Adak, Alaska: A Marine Business Case

Dr. Darren Prokop

Chair, Department of Logistics
Director, Master of Science in
Global Supply Chain Management Program
College of Business & Public Policy
University of Alaska Anchorage

Rasmuson Hall
3211 Providence Drive
Anchorage, Alaska 99508
tel. 907-786-1992
fax 907-786-4115
e-mail: afdjp1@cbpp.uaa.alaska.edu
website: http://logistics.alaska.edu/

Introduction

This paper will determine if efficiencies exist for large ocean vessels, plying the North Pacific Ocean's great circle routes, in using Adak, Alaska as a port of call for refueling. Adak, an island in the Aleutian chain, is the locale of large fuel tanks and has a history of refueling vessels using Alaska's waters. After outlining the nature of trans-Pacific Ocean trade and great circle routes, the paper will briefly examine Alaska's success in becoming a global air cargo gateway and its lessons for ocean carriers. The major ocean carriers plying the North Pacific routes will be identified and a discussion of a transport activity known as *cabotage* will set their operations into proper context. A discussion of the range of operations of these carriers along these routes will be provided. Finally, the marine business case for Adak will be set out and some conclusions will be drawn as to the viability of Adak with respect to large ocean vessel transport.

Trans-Pacific Ocean Trade

The world's busiest oceanic trade takes place along the shipping routes of the North Pacific Ocean and much of it passes through or near the Aleutian Islands. In the past few years, growth in tonnage has been strong. But the global recession has taken a toll. In the 4th quarter of 2008 cargo volumes fell by 15%--- the largest single quarterly drop since 1975. Annual total revenue tonnage also declined (something which has only occurred twice in the last decade). The decline was 3.9% over 2007-08 (Pacific Maritime Association; p. 61). The only period since 1975 which saw a worse performance was a 7.8% drop in the recession years of 1981-82.

Taken as a trend, however, U.S. West Coast cargo volumes have increased more than 5-fold since 1975--- up from 67 mil. tons to 354.4 mil. tons in 2008. In other words, West Coast ports are handling about 1 million tons of cargo per day. Containerized transport represented only 27% of West Coast tonnage in 1975; today it is more than 73%. The efficiencies to be had from containerized trade displaced general cargo transport which has held 8-10 mil. tons of annual cargo over the period but, as a result, saw its trade share decline from 12% to around 3%. The story for auto transport and bulk cargo is a bit different. Each has seen strong growth in annual tonnage but not as much as containerized trade; therefore, each has seen a fall in its trade share over the period. Autos' share fell from 10% to 7%; and general cargo from 44% to 17%.

The implication of these shifts to containerized trade in West Coast ports over the last 30 years is that the ports are required to build and maintain gantry cranes and drayage equipment in order to realize the efficiencies to be had from containerized transport. Unlike general and bulk cargo, container operations require a more expansive and intricate port infrastructure.

The tonnage trade shares for the largest West Coast ports are shown in table 1. Vessel transport takes place in terms of either: containers, bulk cargo, general cargo or automobiles (typically using

roll-on, roll-off ocean vessels). As can be seen the 10 ports shown in the table account for nearly all U.S. West Coast port activity in the various transport types. For example, as noted above, total tonnage in 2008 was 354.4 mil.; and the ports, as noted in the second column of table 1, accounted for over 88% of it. Furthermore, those same ports accounted for over 99% of tonnage by container. In summary, just a few ports along the West Coast account for the vast majority of Asia-U.S. ocean vessel trade flows.

Table 1: The Top U.S. West Coast Ports
(tonnage loaded and discharged; 2008 percent shares)

Port	Total for all Types	Container	Bulk Cargo	General Cargo	Autos
Benicia, CA	-	-	-	-	9.5
Hueneme, CA	-	-	-	8.9	9.7
Kalama, WA	-	-	19.0	6.6	-
Los Angeles	30.1	38.9	1.7	32.7	8.2
Long Beach	26.8	31.7	12.6	11.8	16.1
Oakland	8.0	10.7	-	0.3	2.6
Portland	6.1	1.3	20.5	11.1	19.5
Tacoma	9.8	9.3	12.4	3.7	10.3
San Diego	-	-	-	-	16.9
Seattle	7.5	7.5	11.3	1.7	-
Total Share	**88.3**	**99.4**	**77.5**	**76.8**	**92.8**

Source: *Pacific Maritime Association: 2008 Annual Report*. pp. 58-59 and 61.

Los Angeles and Long Beach are the first and second busiest container ports in the U.S. in terms of twenty-foot equivalent unit (TEU) container throughput (and they are the world's 13th and 15th busiest). Oakland is the 45th busiest in the world (*Journal of Commerce*. (2008); p. 30).

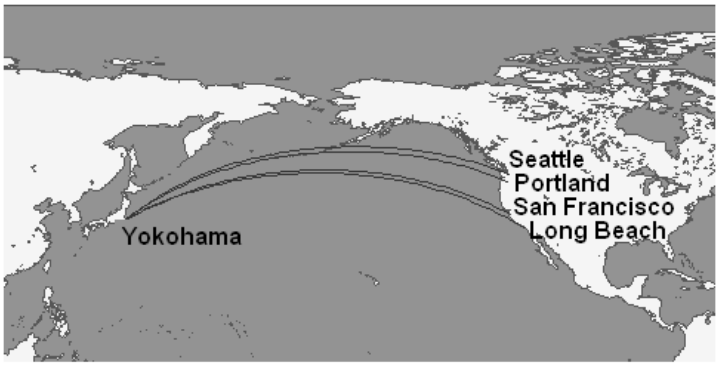
Great Circle Routes

Since the earth is spherical, the shortest distance between two points on a flat two-dimensional projection map is not necessarily a straight line. For example, consider the ocean vessel routes from the Port of Yokohama[1], Japan to selected U.S. ports along the West Coast. Figure 1 shows that all such routes proceed in a northward direction on a curved route into the North Pacific Ocean. In fact, the routes to Seattle and Portland proceed through the Aleutian Islands. It is the case that all ocean vessel routes from ports north of Portland, which travel to Yokohama, move through the Aleutians. These include the Ports of Vancouver and Prince Rupert, British Columbia.

Great Circle Distances from the Port of Yokohama to:

Port of Seattle (4,815 miles)
Port of Portland (4,869 miles)
Port of San Francisco (technically, Oakland) (5,172 miles)
Port of Long Beach (5,499 miles)

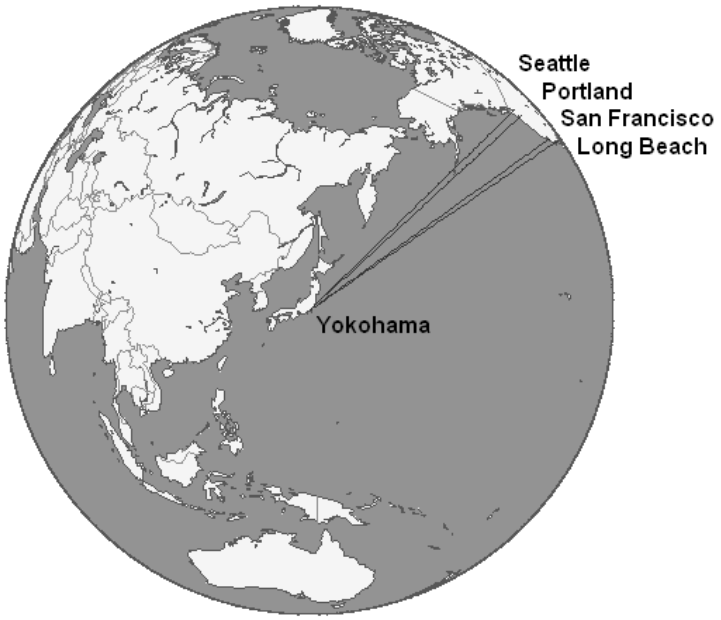
Figure 1: North Pacific Great Circle Routes on a Projection Map



Source: *Great Circle Mapper*. http://gc.kls2.com/ .

Of course, it is not obvious to the casual observer that the routes shown in Figure 1 are indeed the shortest distances. But it must be remembered that, being a projection map, the figure is a distortion of reality used to conveniently "flatten" the globe. To better demonstrate this distortion one could use a string on a globe to connect the points noted in the figure. Doing this would achieve truly straight line routes (which, nonetheless, follow the points noted in figure 1). Figure 2 shows the same routes as charted on a sphere. In this case, the routes are indeed straight lines.

Figure 2: North Pacific Great Circle Routes on a Spherical Earth



Source: *Great Circle Mapper*. http://gc.kls2.com/ .

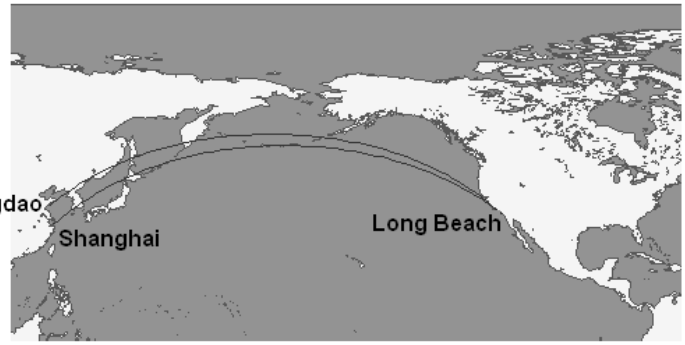
While it would seem that the Port of Long Beach (and nearby Los Angeles) would not cross anywhere near the Aleutian Islands on routes to Far East Asia that is not the case. Consider the Ports of Shanghai and Qingdao, China (the world's 2nd and 10th busiest, respectively). As figure 3 shows, the great circle route from Long Beach needs to pass through La Perouse Strait (or Tsugaru Strait) on the northern (or southern) end of the Island of Hokkaido, Japan. As such, the routes clearly move though the Aleutian Islands. This also indicates that any ports along the Sea of Japan and the Yellow Sea are accessible via this great circle route. These include the following ports: Busan (Korea's busiest; and the world's 5th busiest), and Tianjin, China (the world's 17th busiest). Naturally, any

West Coast ports to the north of Long Beach would also follow this route.

Great Circle Distances from the Port of Long Beach to:

Port of Shanghai (6,519 miles)
Port of Qingdao (6,313 miles)

Figure 3: North Pacific Great Circle Routes from Long Beach



Source: *Great Circle Mapper*. http://gc.kls2.com/ .

Alaska's Global Air Cargo Gateway Status

Alaska's status as an air cargo gateway is solidified by two factors: (1) having two international airports along the great circle between North America and Asia; and (2) the nature of air cargo logistics. Point (1) has already been demonstrated; but point (2) needs further clarification. Air cargo carriers face a trade-off in their operations in terms of revenue (through fast delivery and turn-around) and cost (through carrying fuel for extended range). Refueling in Anchorage or Fairbanks adds time to the trip (reducing revenue per shipment); but refueling also allows for smaller fuel tanks and, therefore, more belly space (enhancing total revenue per airplane). Currently, the lay-over time during refueling has not tipped the profit

equation in favor of completely over-flying Alaska. The typical refueling stopover allows a freighter to carry up to an extra 100 tons of cargo thus trading-off flight time for cargo revenue (Prokop 2008; p. 100). Furthermore, Alaska's two international airports allow for air cargo transfer between the planes of one carrier or even between those of two different carriers. These air cargo transfer operations are not allowed at any other U.S. airports.[2] In 2008, Anchorage saw about 47,000 cargo landings carrying about 2.8 million tons of air cargo. As the world's 3rd busiest airport in terms of tonnage it is also a hub for FedEx and UPS as well as a lay-over point for most Asia-based air cargo carriers flying into the U.S.

Is the ocean vessel mode similar enough to air cargo to benefit from the same type of operations? If so, then the Aleutian Islands are in a potentially strategic locale. Adak, in particular, as the westernmost U.S. city and Alaska's southernmost, is near the heart of the ocean vessel traffic. Furthermore, Adak has three water docks and fueling facilities (supported by 8 mil. gallons of fuel in storage). However, there are major differences between the logistics in these modes and these warrant more careful consideration.

Major Ocean Vessel Carriers

In the North America-Asia shipping lanes there are 45 ocean vessel carriers (also known as vessel operating common carriers (VOCCs)). These are listed in table 2. These represent 24 of the top 40 container carriers visiting U.S. ports.

It is undeniable that these shipping lanes are very busy and very lucrative. In fact, in terms of total value and total weight, ocean vessel transport is the most popular mode of U.S. exports and imports (see *Pocket Guide to Transportation 2009*. BTS Online. Tables 5-5 and 5-6).

Table 2: Ocean Carriers in North America-Asia Shipping Lanes

American Roll-On Roll-Off Carrier	Great American Lines, Inc.	OOCL (USA) Inc
ANL	Grieg Star Shipping	PACC Container Line Pte. Ltd.
APL	Hanjin Shipping	Pacific International Lines Pte. Ltd.
B.S.L.E. Malta Limited	Hapag-Lloyd	Rickmers Linie
Balticon Lines	Hoegh Autoliners	RTM Lines
China Shipping	Horizon Lines	Safmarine
Chipolbrok America, Inc.	Hyundai	Swire Shipping
CMA CGM Group	K-Line	United Arab Shipping
ConFlo Lines	Maersk Line	US Lines
COSCO Container Lines Americas, Inc	MOL (America) Inc.	Wallenius Wilhelmsen Logistics
CSAV Group	Matson Navigation Co.	Wan Hai Lines Ltd.
Eastern Car Liner	Mediterranean Shipping Co.	Westwood Shipping Lines
Eukor Car Carriers Inc.	National Shipping Co. of Saudi Arabia	World Logistics Service
Evergreen Shipping Agency (America) Corporation	NYK Line	Yang Ming (America) Corp.
FESCO	NYK Line North America (Ro-Ro Div.)	Zim Integrated Shipping Services
Source: *JOC Sailings.com.* http://www.jocsailings.com/quick-search/.		

Interlining and Cabotage

Transfer of containers between foreign-flagged vessels is not straightforward. Adak is part of U.S. territory meaning that any pick-up of containers at that port, and transport to another U.S. port, would constitute an operation known as *cabotage*. Cabotage has been illegal in the ocean vessel sector for over one hundred years. It is covered under the U.S. Merchant Marine Act of 1920 (also now as the "Jones Act", after its sponsor Sen. Wesley L. Jones, R-WA). Only under emergencies or extraordinary circumstances have waivers to this law ever been granted in ocean vessel transport. To avoid the cabotage issue, the carrier would have to be U.S.-flagged or the transport would have to be from Adak to a non-U.S. port.

Since most vessels in U.S. West Coast trade lanes are foreign-flagged the inbound transport beyond Adak would have to be to the ports of Prince Rupert or Vancouver, BC (to break the point-to-point route). Of the vessels making up the fleets of the carriers shown in table 2 only about 150 are U.S. flagged and registered (*JOC Sailings.com*). On the outbound transport any container dropped off in Adak would have to have been from a foreign port or, if from a U.S. port, the vessel would have to be U.S.-flagged. Of course, COSCO (the world's 7th largest container carrier) currently operates two sailings per week to Prince Rupert, BC from Yokohama and from the Chinese ports of (from north to south) Dalian, Xingang, Qingdao, Shanghai, Yantian and Hong Kong. These routes proceed as shown in figures 1 and 2.

The U.S. shipbuilding industry benefits greatly from the Jones Act because it is, in effect, a form of trade protection (specifically, a non-tariff trade barrier). The ocean vessels delivering cargo from the contiguous U.S. to Alaska's ports are U.S.-built, registered, manned, and flagged. Of course, vessel costs can be higher for these Jones Act lanes because of limited competition. Labor costs tend to be higher, foreign governments (particularly in Asia) subsidize their industry, and these emerging shipbuilding companies have newer plants and equipment. And, because of these cost

advantages, foreign shipyards are building more vessels thereby more quickly overcoming the technological learning curve.

Cabotage in ocean vessel activity is further complicated by a distinction in cargo haulage versus passenger cruises. The large cruise ships plying Alaska waters are foreign-built and foreign-flagged and it is not likely that domestic shipyards will be cost competitive anytime soon. The tax and labor cost savings of flying a foreign flag are also considerable. As such, the cruise ship industry has to rely on a foreign port of call as part of the Alaska route. With a short layover in Vancouver, BC there is little disruption in a seven day Alaska tour. Of course, re-interpretations of pre-existing legislation can occur at any time. A recent example relates to the *Passenger Vessel Services Act* (PVSA) of 1886. In 2008 the U.S. Maritime Administration (MarAd) proposed a rule whereby the required lay-over at the foreign port be at least 48 hours. While the proposed rule change was prompted to benefit U.S.-flagged cruise ships on routes from the West Coast to the Hawaiian Islands it would impact the Alaska market as well.[3] Alaska cruises might be forced to spend a further day outside of Alaska during the seven day tour or, worse, simply embark at Vancouver and avoid U.S. West Coast ports altogether.

In 2006, the U.S. shipbuilding industry earned over $14 bil. yet accounted for only 1.3% of global tonnage produced. There are about 24 U.S.-based shipyards capable of producing vessels exceeding 400 feet in length and a further 200 shipyards producing smaller vessels (*Shipbuilding Industry*; p. 4). Naturally, the majority of the revenue is earned from contracts to provide vessels for the U.S. Navy and Coast Guard. About 2,000 U.S. vessels are produced every year for commercial and military use. Currently, the entire U.S. commercial fleet numbers about 44,000 vessels.

The Marine Case for Adak

It is certainly the case that Adak is positioned at an attractive spot along the great circle routes of the North Pacific. It is even more intriguing when one considers that it occupies an area near the routes

one would take to enter the Northwest Passage from either Asia or the U.S. West Coast. Therefore, Adak is at a potential crossroads should the Northwest Passage become even more viable in the face of global climate change.

While air cargo carrier refueling in Alaska makes sense because of the trade-off in weight of fuel and weight of cargo no such calculation in ocean vessel carriage is typically made.[4] Weight is not a real issue; in fact, sometimes extra weight is welcome as a form of buoyancy in certain waters. Furthermore, there has been no carrier demand for fuel tanks on ocean carriers to be offering in a variety of capacities to allow for a range of trade-off options. The intent of present day oceanic shipbuilding is to design the vessel with a fuel tank having enough capacity to provide for a round trip. While tanks may not be kept full on oceanic routes they are certainly kept with more than enough fuel to allow for the first leg of the trip. Refueling typically takes place at the port of origin or destination (i.e., a port where cargo business is taking place).

Under these circumstances it would be hard to expect many of the oceanic cargo vessels plying the North Pacific great circle routes to stop in Adak for refueling alone. Perhaps a topping-up of the fuel tank might be necessary on any eventual Europe-Asia routes via the Northwest Passage. However, if trans-shipping were an option on Adak the story might be different. If the port on Adak were equipped with gantry cranes with gauges of sufficient size to handle typical container vessels then the port might be seen as more viable. For example, suppose containers destined for the northern U.S. and the southern U.S. are ready for transport out of Shanghai and out of Yokohama. Vessels traveling from both ports could meet at a viable container port in the North Pacific and have their containers transferred between the vessels such that one travels to, say, Vancouver, BC and the other travels to Long Beach, CA. Of course, we recall, the vessel traveling to Long Beach would have to conform to U.S. cabotage laws.

Conclusions

This paper has shown that Adak does have a geographical advantage due to its position along the North Pacific great circle route. However, it currently lacks an operational advantage of a degree necessary to attract trans-oceanic vessels. Having both advantages in place would make it a more viable port of call. This paper has identified the nature of trans-Pacific ocean carrier trade and has made some recommendations for planners to consider if it is decided that Adak should try to leverage its considerable fuel capacity in order to enhance its port operations.

Endnotes

[1] The Port of Yokohama is the 28th busiest in the world in terms of cargo throughput (measured in twenty-foot equivalent units (TEUs)). Nearby Tokyo is 26th and the two ports share a container barge network. ("World's Top Container Ports."; p. 32).

[2] For a complete description see: Prokop (2008, 2003, and 2002).

[3] Cruises from Los Angeles or San Diego comply with the PVSA by visiting Ensenada in Baja Mexico for an hour or so before heading to the Hawaiian Islands.

[4] Material in this section was provided through interviews with: Karl Johnson, Director of Communications (NASSCO); and David Anderson, Dock Manager (Todd Pacific Shipyards).

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