor site configuration in some areas, the facility is not suitable for larger scale development of a traditional container terminal (that is, a terminal with a large volume of local import and export cargo). However, the site may physically accommodate a high density intermodal container terminal where nearly all the containers are transferred rapidly through the terminal to and from intermodal trains. It should also be noted that larger parcels of land are located elsewhere on the Samoa Peninsula that could be utilized for a larger container terminal operation.

## 4.8 Terminal Development Timeline

The terminal development timeline can be up to 10 years or more from an event such as initial project concept or land purchase to opening of the new terminal. This time horizon is evident at major established container ports as well as at secondary ports entering the container terminal market for the first time. Examples of terminal projects and their development time periods are shown in Table 4.11.

The multi-year process requires a sustained commitment from the port authority in terms of staff and resources to bring a project from initial concept to completion. The construction phase is relatively short and the majority of the time period is consumed by:

- Development and proof of concept
- Master planning of terminal site and facilities
- Completion of environmental reports and permitting

- Identification of a private sector investor, operator or anchor shipping line customer
- Negotiation of a contract with private sector investor, operator or anchor shipping line customer

In most, if not all cases, the port authority (and the private sector investor or operator) is developing capacity for future long-term trade growth and not today's market. A secondary port (the examples of Prince Rupert, Mobile, Coos Bay, and Corpus Christi shown in Table 4.11) must overcome challenges to market entry including proving the project concept to container industry participants (terminal operators, container shipping lines, and shippers) that are firmly based in existing ports, competition for investment from other secondary ports as well as major ports, and development of partnerships with a major railroad(s) to support port development (for example, the Canadian National Railroad was a key supporter of the Prince Rupert project). As a secondary port with a currently limited market profile, Humboldt Bay will have to make a sustained multi-year effort, in which it will be competing for investment with other ports, to attract a container terminal or other terminal development.

**Table 4-11: Examples of Terminal Development Time Periods**

Container Port	Terminal	Time Period	Years
<b><i>Established</i></b>			
Tacoma, WA	NYK	2003 to 2013	10
Houston, TX	Bayport	1993 to 2007	14
<b><i>New</i></b>			
Prince Rupert, BC	Fairview	1997 to 2007	10
Mobile, AL	APM / CMA-CGM	1998 to 2008	10
<b><i>Proposed - No confirmed Investor/Operator</i></b>			
Coos Bay, OR	Proposed	2005 to 2015-18	10 - 13
Corpus Christi, TX	Proposed	1998 to 2012	14

Note: Time period is from approximate year of initial concept, land purchase or similar event to actual or proposed opening year of the terminal.

Source: TranSystems derived from Port web sites

## 5. Automotive Trade

### 5.1 Historical Trends and Market Outlook

Historical statistics on throughput of automobiles at U.S. West Coast ports are provided in Table 5.1. The dominant trade flow is imports of vehicles from Asia and Europe. For the ports covered in Table 5.1, trade grew at a CAGR of 9.3% between 1996 and 2006, however growth has been slower in the past five years partly due to the increase in US based manufacturing by foreign auto producers and the weakening US dollar.

Table 5.1 excludes the privately operated import facilities at the ports of Benicia and Richmond in the San Francisco Bay Area. Benicia is one of three US West Coast import facilities for Toyota Logistics Services, which started moving vehicles through the port in the fall of 2006. The vehicles are distributed to parts of California and by rail to inland states. Toyota transferred the imports from Long Beach due to the expiration of its rail-yard lease at that port. Toyota is expected to ship about 70,000 vehicles through Benicia in 2006 with future volume possibly increasing to 100,000 vehicles or more per year. In the past, Benicia has also handled vehicle imports for Kia and General Motors. The Port of Richmond currently handles an estimated 100,000 vehicles per year of imports for Hyundai and Kia and is seeking new customers.

The dominant import trade is projected to grow at a similar rate as in the past five years with some potential downside over the next few years due to the weaker US economy. Important variables are any further investment by foreign auto companies in US-based manufacturing and the potential for imports from China as that country's auto industry seeks to expand into overseas markets. For the port industry, an important trend is the potential pressure on automotive terminals from expanding container operations in some ports; higher density container activity generating greater revenue for ports. This may create opportunities for secondary ports, both existing and new entrants, to capture automotive business.

**Table 5-1: Historical Vehicle Traffic at US West Coast Ports**

# of Vehicles	1996	2001	2002	2003	2004	2005	2006	CAGR 96-06	CAGR 01-06
<b>IMPORTS</b>									
Portland	159,928	346,863	388,941	362,092	358,196	352,971	463,515	11.2%	6.0%
Long Beach	184,768	249,906	272,434	272,809	348,525	328,019	426,108	8.7%	11.3%
San Diego	57,649	266,246	231,623	242,834	247,058	231,401	311,488	18.4%	3.2%
Hueneme		214,069	240,934	210,144	275,480	295,377	287,249	n/a	6.1%
Tacoma	74,650	168,380	179,858	158,129	156,869	135,698	166,087	8.3%	-0.3%
Los Angeles	214,199	254,935	253,145	276,435	201,452	227,260	139,070	-4.2%	-11.4%
Vancouver, WA	17,979	67,665	60,937	45,644	52,644	46,865	43,016	9.1%	-8.7%
Seattle	42,208	30,058	0	0	0	0	0	-100.0%	-100.0%
<b>Total Above</b>	<b>751,381</b>	<b>1,598,122</b>	<b>1,627,872</b>	<b>1,568,087</b>	<b>1,640,224</b>	<b>1,617,591</b>	<b>1,836,533</b>	<b>9.3%</b>	<b>2.8%</b>
<b>EXPORTS</b>									
Portland	44,614	9,653	5,835	4,291	486	409	42	-50.2%	-66.3%
Long Beach	25,207	5,525	8,852	30,838	44,893	121,299	76,688	11.8%	69.2%
San Diego	0	2,945	380	0	111	850	33,993	n/a	63.1%
Hueneme	0	3,173	1,306	1,097	1,359	1,253	1,218	n/a	-17.4%
Tacoma	3,757	1,006	315	218	300	202	0	-100.0%	-100.0%
Los Angeles	75,046	55,001	3,130	8,247	19,315	28,667	14,965	-14.9%	-22.9%
Vancouver, WA	20	0	0	0	0	5	62	12.0%	n/a
Seattle	398	476	0	0	0	0	0	-100.0%	-100.0%
<b>Total Above</b>	<b>104,428</b>	<b>68,126</b>	<b>13,983</b>	<b>40,400</b>	<b>65,978</b>	<b>152,276</b>	<b>126,926</b>	<b>2.0%</b>	<b>13.3%</b>

Note: The table excludes vehicle traffic that moves through privately operated terminals at the ports of Benicia and Richmond in the San Francisco Bay Area.

Source: American Association of Port Authorities

## 5.2 Terminal Requirements

The terminal may be a dedicated facility solely for automotive and other vehicle cargo or the terminal may be one element of a general cargo facility that handles a mixture of ro-ro, breakbulk, and other cargo with an area of the facility assigned for vehicle storage and processing. The terminal requirements are similar, in many respects, to those discussed earlier for container terminal operations. Companies require:

- A large amount of land for current development and future expansion (see Table 4.2 for examples of terminal sizes at West Coast ports).
- The storage area may be adjacent to the berth or inland from the berth; in the latter case, a dedicated road connects the berth and storage area.
- The storage area may have a processing building performing added-value activities.
- Deep-water berths and channel for pure car and truck carrier (PCTC). Based on a sample of fleets operated by major shipping lines, vessels have a length-over-all (LOA) in the range 560 feet to 660 feet and a draft in the range 25 feet to 33 feet.
- Provision of on-dock or near-dock intermodal rail and truck transfer facility.
- Efficient connections to intermodal rail corridors.
- A cooperative port management and local community environment.

**Table 5-2: Examples of West Coast Automotive Terminals**

Port	Terminal Acres	Processing Facility
Benicia, CA	34 acres for Toyota	25,000 sq. ft. for Toyota
Port Hueneme, CA	75 acres	70,000 sq. ft.
Los Angeles, CA	85 acres	-
Long Beach, CA	168 acres	150,000 sq. ft.
Portland, OR	82 acres	97,600 sq. ft.

Source: Port Authorities

## 5.3 Terminal Development Timeline

The terminal development timeline is similar to that of a container terminal discussed above, given the need to move through the same proof of concept, identification and negotiation with terminal operators and customers, environmental and other reviews, and construction. An important consideration on the US West Coast is the availability of large sites for auto terminals and the possibility that major container ports may convert low density/revenue automotive terminals to higher density/revenue container terminals. The automotive terminals are typically managed by private terminal operators which provide service to automotive companies and shipping lines. These three groups would be involved in the decision as to where to locate new automotive terminal capacity.

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## 6. Short Sea Coastal Shipping

### 6.1 Short Sea Shipping Market

Studies are underway to evaluate the feasibility of short sea shipping service along the Pacific Coast.<sup>10</sup> Major cargo lanes currently serviced by truck and rail are the primary focus of these studies: Los Angeles-San Francisco Bay Areas, Los Angeles-Seattle, and San Francisco Bay Area- Seattle. The studies are in a preliminary phase and have yet to determine the economic and business feasibility of short sea shipping on the Pacific Coast. Market surveys of shippers and trucking companies see a role for short sea shipping service in certain situations if requirements of service and cost were met. The key findings from surveys are:

- Short sea shipping is more appropriate for distances greater than 700 or 800 miles for less transit time-sensitive cargoes (these are typically lower value commodities such as forest products). Shorter transit distances, such as from Los Angeles to the San Francisco Bay Area are considered to be “overnight” markets (defined as 8-12 hour truck transit), and may not be appropriate for a coastwise shipping option.
- Short sea shipping ocean transit times can be longer than trucking so long as discounts are offered on the current trucking costs and the short sea shipping service is reliable. For example, a transit time increase of one day for the longer routes would be reasonable if the rate was 20% to 30% lower than trucking cost. Potential cost savings are one of the key drivers of interest in any proposed short sea shipping service.
- Daily shipping service would be preferable in order to minimize waiting time for the ship. A concern is that port waiting time and truck drayage to/from the port terminal could offset any cost benefits arising from a coastwise option. This factor also limits the likely hinterland for short sea shipping service to within a 50 to 100 mile radius of the short sea shipping port.
- Cargo imbalances on some lanes may create the need to reposition empty equipment in one direction.
- A coastwise service is likely to capture commodities that are non-time sensitive, low-value cargoes that are either being used for non-just-in-time warehouse replenishment or materials for manufacturing where longer transits have been built into the supply chain. Cargoes that may be divertible to short sea shipping include:
  - Not time-sensitive.
  - Warehouse inventory replenishment cargo that is not just-in-time (JIT). Truckload warehouse and distribution cargo is a significant share of truckload freight moving along West Coast highway corridors.
  - Existing railroad cargo that has similar service attributes as short sea shipping (transit time, cost, etc.).
  - Long shelf life cargo, such as forest products.
  - Bulk, low-value or low-margin cargoes that typically move at low freight rates.
  - Non-perishable commodities.
  - Oversize or overweight cargoes – which are often subject to lower trucking speeds and daylight hour driving restrictions.
- Short sea shipping may have additional benefits that include reduced highway traffic congestion, reduced truck pollution, alleviation of some of the challenges facing the truck industry (driver availability,

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<sup>10</sup> Studies are sponsored by the Center for Commercial Deployment of Transportation Technologies (CCDoTT) and the Office of Naval Research (ONR).

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driver work conditions, etc.). Moving freight through ports would have to take into consideration the additional traffic on port access roads.

## 6.2 Regional Freight Movements

The divertible market for short sea shipping is restricted to a reasonable 50 to 100 mile truck distance of the load/discharge port in order to minimize local drayage costs and dray time. While the Port of Humboldt Bay is not being evaluated in current studies due to the small size of its market, it is reasonable that the same criteria would apply and that the majority of divertible cargo would be within a 50 to 100 mile distance of the port, essentially the Humboldt County hinterland. The hinterland may extend further inland if there is significant future congestion on the north-south I-5 truck corridor or new environmental regulations impose additional costs on trucking, which make short sea shipping more efficient than the I-5 corridor. For example, a Redding to Los Angeles domestic freight shipment via truck to Humboldt Bay and then short sea service from Humboldt Bay to Los Angeles.

Table 6.1 shows inbound truckload freight to Humboldt County by West Coast County of origin. The primary origins of freight are in Southern California and the San Francisco Bay Area, and these origins largely ship “warehouse and distribution center” freight for consumption in Humboldt County. Much of this cargo (around 50% of total inbound freight and 90% in the case of Alameda County) comprises domestically sourced products and imports of consumer goods from Asia that have been discharged at the ports of Oakland and LA/LB, which then pass through regional distribution centers in the hinterland of these ports. The freight is then moved by truckload to Humboldt County. The longer distance and transit time from Southern California may make this corridor attractive if service could be efficiently integrated into a viable Southern California-Pacific Northwest vessel rotation.

Table 6.1 also shows the outbound truckload freight from Humboldt County by West Coast County of destination. The primary destinations are in Southern California and the San Francisco Bay Area. The principal outbound commodity is primary forest products (around 50% of total outbound shipments) followed by various wood products (another 25% to 30% of freight). These products are lower value and less time sensitive, and therefore may be divertible to short sea shipping, if a Humboldt Bay port call could be successfully integrated to a viable coastal service, for example a Southern California-Pacific Northwest vessel rotation or a Southern California-Northern California service.

A successful short sea shipping service between Humboldt Bay and other West Coast ports could offer a range of benefits for the local and regional economy. The diversion of truckload traffic from highways to coastal sea service would ease the costs related to highway maintenance, repair, and expansion. There would be benefits from an easing of pollution impacts from truck highway traffic. In addition, short sea shipping may offer lower transportation costs for consumer and industrial goods moving in and out of Humboldt County and surrounding areas.

**Table 6-1: Inbound and Outbound Truckload Freight to Humboldt County by County of Origin**

Inbound Truckload Freight to Humboldt County		Outbound Truckload Freight to Humboldt County	
Origin County	Total Short Tons	Destination County	Total Short Tons
LOS ANGELES, CA	634,486	LOS ANGELES, CA	804,584
TRINITY, CA	270,951	ORANGE, CA	166,145
ORANGE, CA	139,234	SAN DIEGO, CA	146,741
ALAMEDA, CA	123,020	COWLITZ	241,492
SAN BERNARDINO, CA	108,308	SANTA CLARA, CA	119,397
SAN DIEGO, CA	82,790	ALAMEDA, CA	107,849
COLUSA, CA	50,232	SAN BERNARDINO, CA	92,019
RIVERSIDE, CA	74,718	RIVERSIDE, CA	89,034
SAN MATEO, CA	69,759	SACRAMENTO, CA	91,304
SAN JOAQUIN, CA	75,696	FRESNO, CA	61,609
FRESNO, CA	53,685	CONTRA COSTA, CA	46,693
SAN FRANCISCO, CA	63,499	SAN JOAQUIN, CA	41,203
YOLO, CA	39,353	SHASTA, CA	41,198
SANTA CLARA, CA	38,384	SAN FRANCISCO, CA	37,929
CONTRA COSTA, CA	40,404	VENTURA, CA	34,927
KERN, CA	33,124	SAN MATEO, CA	35,197
SHASTA, CA	46,621	KERN, CA	29,805
STANISLAUS, CA	23,694	WALLA WALLA	54,706
SONOMA, CA	23,988	SONOMA, CA	26,649
SOLANO, CA	19,961	STANISLAUS, CA	25,092
VENTURA, CA	18,718	MENDOCINO, CA	24,560
SACRAMENTO, CA	14,615	TULARE, CA	18,407
MONTEREY, CA	12,821	SOLANO, CA	17,190
IMPERIAL, CA	10,660	SANTA BARBARA, CA	16,479
MENDOCINO, CA	17,045	KING	30,406
MARIN, CA	9,832	MONTEREY, CA	14,372
BUTTE, CA	11,957	BUTTE, CA	12,647
<b>Total Above</b>	<b>2,107,554</b>	<b>Total Above</b>	<b>2,427,636</b>
<b>Grand Total</b>	<b>2,222,976</b>	<b>Grand Total</b>	<b>2,685,183</b>

Note: The above table shows truckload freight, which excludes freight that may move by in-house private fleets operated by individual companies (for example, retailers).

Source: Feasibility Assessment of Short Sea Shipping to Service the Pacific Coast, December 2006, TranSystems

### 6.3 Terminal Requirements

A short sea shipping terminal requires sufficient land to accommodate storage and staging of ro-ro trailer traffic, a suitable berth for ro-ro vessels or barges, and good access to the local road network.

Vessel designs under consideration range in capacity from 150 to 700 trailers depending on divertible cargo in each trade lane under evaluation. The larger vessels (Table 6.2) are comparable in size and configuration to the TOTE (Totem Ocean Trailer Express, Inc.) vessels deployed in the PNW-Alaska trade.

Tug and barge combinations are also under consideration since they have a significant construction cost advantage over ships. These would have a much shallower draft, around 10 feet, and would use a similar terminal configuration for handling cargo as ro-ro ships.

**Table 6-2: Representative Dimensions of Short Sea Vessel Designs**

	<b>Baseline w/ Gas Turbine</b>	<b>Baseline MAX</b>	<b>SUPER MAX</b>	<b>SL-7 VARIANT Deep Hull</b>
LOA (feet)	832.5	837.7	959.6	980.1
BOA (feet)	118	118	118.1	105.5
Draft (feet)	19.84	23.66	26.7	23.41
Trailer Capacity	450	550	718	500 to 600

Source: Feasibility Assessment of Short Sea Shipping to Service the Pacific Coast, December 2006, TranSystems

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## 7. Military Cargo and Strategic Ports

### 7.1 Military Cargo

A number of commercial ports are designated as strategic ports to support major military deployments overseas. The ports are selected based on their proximity to deploying units, transportation links between the units and ports, and port characteristics (including deep draft, modern terminals, and intermodal rail links). There are 13 strategic ports nationwide including four on the West Coast – Oakland, CA; Tacoma, WA; Long Beach, CA; and San Diego, CA. The ports handle containerized and non-containerized freight.

The military moves containerized cargo overseas using commercial container terminals and commercial container shipping lines. On the West Coast, the majority of these shipments move through the Port of Oakland. The containerized shipments take three forms:

- Military freight moving through the ports as part of the Direct Vendor Delivery (DVD) system. This freight is shipped directly from the vendor to overseas locations.
- Military containerized non-DVD shipments of freight from the Defense Logistics Agency (DLA) Container Consolidation Points (CCP). This freight, issued direct from DLA warehouses and containerized, is handled in the same manner as commercial cargo.
- Military containerized shipments associated with a surge movement of non-DVD freight during certain war time deployment plans is typically concentrated over a period of five days and represents a small volume (in the region of 500 plus railcars of single stack 20-foot containers).

The military moves non-containerized cargo (vehicles, etc.) overseas using vessels, some chartered from commercial shipping lines, of the Military Sealift Command. The military's terminal requirements are similar to those of a commercial ro-ro/breakbulk terminal – storage area for vehicles, berthing that supports ships ramps, sufficient draft for large commercial ro-ro vessels, and good inland transportation connections.

Humboldt Bay could compete for selection as a strategic port for the military if it can offer the appropriate terminal infrastructure, shipping services and intermodal rail links that guarantee reliable service. The proposed terminal infrastructure presented in the Task 3 Report "Assessment Phase" would meet the cargo terminal infrastructure requirements of the military.

### 7.2 Ready Reserve Force

The Ready Reserve Force (RRF) is a fleet of 52 reserve ships managed by the US Maritime Administration (MARAD) and which can be activated to support the rapid, massive deployment of military supplies and troops for a military exercise or large-scale conflict. The ships are managed by commercial companies and crewed by civilian merchant mariners. When activated, RRF ships come under the operational control of Military Sealift Command.

The RRF includes roll-on/roll-off ships, lighter aboard ships, modular cargo delivery system ships, heavy lift ships, government-owned tankers and crane ships. The largest vessels are up to 950 feet in length with draft of 36 feet. Because of their configurations, RRF ships are uniquely capable of handling bulky, oversized military equipment. The RRF is maintained at port locations throughout the country; currently there are 17 ships located on the US West Coast.

The port locations are selected by MARAD through a public bidding process with contracts normally awarded for 5-year or 10-year periods. Private companies submit bids based on berth lease agreements negotiated with

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private terminals or port authorities. Public port authorities can submit direct bids but normally allow the private sector to take the lead.

A berth must meet the following requirements:

- Located in or near a full service port complex
- Physical lay berth; no mooring buoys
- Sufficient draft with 4 feet of clearance under the ship's keel
- Pilot tugs available 24 hours a day/7 days a week
- Harbor tugs
- Open water at most 15 nautical miles from the lay berth
- Provision of a mooring plan incorporating heavy weather conditions
- The lay berth and mooring plan must not interfere with a navigable waterway or channel
- Bunker fuel service within 24 hours transit by barge
- Ship repair facilities located within 30 nautical miles of the lay berth
- 20 car parking spaces per ship
- A fenced secure berth area

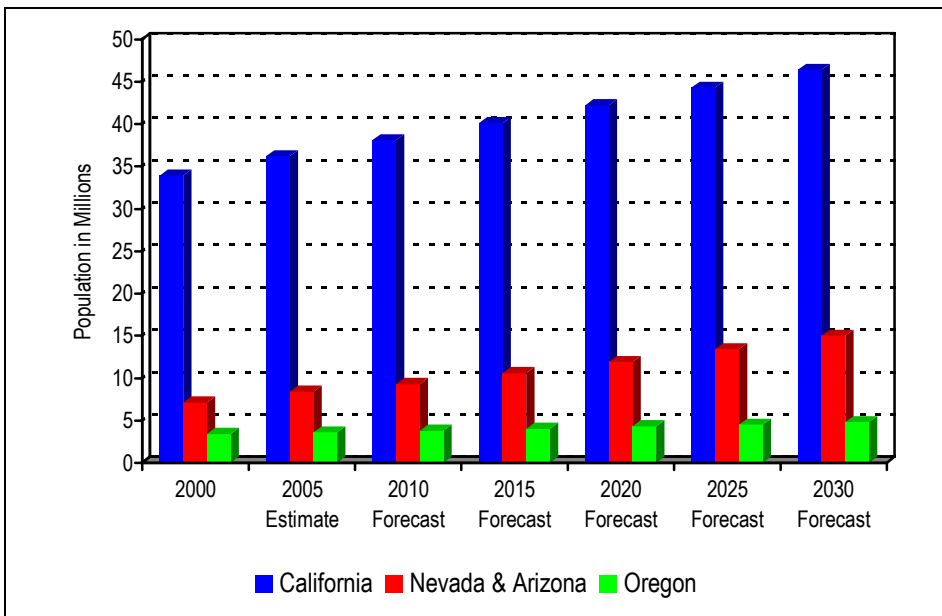
The requirement for a full service port currently excludes Humboldt Bay as a candidate for berthing of RRF vessels.

## 8. Regional Trends

California has 11 public ports, three major ports (Los Angeles, Long Beach and Oakland) and eight smaller ports (Humboldt Bay, San Francisco, Sacramento, Stockton, Redwood City, Richmond, Hueneme, and San Diego). In addition, there are private terminal facilities that handle cargo. Of the public ports, only seven are deep-draft ports – Los Angeles, Long Beach, Oakland, Humboldt Bay, San Francisco, Richmond, Hueneme and San Diego). The remaining ports are draft constrained – Sacramento, Stockton and Redwood City. Humboldt Bay is the only deep draft port between the San Francisco Bay area and Coos Bay. This statewide port system must accommodate projected growth of international trade driven by the State’s population and economy, as well as handle trade for other regions of the country.

The population of California increased from 33.87 million in 2000 to 36.15 million in 2005 (Figure 8.1) based on estimates from the US Census Bureau. The US Census Bureau projects a population of 40.1 million in 2015 (+11% from 2005) and 44.3 million in 2030 (+23% from 2005). Californian population growth will primarily be concentrated in the major urban areas of Southern California and the San Francisco Bay Area. The Association of Bay Area Governments (ABAG)<sup>11</sup> projects the population of its nine member counties to increase from 7.2 million in 2005 to 8.2 million in 2025 (+14%). The population of the six counties in the Sacramento region<sup>12</sup> is projected to increase from 2.2 million in 2005 to 3.0 million in 2025 (+36%).

**Figure 8-1: Population Projections for California and Oregon**



Source: US Census Bureau

The growing population is expected to generate increased international trade, both imports and exports, and thus place additional demands on the State’s international trading infrastructure – ports, railroads and highways. In addition, as the largest gateway for US trade with Asia, California’s transportation infrastructure will also have to support the increased international trade of the growing populations of neighboring States and other inland

<sup>11</sup> Association of Bay Area Government (ABAG) comprises the counties of Sonoma, Marin, Napa, Soland, Contra Costa, Alameda, San Francisco, San Mateo and Santa Clara.

<sup>12</sup> Population projection from the Sacramento Area Council of Governments (SACOG), which includes the counties of El Dorado, Placer, Sacramento, Sutter, Yolo and Yuba

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regions of the country. The population of Nevada and Arizona combined is projected to increase from 8.4 million in 2005 to 10.6 million in 2015 and 15.0 million in 2030 (+41%).

The expected long term growth of imports and exports due to population growth, which is implicit in the forecasts of containerized traffic presented in this study, will require investment in ports and upgrades to inland highway and rail transportation corridors. There will be a need for investment at locations outside of the traditional port gateways, and this is expected to provide long term opportunities for secondary ports in California, such as Humboldt Bay, and at other West Coast locations to expand their presence in the cargo market. In addition, pressure from the State and local communities to reduce the environmental impacts of cargo activities at the major ports is also expected to support investment at other locations. Finally, the State of California is likely to support investment at secondary ports and in transport corridors through California Proposition 1B, transportation bond measure passed by California voters in November 2006<sup>13</sup> to upgrade California's transportation infrastructure.

Humboldt Bay should present itself to the shipping industry and government agencies as offering available deep water capacity that can accommodate some of the long term cargo growth from population expansion, as a potential route for rail served cargo, and as offering capacity to counteract the potential long term capacity constraints facing the major Californian and other West Coast ports. As an underutilized port asset on California State waters and connected to inland locations by the NCRA, a California State authorized agency, the State should view Humboldt Bay as an important asset to support Californian international trade and economic activity. The discussion in Section 9 describes the importance of ports in supporting local and regional economic activity by generating direct jobs, supporting jobs at companies that use port facilities and services, and generating taxes and other economic benefits.

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<sup>13</sup> Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006

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## 9. Redwood Marine Terminal – Short to Medium Term Opportunities

### 9.1 Short to Medium Term Market Strategy

In the market survey, a number of short to medium term opportunities were identified which could potentially provide commercial business for the Redwood Marine Terminal and revenues to support development of medium to long term market opportunities, and pursuit of the District's recreation and conservation missions. The opportunities, which are not rail dependent, are:

- Cruise market
- Container-on-barge
- Project cargo
- Bulk cargo

The cruise, project cargo and local bulk cargo opportunities currently offer greater prospects than the container-on-barge service, which at present may be unattractive due to limited cargo volumes and the competitive cost of truck service between Oakland and Humboldt Bay. Container-on-barge service may become more viable in the future if the cost of trucking increases due to environmental and congestion issues, and those interested in developing barge service can overcome high stevedoring costs and access to a suitable terminal in the Oakland area.

These opportunities suggest that initial development at the Redwood Marine Terminal should focus on a multipurpose berth suitable for docking cruise vessels, handling multipurpose ships, barges and other vessel types. Appropriate storage area would be offered based on specific shipper requirements. Initial terminal infrastructure would be constructed so it can be integrated into any future expansions. Terminal equipment consistent with the District's environmental requirements would be provided by the stevedoring company contracted to provide vessel stevedoring and terminal services.

Non-cargo uses could also be developed if they do not disrupt immediate and longer terminal development at the Redwood Marine Terminal. Some of these non-cargo uses may support maritime uses, for example an historical complex that is an attraction for cruise passengers.

The above market strategy should be pursued in conjunction with and parallel to the medium to long term market strategy described in Section 10. The short to medium term opportunities are described in more detail below.

### 9.2 Cruise Market

The North American cruise market has experienced strong growth for the past two decades with passenger growth averaging 8.2% per year<sup>14</sup> since 1980. Similar growth is projected over the next five to ten years. California receives more than \$1.6 billion in direct spending from the cruise industry and handles over 1.3 million passenger embarkations per year. The four major ports in California are Los Angeles (615,000 passenger embarkations in 2005), Long Beach (363,000 passenger embarkations), San Diego (234,000 passenger embarkations) and San Francisco (89,000 passenger embarkations).

San Francisco is the only major embarkation point between Southern California and Seattle in the Pacific Northwest. The port has around 70 cruise vessel calls each year and handles over 200,000 cruise passengers, which provides an estimated \$60 million economic benefit in wages, taxes and purchases of goods and services. The port's cruise activity is largely the longer 10-day cruises in the summer to Alaska and in the winter to Mexico, as well as calls by vessels redeploying to and from Alaska. The port expects continued growth in cruise business and is planning to build a new cruise terminal in the future.

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<sup>14</sup> Statistics on the cruise industry were obtained from the Cruise Lines International Association.

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Smaller ports along the U.S. West Coast normally receive short duration calls with the cruise vessel arriving early in the morning and departing in late afternoon or evening of the same day. An excellent example is the Port of Astoria, Oregon. Astoria was successful in developing a cruise business based on local community support, a cooperative port authority, its ability to handle cruise ships of all sizes, its easily accessible location as vessels sail to and from Alaska, and its local history based around the Lewis and Clark exploration. Astoria entered the cruise business in 1980 and invested \$10 million in pier improvements to accommodate cruise ships. The Port has 18 cruise calls scheduled for 2007 and a similar number scheduled for 2008, which provides a good boost to the local economy. The calls occur primarily in April, May, and September as vessels are redeploying to and from Alaska. Astoria also receives regular calls by smaller cruise vessels operating on the Columbia River and from the Seattle area. Transportation between cruise ships and local attractions is provided by six public transit buses supplemented by area school district buses on an as-needed basis, local taxi services, rental car companies and the Astoria River Front trolley. In addition, Astoria approaches the cruise shipping lines year after year offering new shore excursions and keeping the lines updated on port developments.

Humboldt Bay can position itself as a niche port of call for cruise vessels operating along the U.S. West Coast. The model is that of Astoria, Oregon which has successfully developed a healthy cruise business. The Port of Astoria, OR handles about 32,000 cruise passengers per year (international and domestic) and 10,000 ships crew (international and domestic).<sup>15</sup> The opportunities for Humboldt Bay are:

- Calls by vessels redeploying to and from Alaska (April/May and September/October). Between 10 and 20 vessel calls per year would result in 15,000 to 30,000 passengers (assuming an average of 1,500 passengers per cruise ship call) plus crew. Each cruise passenger may spend an average of \$140 per visit<sup>16</sup> with additional expenditure by crew.
- Occasional calls from vessels operating West Coast cruises during the summer months.
- Cruise shipping lines continuously evaluate their ship deployments and are seeking to develop new markets. In the medium to long term, it is likely that the cruise ship lines will explore and develop regular West Coast cruising with multiple port calls. Humboldt Bay should position itself to participate in any such efforts initially through raising its profile amongst the cruise shipping industry community.
- Potential for smaller cruise vessel calls tied perhaps to a San Francisco Bay-Humboldt Bay itinerary, similar to the small cruise vessels that operate in and around the Puget Sound and Columbia River.

The investment required for cruise terminal facilities is relatively small compared to major cargo terminal developments. In addition, the facilities (berth, etc.) can be designed as part of a long term terminal development strategy, whereby initial facilities can support other uses or be integrated into future terminal expansion.

Additional investment is likely required by the City of Eureka and other communities in Humboldt County to include adequate local transportation of passengers, marketing, and attraction development. The development of cruise business is viewed as consistent with City of Eureka and Humboldt County policy to develop regional tourism and the goals of local historical bodies to preserve and promote the region's history.

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<sup>15</sup> Source: Port of Astoria, OR

<sup>16</sup> Based on the average expenditure per passenger at Alaskan ports. Source: "The Contribution of the North American Cruise Industry to the U.S. Economy in 2006", August 2007, Cruise Lines International Association.

### 9.3 Container-on-Barge Service

While there is interest amongst some shippers and barge companies in the provision of container-on-barge service between Humboldt Bay and Oakland, there are doubts about the current sustainability of such a service given the small volume of local containerized freight within the immediate hinterland of the port. In addition, lift-on/lift-off stevedoring costs are viewed as potentially prohibitive to the economic viability of a service. An alternative roll-on/roll-off ro-ro barge service may prove viable if suitable terminal space can be secured in the Oakland area to support ro-ro terminal operations.

Table 9.1 provides an estimate of the cost associated with each barge option in comparison with current truck service. For barge service, the principal cost components are stevedoring, voyage cost and local drayage between the Redwood Marine Terminal and the shipper's location. The estimates indicate that barge service, when measured on a cost per cargo basis, could be competitive with trucking so long as stevedoring costs can be maintained at a reasonable level. If the barge service can secure discounted container handling charges then it is likely to be competitive with trucking. There is precedent for reduced stevedoring costs for barges. For example, the Port of Portland's public tariff charges \$99 per lift for river barges (excluding dockage) compared to \$199 per lift (excluding dockage) for container ships.<sup>17</sup> The cost estimates in Table 9.1 should be confirmed through detailed discussion with barge operators and stevedores.

While current cargo volumes and economics are not favorable towards container-on-barge service, there are a number of factors that could shift the cost environment in its favor. State efforts to control truck emissions and expected increased congestion on state highways, would increase the cost of truck transport. A further consideration is the potential availability of state or federal funds to cover the start-up costs of a service. This model was used on the East Coast for some services although once grant funding expired some of these services were discontinued due to poor cargo volume.

A further consideration for the ro-ro barge option is its potential to open up opportunities to move domestic trailer freight as well as international containerized freight. The shipper of freight in domestic trailers could have a competitive alternative to using Highway 101. However, the trailer would still be restricted to highway weight restrictions and so it may not be possible to provide a discount to current trucking service.

**Table 9-1: Estimated Costs of Container-on-Barge Service and Current Truck Service**

	Container-on-Barge Service Lift-on/Lift-off Operation	Container-on-Barge Service Roll-on/Roll-off Operation	Current Truck
MT Tons per 40-ft Container	26.5	26.5	20.3
<b>Estimated Cost per Container:</b>			
Oakland: Terminal to Barge	\$240 <sup>1</sup>	\$150 <sup>2</sup>	-
Round Trip Transport	\$400	\$400	\$800
Humboldt Bay: Barge to Terminal	\$150	\$100	-
Humboldt Bay: Local Dray	\$150	\$150	-
Humboldt Bay: Terminal to Barge	\$150	\$100	-
Oakland: Barge to Terminal	\$240 <sup>1</sup>	\$150 <sup>2</sup>	-
<b>Total Cost</b>	<b>\$1,330</b>	<b>\$1,050</b>	<b>\$800</b>
<b>Cost per MT</b>	<b>\$50.19</b>	<b>\$39.62</b>	<b>\$39.41</b>
<i>Difference from Current Truck</i>	+13%	+1%	

(1) Assumes barge calls at the same terminal as the container ship.

(2) Includes drayage cost between container terminal and ro-ro terminal

Source: TranSystems estimates based on interviews.

<sup>17</sup> Terminal Tariff No.7, Port of Portland, OR

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## 9.4 Project Cargo

The Redwood Marine Terminal is a suitable location for handling heavy and oversized project cargo that may, on occasion, move in and out of the region. Such cargo is typically not suited to highway transportation; therefore, the availability of berth and storage facilities at Redwood Marine Terminal would be attractive to some shippers. Project cargo can be shipped by barge or by multipurpose ship. A review of recent ship calls at other West Coast ports show that many multipurpose vessels have the following dimensions: length-over-all (LOA) of up to 500 feet and draft of 25 to 32 feet.

Project cargo is typically one-off in nature, tied to a specific project, and cannot be easily forecast. TranSystems identified one significant project cargo activity related to the potential development of a wind farm in the hinterland of Humboldt Bay. Other opportunities are likely to emerge in the future as the District expands its marketing presence. Furthermore, the hinterland for project cargo could extend inland to Redding and other areas of Northern California if Highway 299 is deemed suitable for such loads. Project cargo can generate healthy revenue for a port; however, project cargo on its own is not likely to support investment in terminal facilities; and therefore this market sector must be considered as part of a broader terminal project.

## 9.5 Bulk Cargo

There are some company specific opportunities to handle bulk cargo over the Redwood Marine Terminal. One example is the movement of fuel in barges for local power plants. They will require the District to market and negotiate directly with individual shippers to assess unique requirements (storage, warehousing, etc.) and create customized port service solutions. This opportunity alone is not expected to support investment in a new terminal facility and should be integrated into a broader strategy for terminal development.

## 9.6 Non-Cargo Uses

The District should consider opportunities for non-cargo uses that either compliment marine terminal activities are can be integrated into site development along side marine terminal activities. Some of these activities may act as excursion destinations for visiting cruise passengers. The activities identified during the interview process of this study include:

- Allocation of land for aquaculture and related activities.
- Development of a historic attraction complex on the site of the roundhouse and other buildings nearby, including integration of the proposed Timber Heritage Association Museum.
- Continued use of Warehouse #3 to provide storage for commercial fishing and U.S Coast Guard equipment.
- Other uses that could support cruise shipping development.

The District will have to negotiate individually with each potential user on building and land requirements, lease arrangements and facility improvements provided by the District and the tenant.

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## 10. Redwood Marine Terminal – Medium to Long Term Opportunities

### 10.1 Medium to Long Term Market Strategy

A number of industry trends will support the need for investment in new terminal capacity on the US West Coast over the next decade and beyond, and will create opportunities for secondary ports to expand their market presence. These trends and opportunities are summarized below and discussed in more detail in the remainder of Section 10.

- The container shipping industry is expected to face West Coast port capacity constraints in the 2015 to 2020 period based on a review of existing container ports and confirmed new terminal projects.
- As container ports expand capacity, they may replace existing automotive terminals with higher cargo density and revenue yielding container operations.
- Non-container cargo sectors – such as automotive and bulk – are likely to seek port facilities and land to support expansion of import and export activities.
- Environmental constraints related to local cargo truck traffic (pollution, traffic congestion) and long term expansion of local cargo traffic at major West Coast ports may slow ability to expand intermodal rail traffic. This is expected to support interest in the development of secondary ports and new port locations for intermodal rail cargo.
- Studies are taking place on the feasibility of operating coastal short sea shipping services for domestic freight, either using ro-ro barges or ships, which would operate on routes between the major West Coast population centers but may also call at secondary ports.
- The private sector (investment funds, terminal operators, etc.) is showing greater interest in the development of transportation infrastructure including ports, railroads and warehousing. This participation can take a number of forms including full private sector control and public-private partnerships.
- The timeframe for terminal development can be 10 years or more from the initial concept through the various evaluation and planning stages (environmental reviews, permits, negotiations with terminal operators, construction, etc.) to terminal completion.

Humboldt Bay must compete with other secondary ports and potential new port locations for investment, each location having advantages and disadvantages. In order to be considered by terminal operators and investors, the District would need to pursue the following market strategy:

- Commit to a sustained multi-year effort to market the Redwood Marine Terminal given that terminal projects, including competing for investment, can take upwards of 10 years from concept to completion.
- Raise the industry profile of Humboldt Bay amongst the cargo shipping industry (terminal operators, shipping lines, shippers, etc.). The shipping industry community has very poor awareness of the port and the rail corridor, and this lack of knowledge is currently a significant weakness for the port compared to other potential locations for investment on the West Coast.
- The availability of a functional and efficient rail corridor between Humboldt Bay and the transcontinental rail system is a requirement to be considered for terminal investment and operation. The District must have a coordinated development strategy with the management of the rail corridor. Part of this strategy

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should include a full evaluation of the rail corridor, including cost of construction to meet standards for intermodal rail service and environmental impacts, which is then available to potential terminal operators and investors.

- Investigate environmental requirements and permits that would support terminal development and investment including evaluation of dredging deeper at the berth and enlarging the turning basin.
- Pursue potential funding support from the State, including under California Proposition 1B, the transportation bond measure passed by California voters in November 2006.

The above strategy is expected to improve the opportunities available to Humboldt Bay but the port will still remain in a very competitive investment environment. Potential for success will take a sustained multi-year commitment on the part of the District. The medium to long term market strategy could run in conjunction with and parallel to the short to medium term market strategy described in Section 10 of this report.

## 10.2 Container Market

TranSystems has taken two approaches to determining if an opportunity exists to develop a container terminal at Humboldt Bay. The first approach draws on the findings on West Coast port throughput, port capacity and port utilization discussed earlier in the report. The second approach looks at the specific strengths and weaknesses of Humboldt Bay as a location for a container terminal based on interviews with terminal operators and container shipping lines, and TranSystems' experience with other container ports.

The West Coast port market is likely to face capacity constraints in the 2015 to 2020 timeframe even with productivity improvements at container terminals. The constraints will largely occur in Southern California and discretionary intermodal cargo that would otherwise move over LA/LB is expected to be handled by other West Coast ports, by Panama Canal all-water service, and ports in Canada and Mexico. This medium to long term market environment will be conducive to investment in new container terminal facilities at secondary ports, such as Humboldt Bay, and new locations.

Humboldt Bay has the following strengths:

- Large amounts of land for terminal development with on-dock rail, based on the public and private land parcels available on the Samoa Peninsula.
- Sufficient waterfront property to develop a multi-berth facility.
- Vessel draft that can handle container ships up to around 5,800 TEU. Improvements would be required for larger ships.
- An uncongested port that can accommodate long term growth in ship traffic.
- An existing harbor pilot service that can be expanded in the future.
- An historical relationship with the International Longshore and Warehouse Union (ILWU), which provides labor at US West Coast cargo terminals.
- No current competition for port and other infrastructure on the Samoa peninsula.
- A motivated port and workforce that is interested in developing new business.

Humboldt Bay faces the following challenges related to investment requirements, geographic location and inland connections:

- Considerable investment will be required to develop a new container terminal involving preparation of land, development of berths, storage yard, on-dock intermodal yard, dredging and support services.

- Large scale investment will be required to develop intermodal rail infrastructure at the port and along the North Coast rail corridor.
- The location is distant from major Californian population centers with poor inland transportation connections.
- The absence of a large local market for both international and domestic cargo. This also will present challenges for repositioning marine and rail equipment.
- There is concern about the adequacy of a restored North Coast rail infrastructure to efficiently service high volume and time sensitive intermodal container markets beyond California.
  - These concerns include: sufficient train bypass sidings; frequency of weather disruptions; number of grade level crossings; ability to accommodate 7,000 to 8,000-foot unit trains; movement of trains including night traffic through Eureka and other communities along the rail corridor. In addition, there is concern over interaction with other rail traffic (freight and passenger rail traffic) and if priority will be given to intermodal container trains.
  - Potential port users would be concerned about the ability of the local and regional rail system to accommodate the surge of import intermodal rail traffic at the same time as handling the return flow of export containers by rail for loading on the ship.
- Container terminal operators and container shipping lines typically prefer ports and container terminals that have direct service from one or preferably two major railroads; BNSF and UP on the US West Coast. For Humboldt Bay, the preference is for direct on-dock rail service by a major railroad over NCRA tracks instead of service by a short line operator that then interchanges with a major railroad 300 miles to the south.

In conclusion, terminal operators and shipping lines will continue to focus their investment resources on incremental improvements at existing West Coast ports to maximize container productivity and throughput capacity, and on development of new container terminals at existing ports (such as the two terminals under development at Tacoma). They are also evaluating secondary ports and new port locations on the West Coast of North America. They are considering investments that will provide terminal capacity over a multi-decade time horizon and must be confident about a locations long term infrastructure and service capabilities to accommodate cargo growth. Each location has advantages and disadvantages either in terms of land availability, rail connections, local markets, channel draft, cost of development and the like.

At present, the concern for Humboldt Bay is that it is not even considered as a potential location due to the lack of knowledge in the container industry about the port's infrastructure and potential rail corridor. Once this perception issue is overcome, Humboldt Bay must address challenges related to its location and rail corridor, and must compete with other secondary ports and new locations for investment.

### 10.3 Automotive Market

Unlike the broader container market, automotive is very much a company specific market that reflects the individual import and export strategies of each auto manufacturer. Companies seek out ports with available land and excellent inland transportation connections to service local, regional and national markets. Logistics service providers who manage terminals and distribution for some auto manufacturers also play an important role in the port selection decision. The strengths and weaknesses of Humboldt Bay, and the conclusions on market potential, identified above in the discussion of the container terminal market equally apply to the automotive sector. In addition, Humboldt Bay would have to overcome competition from small ports in the San Francisco Bay (Richmond, Benicia, etc.) that have land to expand their vehicle handling activities and better proximity to regional markets. An important medium to long term consideration is the likely constraints on land at major ports along the West Coast as they increase their investment in container terminal facilities.

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## 10.4 Bulk Cargo

There may be opportunities for Humboldt Bay to position itself in the growing export trade of recycled metals and other materials from Northern California to markets in Asia. In 2005, ports in the San Francisco Bay handled over 1 million short tons<sup>18</sup> of ferrous and non-ferrous scrap received from around California, including the counties in Northern California, and neighboring states. This market segment is growing due to strong demand from the global steel industry. Bulk recycled metals are exported in ships that are similar or smaller in size to the Star Shipping vessels that currently call at Humboldt Bay. In the future, the export market may also extend into other materials. A likely requirement is to have a rail connection to transport recycled metals in from major population centers for processing and export.

## 10.5 Short Sea Shipping Market

Short sea shipping is a medium to long term opportunity but is incorporated here because it is a non-rail serviced market suitable for a small multipurpose berth.

The commercial viability of a short sea shipping service for the Pacific Coast is under investigation with the focus on major freight corridors between Southern California, San Francisco Bay Area and the Pacific Northwest. If any of these corridors are deemed viable then consideration may be given to integration of secondary ports if they do not cause deterioration in the service quality between major ports. Some of the freight that moves in and out of Humboldt County may be suitable to a short sea shipping service based on commodity characteristics (low value, less time sensitive and heavy) and/or transit time considerations. Direct discussion with local shippers and with future short sea shipping service providers would be required to determine service viability.

A short sea service, either using ships or barges, could be accommodated at the multipurpose berth. Incremental investment may be required for ramps depending on the vessel characteristics and on terminal storage area. The timeframe for the introduction short sea service along the Pacific Coast is five to ten years given the need to determine market viability, identify suitable terminal locations, build new ships, etc.

## 10.6 Cargo Related Activities

A terminal development typically supports related industries and services that involve some element of cargo processing or equipment management. These activities include: warehousing and distribution activities, equipment depots for storage and repair, Free Trade Zone activities (storage and added-value activities), and vessel supply services. The nature of the terminal will drive the support activities. For example, a container terminal focused on intermodal rail traffic would generate limited need for warehousing and distribution services, while an automotive terminal could support added-value processing of imported vehicles.

## 10.7 Comparison to Harbor Revitalization Plan

The findings of the container market and auto market are compared with those of the Port of Humboldt Bay Harbor Revitalization Plan completed in 2003.

The 2003 Study had the following conclusion on Humboldt Bay's competitiveness for containers:

“Based on Humboldt Bay's very small local market size, lack of close proximity by highway to a major West Coast market like San Francisco, and poor rail access (assuming rail service is restored), its competitiveness for container cargo is very poor. Even with rail access restored, Humboldt Bay would not be considered by the container carriers as a potential port call or overflow outlet. As discussed earlier, rail service over the NCRA line would take three to four days to interchange with UP in Fairfield before heading east, which would not meet the steamship lines' requirements for 65- to 85-hour service to the Midwest. This time-consuming and circuitous rail routing—which must backtrack though other

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<sup>18</sup> US Army Corp of Engineers “Waterborne Commerce Statistics”.

competing port areas—is a severe limitation on Humboldt Bay’s competitiveness. The extra transit time and rail mileage cannot compete with service at other, more established ports.”

The finding is accurate in stating that Humboldt Bay’s very small local market size cannot support a container terminal. However, the complete elimination of the potential to service inland markets (such as the US Midwest) by rail is too severe given the projected changes in the West Coast port market, potential for capacity constraints at existing ports, and interest in secondary ports. The following are important points:

- Capacity constraints at existing ports could occur in the second half of the next decade thus presenting opportunities for secondary ports to participate in the container market.
- The assumption that it would take 3-4 days to interchange with UP is too pessimistic given that long-term upgrade of the railroad to Class 3 could provide an operating speed for freight trains of 40 miles per hour<sup>19</sup>. At an average speed of 40 miles per hour the approximately 300 mile trip would take 7.5 hours. At a reduced average speed of 20 miles per hour, assuming impacts from slower travel through communities, non-freight train services and delays, the trip would take around 15 hours. Furthermore, any operating model for Humboldt Bay would have to consider direct service by a major railroad from the container terminal to ensure competitive intermodal service from the port. This would require a major railroad to secure operating rights over the NCRA corridor.
- One criteria used to evaluate routings is the total transit time from the origin port to the final inland destination, comprising ocean transit time, time in port and rail transit time. As shown below, Humboldt Bay is competitive with the Port of Oakland after accounting for sailing time, corridor transit time, and mainline rail transit to the inland point:

<b>Transit Time in Hours – Origin to Inland Point</b>	<b>Humboldt Bay</b>	<b>Oakland</b>
Sailing Time from Shanghai @ 24 knots	217	225
NCRA Rail Corridor	10	0
Mainline Rail (5 days to Midwest)	120	120
<b>Total Transit Time</b>	<b>347</b>	<b>345</b>
Difference		-2

The above comments are intended to clarify the market position of Humboldt Bay but not discount the challenges it faces in developing rail-served container business. Competition amongst ports for investment from the private sector is intensive. Additionally, the NCRA will have to restore the corridor to a position where it can support reliable and time efficient service, with infrastructure (tunnel clearances, etc.) to allow double-stack intermodal train service.

The 2003 Study had the following conclusion on Humboldt Bay’s competitiveness for automotive business:

“Despite the availability of plentiful low-cost land, the opportunity for auto imports or exports via Humboldt Bay is limited due to competition from other ports, highway distance from the larger market in San Francisco Bay, and poor/circuitous rail access. As discussed earlier, rail service over the NCRA line would take three to five days to interchange with UP in the Bay Area before heading east, which would not meet the auto companies’ requirements for 85-hour service to the Midwest. Humboldt Bay would need to compete with Bay Area ports for imports of fully assembled autos. In addition to Benicia, the Port of Stockton is gearing up to compete for potential automobile opportunities at its newly

<sup>19</sup> Class 3 freight service is part of the long term improvement plan described in “Capital Assessment Report” prepared for the NCRA by Willdan/HNTB in 2002.

acquired, 1,400-acre Rough and Ready Island site. As the auto companies continue to consolidate port operations, competition also occurs with ports in the Pacific Northwest and Southern California for intermodal traffic. As a result, Humboldt Bay’s opportunities to attract auto business are poor.”

The above statement requires qualification based on a number of factors:

- As stated in the market assessment, many major ports are converting automotive business to container uses, which is creating opportunities for secondary ports. This pressure caused Toyota to transfer some of its automotive import business from Southern California to Benicia.
- As with containers, the rail transit time is overly pessimistic. Similarly, any terminal operating model would seek to have direct service by a major railroad.
- Many secondary ports in the Bay Area are disadvantaged for auto business due to “air draft” constraints; under bridge clearances are too low to allow safe passage of medium to large PCTC vessels. As shown in Table 10.1, Sacramento, Stockton, and Redwood City all face air draft constraints. Benicia also faces constraints and cannot accommodate the new larger vessels. One shipping line interviewed for this study stated that they look at a port based on a fleet wide basis, that is all vessels in their fleet must be able to enter a port so they can mix and match vessels as needed. In addition, the shipping line had looked at Stockton but decided not to call because of the low bridge clearances along the ship channel to Stockton.

As with containers, major challenges relate to competition for investment and the ability to provide a reliable rail corridor that can accommodate tri-level automotive rail cars.

**Table 10-1: Air Draft Bridge Constraints at San Francisco Bay Ports**

<b>Destination Port</b>	<b>Air Draft Constraint</b>
Sacramento	132 feet
Stockton	132 feet
Redwood City	135 feet
PCTC Air Draft <sup>1</sup>	150+ feet

(1) Air draft of medium to large Pure Car Truck Carriers.

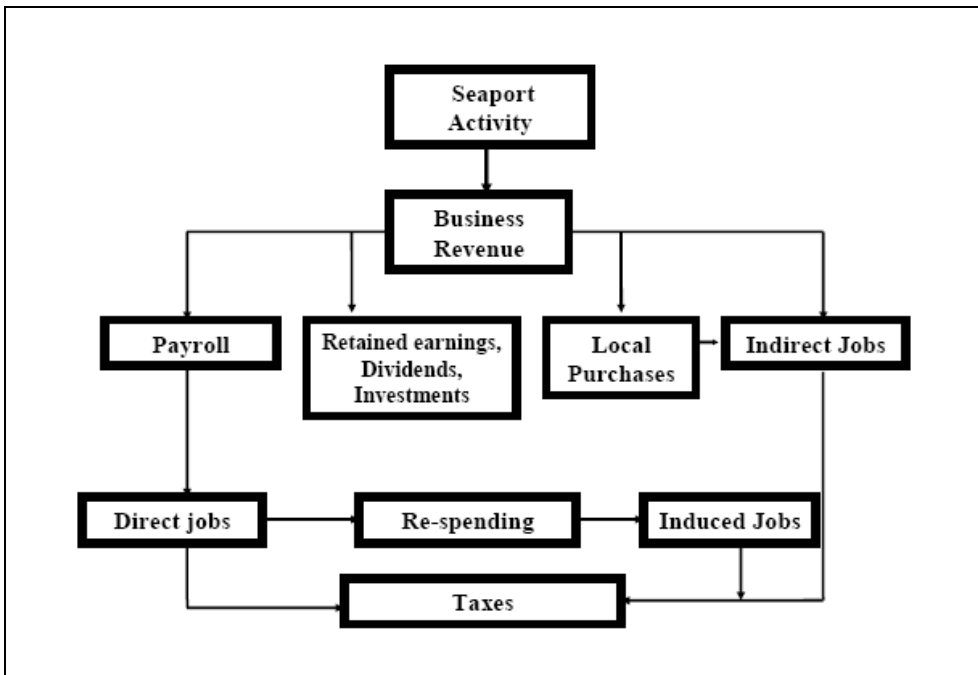
Source: TranSystems derived from San Francisco Bar Pilots and Ports

## 11. Economic Impacts of Terminal Development

A port or terminal development has a range of economic impacts on the local and regional economy. A recent study<sup>20</sup> was released by the American Association of Port Authorities (AAPA) on the economic impact of the US nationwide port system. The economic impacts, illustrated in Figure 11.1, fall into the following categories and sub-categories:

- Jobs
  - Direct jobs are derived from the port or terminal operations (stevedores, warehouse employees, etc.).
  - Induced jobs are created locally and regionally due to purchases of goods and services by those directly employed.
  - Indirect jobs are those generated by local purchases of the firms directly dependent on the terminal activity. Examples include office supply services, maintenance and repair services, and equipment and parts suppliers.
  - Related jobs are those within the manufacturing and distribution companies that utilize the commodities and products handled by the terminal. The related jobs are not directly dependent on the terminal since companies have alternative cargo routing options, but the terminal can have some influence on their competitiveness.
- Employee Earnings.
- Business Revenue.
- State, Local and Federal Taxes.

Figure 11-1: Flows of Economic Impacts through the Economy



Source: "The Local and Regional Economic Impacts of the US Deepwater Port System, 2006" prepared by Martin Associates for the American Association of Port Authorities, September 5, 2007

<sup>20</sup> Source: "The Local and Regional Economic Impacts of the US Deepwater Port System, 2006" prepared by Martin Associates for the American Association of Port Authorities, September 5, 2007

The AAPA report concluded that every direct job provided by a port supports a further 1.84 jobs in the local and regional economy around the port, broken out as follows:

- Every direct job provided by a port supports:
  - 1.24 induced jobs in the local and regional economy.
  - 0.60 indirect jobs in the local and regional economy.

The AAPA report also concluded that the economic impacts from port operations had increased since the topic was last examined in 1999. In 2006, each direct job supported 1.84 induced/indirect jobs compared to 1.58 induced/indirect jobs in 1999. The improvement reflects the growth of international trade activities at US ports. The level of economic impacts (jobs supported, taxes, etc.) will vary by port and will be impacted by the scale of terminal operations, as well as the volume and type of cargo handled by the terminal. Table 9.1 shows the economic impact of cargo and cruise operations at several west coast ports – Oakland, Seattle and Portland. In 2005, each direct job at Oakland supported 1.88 induced/indirect jobs. In addition, there were an additional 421,135 jobs in the State of California related in some way to cargo and other maritime activity at the Port of Oakland. Portland supported 1.90 induced/indirect jobs for every direct job. The proposed container terminal at Coos Bay, still awaiting a private investor, is projected to generate a total of 2,165 direct, indirect and induced jobs during its first phase of operation.

**Table 11-1: Employment Impacts of Selected West Coast Ports**

	Oakland (Maritime)	Portland (Maritime)	Coos Bay (Proposed Terminal)	Coos Bay (Proposed Terminal)
Number of Jobs	2005 Impact	2006 Impact	Impact @ Startup (500,000 TEU)	Impact @ Build Out (2.0 Million TEU)
Direct Jobs	9,880	6,568	n/a	n/a
Induced Jobs	14,821	8,636	n/a	n/a
Indirect Jobs	3,821	3,833	n/a	n/a
<b>Total Above</b>	<b>28,522</b>	<b>19,036</b>	<b>2,165</b>	<b>8,648</b>
<b>Ratio of Induced &amp; Indirect / Direct</b>	<b>1.89</b>	<b>1.90</b>	n/a	n/a
Related Jobs	421,135	n/a	n/a	n/a

Sources: The Economic Impact Study of Port of Oakland Maritime Operations, March 2006; The Local and Regional Economic Impacts of the Port of Portland, 2006; 2006 Economic Impact of Intermodal Container Operations – Final Report, 2007, Port of Coos Bay.

The analysis by the AAPA and examples of other ports illustrate the strong economic benefit a port can have on local and regional communities. A successful development of the Redwood Marine Terminal would have a positive economic benefit for the local communities of Humboldt County and also support economic activity in Northern California. The last study on the economic impact of port activity at Humboldt Bay was prepared in 1997 – “The Impact of Infrastructure Investment on Economic Development, Job Creation, and Real Estate Values: Financing Public Investment in The Port at Humboldt Bay”, John M. Quigley, January 14, 1997. This study concluded that investment in port infrastructure at Humboldt Bay would generate jobs, income, sales taxes and other economic benefits for the region. The job multiplier in this study was similar to those found in the studies discussed above on the general US port industry and on the economic impact of the Port of Oakland. Successful development of the Redwood Marine Terminal would be expected to:

- Restore direct port employment, which was lost at Humboldt Bay due to the decline of cargo activity during the late 1980s and 1990s.
- Support induced and indirect jobs in the surrounding communities.
- Support higher tax revenues for local communities.
- Support higher real estate values.
- Support the local and regional tourist industry if cruise ship calls occur.

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- Support related jobs at companies active in international trade located in California and other States.
  - Provide broader regional economic benefits for Northern California.
  - Retention of port related jobs in California that otherwise could migrate outside the State or Country if shippers and shipping lines seek alternative routes for their cargo (for example, ports in Mexico or Canada).