

2.5 Liquid Bulk Assessment (Petroleum Products)

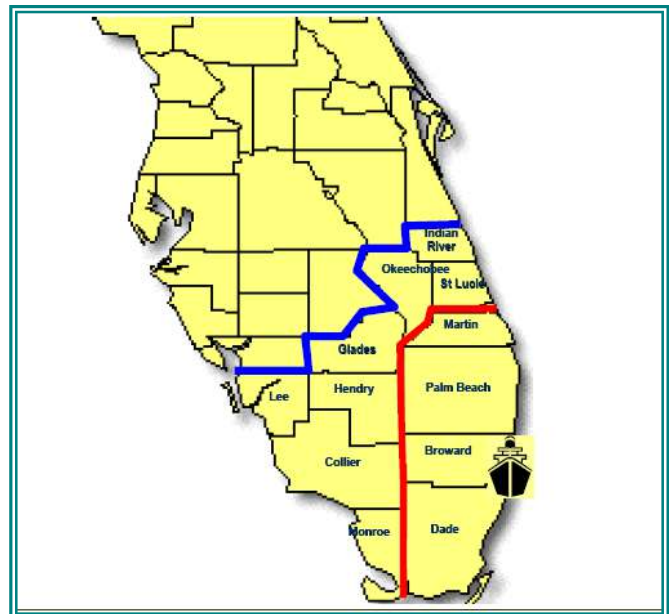
2.5.1 Introduction

This section discusses Port Everglades' liquid bulk market, specifically the diverse petroleum products that account for a substantial portion of the Port's revenue. For the most part, the information contained in this section has been derived from the *Petroleum Sector Strategy Study*, Purvin and Gertz (P&G), Inc., prepared for the Port in 2005. Additional specifics derived from the Consultant Team's interviews with several of the Port's petroleum industry tenants and updates through FY 05/06 supplement the P&G information.

The P&G study provides insights about the facilities the Port needs to meet the petroleum industry's expected growth in South Florida through 2020 and beyond. It includes an analysis of market conditions and the physical capabilities of the Port's petroleum infrastructure as well as projections of likely volumes of product that will move through the Port.

The petroleum sector has been and will remain vital to the future success of Port Everglades and the region as a whole. The Port literally fuels the growth of the extended South Florida region, supplying 87 percent of the gasoline demand in the region and 37 percent of Florida's gasoline requirements. Petroleum products moving through the Port thus support the region's diverse transportation demands and facilitate its economic development.

Figure 2.5-1
Port Everglades Petroleum Markets
Source: P&G Study



The Port's petroleum sector has grown significantly over the years as South Florida's population and commerce have expanded. The Port receives and distributes a variety of fuels, including gasoline, diesel, and jet fuel to a 12-county market of 7 million people (outlined in blue in Figure 2.5-1), which represents close to 40 percent of Florida's 2006 population of 18 million. Over 30 percent of these residents live in the Port's immediate 4-county market alone (Miami-Dade, Broward, Palm Beach, and Martin Counties), as outlined in red in Figure 2.5.1. The 8-county secondary market includes Collier, Glades, Hendry, Indian River, Lee, Monroe, Okeechobee, and St. Lucie Counties.

Industry services include

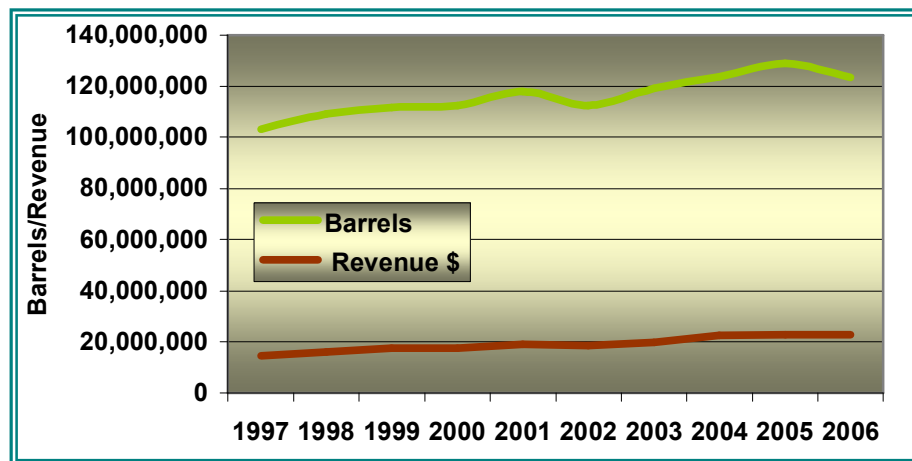
- Selling gasoline to retail gas stations in the region.
- Supplying the region's international airports.
- Fueling the Port's cargo and cruise ships.

- Serving the FPL electric power plant.
- Serving military needs.

Figure 2.5-2 shows both the Port’s throughput in barrels between FY 96/97 and FY 05/06 and the revenue generated by this commodity during the same period. In FY 05/06, the Port’s petroleum throughput was 123.5 million barrels, a slight decrease over a peak of 128.8 million barrels in 2005. Revenue generated by the petroleum sector at the Port amounted to \$22.9 million in FY 05/06, consistent with revenue in the two preceding years.

Figure 2.5-2
Port Everglades Annual Petroleum Throughput and Revenue
1997-2006

Source: Port Everglades Waterborne Commerce Report 2006



2.5.2 Petroleum Terminals at Port Everglades

Fourteen active privately owned petroleum terminals are currently located at Port Everglades; their locations are shown in Figure 2.5-3.

Each terminal consists of one or more tank farms used to store petroleum products, typically received by ship: these products include regular and premium grade gasoline, high and low sulfur diesel fuels, jet fuels, fuel oils, aviation gasoline, asphalt, and propane. One facility receives crude oil by truck for discharge to vessels.

The capacity share of each terminal is shown in Figure 2.5-4, based on the analysis provided in the P&G study. The TransMontaigne north terminal has the most capacity and product diversity.

Figure 2.5-3
Petroleum Terminals at
Port Everglades
Source: P&G Study

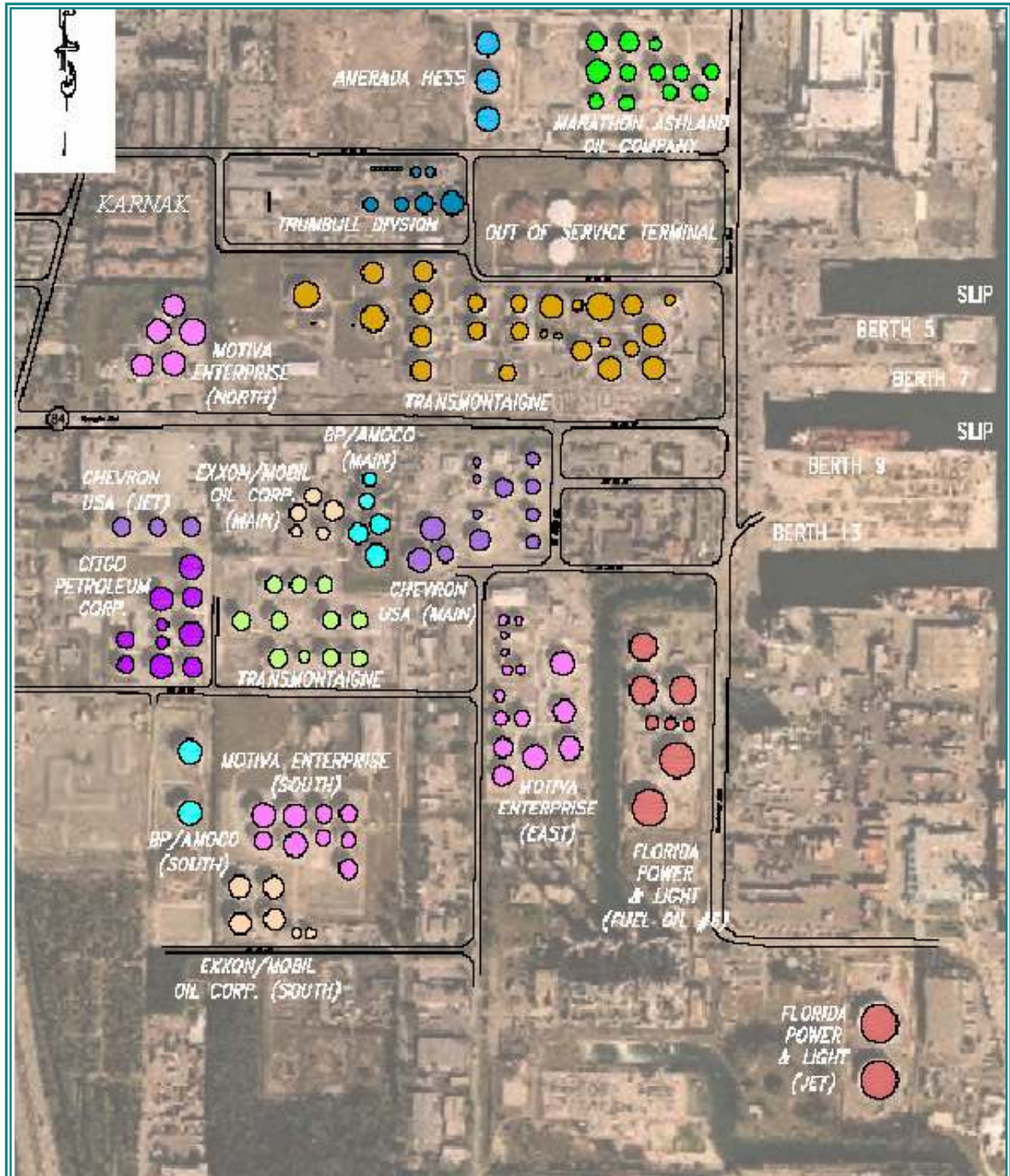
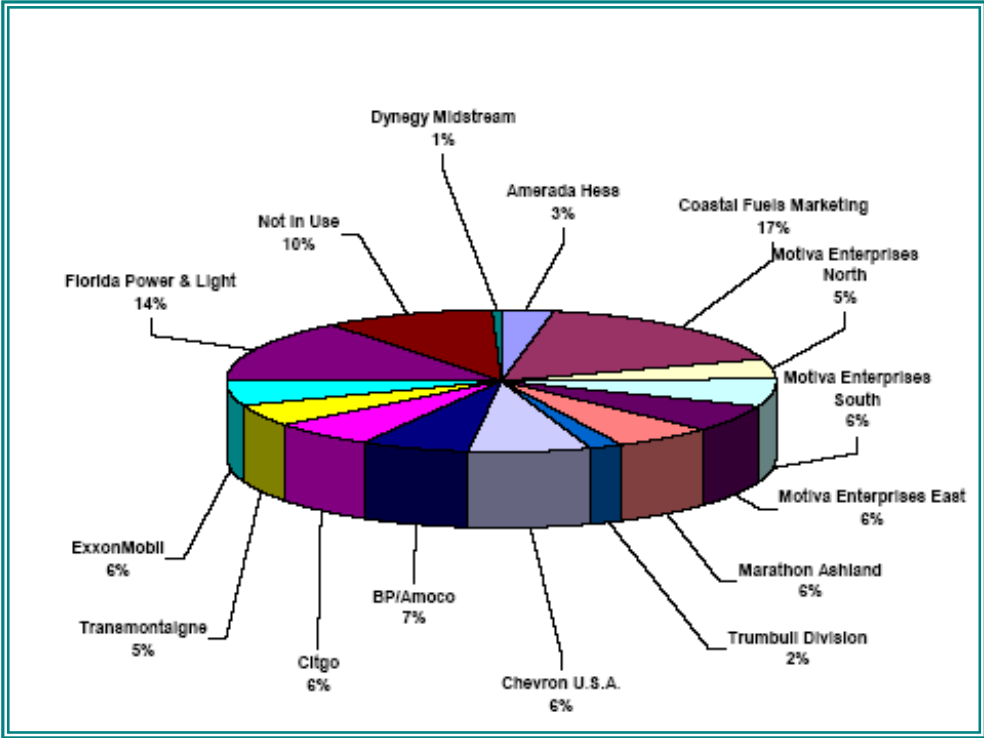


Figure 2.5-4
Terminal Tank Working Capacity Comparisons
2004
(Percent Share of Throughput)
Source: P&G Study



2.5.3 Current Market Overview

U.S. East Coast Conditions. The U.S. Department of Energy divides the country into five Petroleum Administration for Defense Districts (PADDs) for planning purposes. Florida, along with seventeen other East Coast states, is part of PADD I. As cited in the P&G study, refined product demand in PADD I far exceeds the production capability in the region. As a result, product supplies to the region flow from regional refiners, the U.S. Gulf Coast, and offshore import sources such as Europe and Latin America. For gasoline alone, imports supply over 10 percent of total PADD I demand, while almost 60 percent comes from the U.S. Gulf Coast and other U.S. locations. Local refineries produce the balance of approximately 30 percent of the requirements.

Like the other East Coast states, Florida, in serving the petroleum product demand of its varied constituencies, must contend with many issues, such as the following:

- Growing economic activity.
- Growing population.
- Growing petroleum demand.

- Increasing reliance on imports to meet demand.
- Increasing environmental awareness and concern.
- Infrastructure capacity limitations.

To cite the P&G study,

Economic activity has grown steadily in PADD I over the last few years. Business activity has picked up pace, hiring has increased, and businesses are looking to expand and grow their operations. The increased business activity has increased the demand for petroleum products to fuel the growth. Fuel is required to transport imported goods, construction material, and finished products. As economic activity increases, the need for petroleum will grow.

Since production accounts for only 30 percent of PADD I demand for gasoline alone, imports to the region are a critical concern. The East Coast relies primarily on U.S. Gulf Coast gasoline supplies; thus, petroleum prices are consistently higher than U.S. Gulf Coast prices. Product imports from Latin America and Europe are also an important supply source to the East Coast. The situation is exacerbated in the Florida market due to the absence of any indigenous supply, great population growth, and very strong economic growth.

Regional Demand. As the key port serving Florida's southern 12-county market, Port Everglades provides waterborne access for all petroleum products to this market. It also serves the container and cruise ships calling locally. Through the many interconnected terminals at the Port, gasoline and diesel fuel are transported via trucks to the market.

The P&G study determined that, in 2004, of the nearly 126 million barrels received at the Port, over 54 percent was gasoline, over 20 percent was jet fuel, and almost 14 percent was diesel fuel. The remaining products accounted for about 12 percent of the total volume. Figure 2.5-5 shows the proportion of the different petroleum products distributed through the Port's terminals.

Gasoline. The Port Everglades petroleum product mix, as shown in Figure 2.5-5, is heavily weighted toward gasoline. This product is destined primarily for the many retail stations serving the region.

Jet Fuel. Tourism, population growth, and economic growth are key factors driving jet fuel demand. Total jet fuel movements through Port Everglades are second only to gasoline movements, totaling over 26 million barrels in 2004. The major commercial airports in South Florida -- Fort Lauderdale-Hollywood International Airport (FLL), Miami International Airport (MIA), and Palm Beach International Airport (PBI) -- receive their jet fuel from Port Everglades, as do other airports in the region.

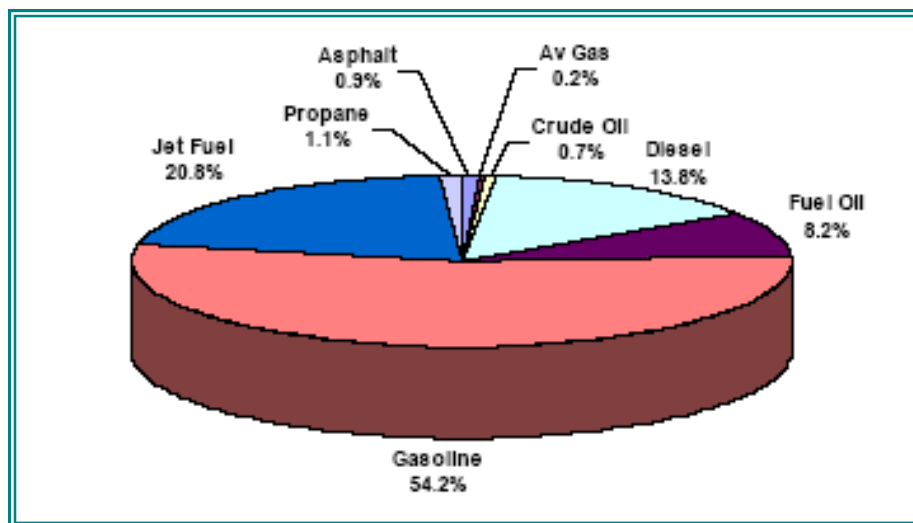
Diesel Fuel. Total diesel movements through Port Everglades are the third highest behind gasoline and jet fuel. Trucking operations, which have expanded with the region’s economic growth, are the primary consumers of on-highway diesel.

Fuel Oil. Florida Power & Light (FPL), which operates a power generation facility on a 94-acre site at the Port, requires fuel oil for its operations, although its plant is capable of firing residual fuel oil, natural gas, or a combination of both.⁶

Another major use of residual fuel oil is for vessel bunkering.

Liquid Petroleum Gas. Liquid petroleum gas (LPG) is primarily used for home heating and cooking as well as for growing business uses.

Figure 2.5-5
Port Everglades Product Distribution
2004
(Percent Share of Throughout)
Source: P&G Study



⁶ As reported in the P&G study, FPL has identified preferred and potential sites for future generation additions in the company’s *Ten-Year Power Plant Site Plan*, based on FPL’s projection of future resource needs. FPL has identified four preferred sites for capacity additions during the 2005-2007 timeframe. Also identified are seven potential sites where generation-capacity additions to meet FPL’s future needs may be considered, but are not presently planned. The Port Everglades plant has been classified by FPL as Potential Site #5. Of the FPL plants in the 12-county Port Everglades market, only the Port Everglades and Lauderdale power-generating plants are supplied with distillate and fuel oil through Port Everglades. Other plants in the immediate area that consume liquid fuel include Riviera, Martin, and Turkey Point. The fuel for these plants is supplied through the Port of Palm Beach and the Port of Miami.

Supply Sources. The petroleum product needs of the Florida market are primarily covered by waterborne deliveries to four ports: Port Everglades, Port Canaveral, and the Port of Jacksonville on the East Coast; and the Port of Tampa on the West Coast. Because no local petroleum refinery exists to meet demand in Florida, this demand must be met by shipments from large Gulf Coast refineries in Texas, Louisiana, and Mississippi, occasional movements from the New York Harbor, and, increasingly, foreign locations such as the Caribbean, Europe, the former Soviet Union, and Latin America. These sources of supply are illustrated in Figures 2.5-6, 2.5-7, and 2.5-8.



Figure 2.5-6
U.S. Gulf Coast
Petroleum Sources
Source: P&G Study



Figure 2.5-7
Foreign Petroleum
Sources
Source: P&G Study



Figure 2.5-8
East Coast Petroleum
Sources
Source: P&G Study

With no Interstate common carrier pipeline serving the area from the U.S. Gulf Coast, waterborne transportation is the only means of serving petroleum distribution centers. This places direct pressure on the state's seaports, including Port Everglades, and connecting infrastructure to keep pace with the growth in petroleum demand statewide.

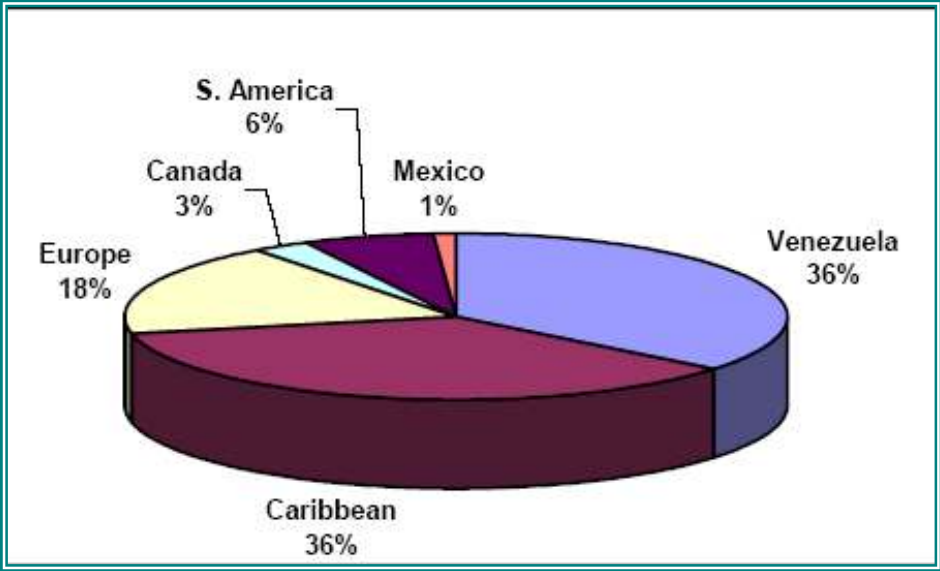
Concerns exist about product inventories and potential supply disruptions from the Gulf refineries. These could result from accelerated demand; natural disasters, such as hurricanes; and other constraints. Among the serious constraints to continued Gulf shipments are the age and shrinking of the Jones Act ships required to transport cargo and passengers between U.S. seaports.⁷

While shipments from the Gulf Coast refining complex continue to dominate the supply of petroleum products to the Port Everglades market, the volume of foreign supplies has grown considerably over the last few years. In 2004, foreign imports grew to over 30 percent of the annual total volume of 126 million. As the sources of incremental supply become increasingly foreign, the economies of scale require longer hauls and larger vessels to transport these products.

⁷ The Merchant Marine Act of 1920 (commonly known as the Jones Act) is a federal statute that requires U.S.-flagged vessels to be built in the U.S., owned by U.S. citizens, and documented (i.e., registered, enrolled, or licensed) under the laws of the U.S. In addition, all officers and 75 percent of the crew must be U.S. citizens. Vessels that satisfy these requirements comprise the "Jones Act fleet." The Jones Act restricts the carriage of goods between U.S. ports to U.S.-flagged vessels.

Based on P&G’s analysis, the origins of the Port’s foreign imports in 2004 are shown in Figure 2.5-9. Venezuela and the Caribbean dominated these imports, with about 36 percent each, while shipments originating from Europe accounted for 18 percent of the imports. South America, Canada, and Mexico had much smaller shares.

Figure 2.5-9
Port Everglades Foreign Petroleum Imports by Region
2004
Source: P&G Study



2.5.4 Petroleum Vessel Characteristics

Among the U.S. and foreign-owned vessels transporting petroleum products to Port Everglades are ocean-going tankers, ocean-going barges, and integrated tug-barges. Table 2.5-1 shows the average dimensions of the international tankers that called at the Port in 2004, based on P&G’s analysis. The largest of these was a 95,000-deadweight ton (DWT) tanker; the tanker with the greatest length overall (LOA) and beam was an 83,000-DWT tanker.

Table 2.5-1
International Tanker Fleet Characteristics (2004)
Source: P&G Study

Vessel Size (DWT)	Number of Vessels	Average Length Overall (Feet)	Average Beam (Feet)	Average Draft (Feet)
30	< 7	450	65	25
30-60	102	594	97	38
60-80	14	629	106	41
>80	4	801	137	44

The U.S.-flagged tankers and barges calling at Port Everglades, which are required to be Jones Act compliant, have the characteristics shown in Tables 2.5-2 and 2.5-3, respectively. Other

than the foreign-flagged tankers calling at Port Everglades, which could be larger in the future, the sizes of these vessels are expected to remain constant, as discussed in Section 2.5.6.

**Table 2.5-2
U.S.-Flagged Tanker Fleet Characteristics (2004)**

Source: P&G Study

Vessel Size (DWT)	Average Length Overall (Feet)	Average Beam (Feet)	Average Draft (Feet)
30,000 - 50,000	600-680	84-106	34-44

**Table 2.5-3
U.S.-Flagged Barge Fleet Characteristics (2004)**

Source: P&G Study

Vessel Size (Barrels)	Average Length Overall (Feet)	Average Beam (Feet)	Average Draft (Feet)
62,000-252,000	350-558	56-93	12-32

Smaller LPG barges also call at the Port; their average sizes are shown in Table 2.5-4.

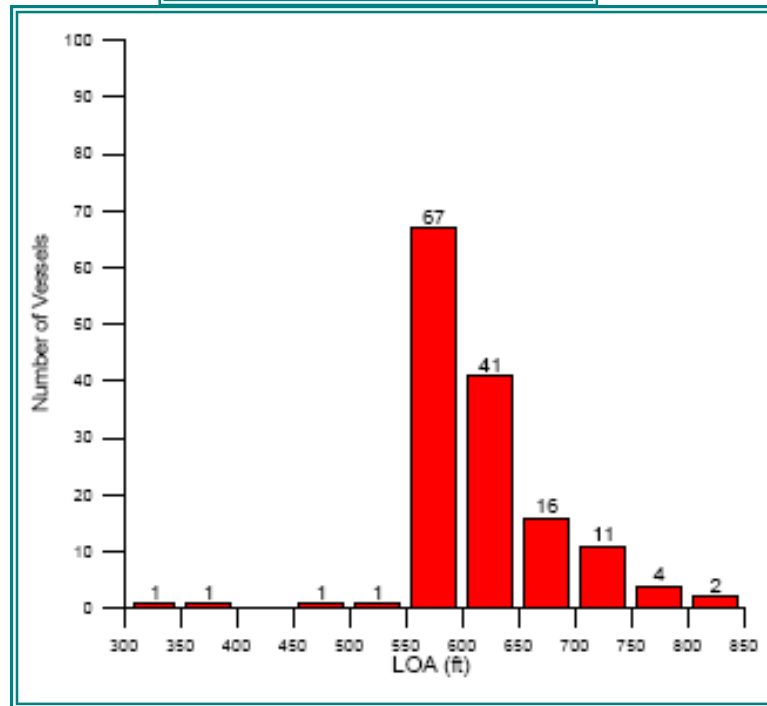
**Table 2.5-4
LPG Barge Fleet Characteristics (2004)**

Source: P&G Study

Vessel Size (Barrels)	Average Length Overall (Feet)	Average Beam (Feet)	Average Draft (Feet)
10,000-23,000	242-285	48-63	10-12

Figures 2.5-10, 2.5-11, and 2.5-12 summarize the distribution by LOA, beam, and draft, respectively, of the tankers calling at Port Everglades in 2004. These dimensions are critical in determining the berth lengths, slip widths, and draft requirements needed to accommodate the petroleum vessels expected to call at the Port in the future. Other critical factors include the configurations at the loading ports. For example, foreign ports tend to have somewhat deeper-draft berths than U.S. ports, creating a potential demand for deeper-draft berths at Port Everglades to accommodate the larger tankers.

Figure 2.5-10
Distribution of Tankers Calling at
Port Everglades by LOA
2004
 Source: P&G Study



Among the potential physical constraints P&G observed for the petroleum vessels calling at Port Everglades are:

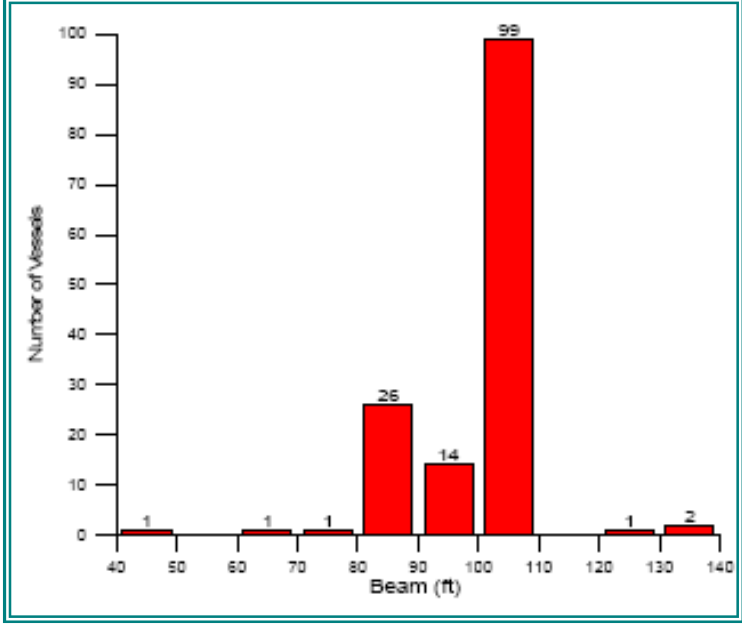
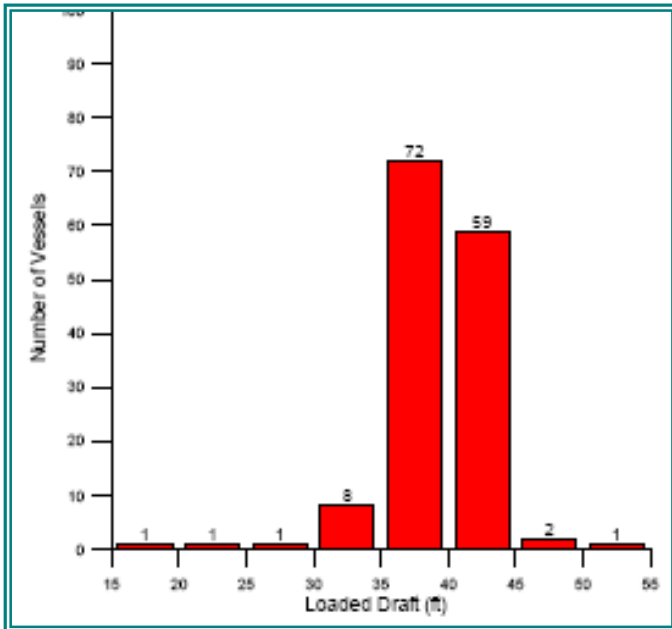
- The width of the approach channel at its narrowest point is 440 feet; this is narrower than the PIANC-recommended⁸ single-way straight approach channel width for vessels with beams larger than 125 feet.
- The petroleum slips are approximately 300 feet wide and fall short of the PIANC-recommended width of 6 times the largest vessel beam.
- The available water depths at certain slips prevent most tankers exceeding 35,000 DWT from arriving in a fully loaded condition; if these slips were deepened, then the approach channel and turning area would also have to be dredged deeper if ships greater than 50,000 DWT were to arrive fully loaded.

⁸ PIANC is a worldwide technical and scientific organization whose objective is to promote both inland and maritime navigation by fostering progress in the planning, design, construction, improvement, maintenance and operation of inland and maritime waterways. Founded in 1885, PIANC is the oldest international association concerned with these technical aspects of navigation.

Element 1 of this Plan discusses these issues in the context of the Port’s existing infrastructure. Element 3 addresses them in the context of the 20-year Vision Plan.

Figure 2.5-11
Distribution of Tankers Calling at
Port Everglades by Beam Width
2004
 Source: P&G Study

Figure 2.5-12
Distribution of Fully Loaded Tankers
Calling at Port Everglades by Draft
2004
 Source: P&G Study



2.5.5 Other Florida Petroleum Product Distribution Points

In addition to Port Everglades, the Florida seaports with petroleum operations include:

- Port of Tampa.
- Port of Jacksonville.
- Port Canaveral.
- Port of Miami.
- Port of Palm Beach.
- Port Manatee.

Of these seaports, only the Ports of Tampa and Jacksonville have petroleum operations on the comparative scale of Port Everglades. The other ports’ petroleum operations primarily consist of fuel oil for bunkering their cargo and cruise ships or for supply to local power plants. Port Everglades has the largest storage capacity and the second largest throughput of these ports (see Table 2.5-5).

**Table 2.5-5
Summary of Florida Port Data (2003)**
Source: P&G Study

Port	Throughput, Inbound, 2003, MB/D	Primary Product	Est. Shell Storage Capacity, Million Barrels	Tank Turnovers (Annually)	No. of Berths
Everglades	325	Gasoline	8.5	14.0	5 ¹
Tampa	355	Gasoline	7.4	17.5	9
Jacksonville	147	Gasoline	5.6	9.5	6
Manatee	22	Fuel Oil	2.5	3.3	5
Canaveral	28	Fuel Oil	1.3	7.9	5
Miami	21	Fuel Oil	0.7	11.4	1
Palm Beach	29	Fuel Oil	NI	NI	1

Notes: NI = No Information Available.
1) Effective number of usable berths due to vessel length

Figure 2.5-13 shows the petroleum product throughput for Florida’s seaports between 1999 and 2003, based on Waterborne Commerce data collected by the ACOE and included in the P&G study. Since that time, as shown in Figure 2.5-14, which presents the seaports’ petroleum tonnage from FY 03/04 through FY 05/06, all of these ports have seen comparatively consistent petroleum product throughputs.

Trucking companies have indicated that the typical practical range for truck deliveries is 120 to 130 miles. In unusual cases, runs up to as far as 200 miles are made.

Figure 2.5-13
Total Petroleum Products Received
at Port Everglades
1999-2003
 Source: P&G Study

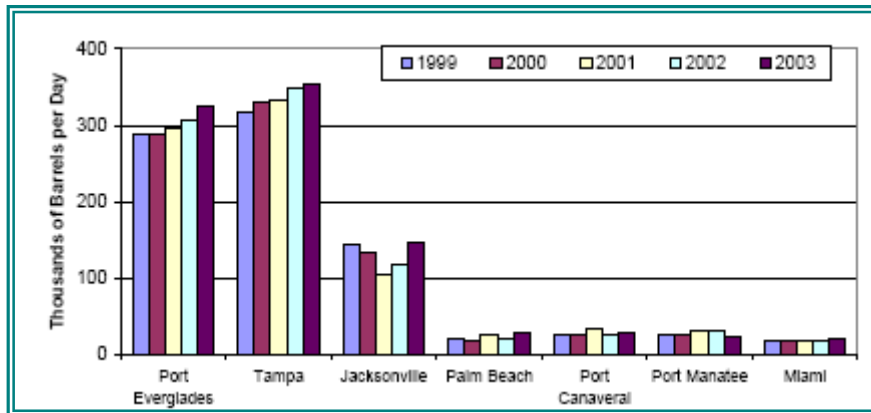
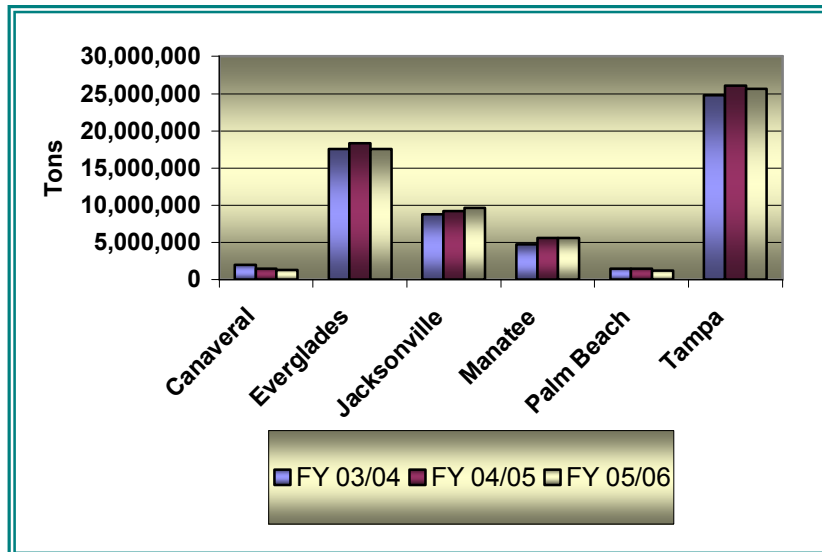


Figure 2.5-14
Total Petroleum Products Received
at Port Everglades
FY 03/04-FY 05/06
 Source: Seaport data as reported in Annual Seaport Mission Plans



The relevant characteristics of each seaport, as reported in the P&G study, are summarized below:

- Port of Tampa.** The Port of Tampa is approximately 235 miles driving distance (over 300 miles by water) from Port Everglades. Tampa clearly has a location advantage in terms of Gulf Coast supplies; however, petroleum products must be trucked from Tampa over 80 miles across the state to penetrate the outer 12-county market Port Everglades serves.
- Port of Jacksonville.** The Port of Jacksonville is approximately 320 miles to the north of Port Everglades. Jacksonville has a location advantage in terms of supplies from New York Harbor and European imports; however, to penetrate the outer 12-county market served by Port Everglades, products must be trucked over 170 miles, which is beyond the typical practical trucking range.
- Port Canaveral.** Located approximately 170 miles north of Port Everglades, Port Canaveral is within trucking range of counties served by the Port of Tampa, Port Everglades, and the Port of Jacksonville. It is also ideally located to serve the growing Orlando and I-4 Corridor market. The P&G study suggests that, if the appropriate infrastructure were expanded at Port Canaveral, it could absorb some of the future growth in outlying areas currently being served by the Port of Tampa and Port Everglades. This capacity expansion is now occurring, as Port Canaveral has just authorized the creation of a new fuel tank farm in a 30-acre site at the port, although the product may not be intended for in-state use.
- Port of Miami.** The Port of Miami is located approximately 35 miles to the south of Port Everglades. Miami's volumes are primarily residual fuel oil for ship bunkering and power plant operations at Turkey Point.
- Port of Palm Beach.** The Port of Palm Beach is located approximately 50 miles to the north of Port Everglades. Essentially all the volumes through the port are residual fuel oil for the nearby power plant. Recently the port has added the capability of receiving modest volumes of asphalt and diesel fuel
- Port Manatee.** Port Manatee is 35 miles south of the Port of Tampa and about 210 miles driving distance from Port Everglades. The receipts at this port have been primarily residual fuel oil for bunkering and for the nearby FPL power plant.

Figure 2.5-15
Competitive Florida Port Supply
Overlap
Source: P&G Study

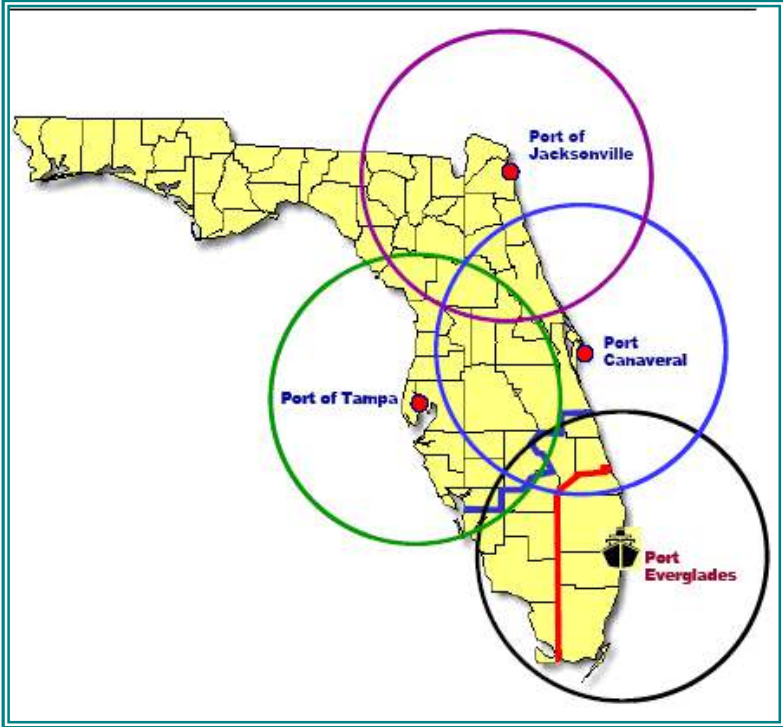


Figure 2.5-15 shows the overlapping service areas of the respective Florida seaports with significant petroleum operations, based on radii of 130 miles around each port. The more typical run distance of 120 to 130 miles is approximately half way between the Port of Tampa and Port Everglades, so there can be competition at the outer edges of each port's delivery range. Port Canaveral could also compete in the ranges of the Port of Tampa, Port Everglades, and the Port of Jacksonville. The greatest overlap is between Port Canaveral and the Port of Tampa.

In summary, the P&G study observes that the Port of Tampa has a waterborne freight advantage for shipments from Gulf Coast locations; but could be constrained from further growth due to high utilization of storage, unless new storage tanks are added. Existing and future demand on Florida's growing Gulf Coast and I-4 corridor, trucking cost considerations, and tankage limitations, may preclude the Port of Tampa from supplying petroleum products to Port Everglades' primary 4-county market of Broward, Miami-Dade, Martin, and Palm Beach. Depending on oil company pricing and distribution policies, however, some competition could occur in the overlapping western counties of the secondary 12-county market, particularly Glades, Hendry, Lee, and Okeechobee Counties.

Jacksonville has some underutilized capacity, but its ability to supply product to the markets served by Port Everglades is limited by distance and higher trucking costs.

Given their product storage and mix limitations, Port Canaveral, the Port of Miami, the Port of Palm Beach, and Port Manatee are not presently capable of providing any meaningful amount of gasoline or jet/light distillate to the markets served by Port Everglades. If additional infrastructure were added in the future to expand storage and diversify their product mix, Port Canaveral and Port Manatee do have the capacity to be competing ports for product imports.

2.5.6 Petroleum Product Forecasts

Future Demand Factors. The P&G study cites numerous issues related to forecasting the future throughput of petroleum products for the Port Everglades market. These issues include:

- Demand for petroleum products.
- Level of foreign imports.
- Refining capacity utilization.
- Jones Act vessel constraints.
- Competitively priced foreign supplies.
- Efficiency of ship deliveries vs. barges.
- Cargo sizes per vessel call.
- Co-loading products
- Discharges to multiple terminals.

Other factors include the relative strength of the economy, petroleum prices, the regulatory environment, the extent of travel, the fuel efficiency of the fleet, and assumptions regarding alternative motor fuels.

Population Trends. Between 2000 and 2005, Florida’s population grew by 12 percent, from 15.9 million to 17.9 million, an average of 2.4 percent annually. By 2026, the Port’s planning horizon, the state’s population is expected to reach 25.2 million, having grown by 58 percent since the start of the century. By 2030, Florida, California, and Texas will each gain more than 12 million residents and together will account for 46 percent of the nation’s growth. Florida will have overtaken New York to become the third most populous state in the nation (see Figure 2.5-16). The expected growth in the Port’s 12-county petroleum market area through 2026 and beyond is shown in Table 2.5-6. Three of the nation’s fastest growing counties -- Collier, St. Lucie, and Lee -- are in this market area.

**Figure 2.5-16
Population Comparison
2000-2030**

Source: U.S. Census Bureau

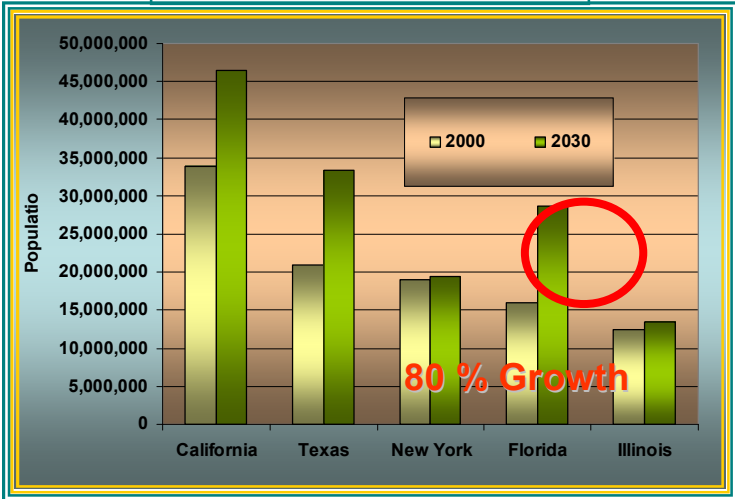


Table 2.5-6
Population Growth in 12-County Market
 Source: Florida Legislature, Office of Economic and Demographic Research

County	2000	2005	2010	2015	Percent Change 2000-2015	Average Annual Growth Rate	2020	2025	2026	2030	Percent Change 2015-2030	Average Annual Growth Rate
Miami-Dade	2,253,779	2,422,075	2,605,918	2,771,541	23%	1.53%	2,927,601	3,066,962	3,093,698	3,196,771	15%	1.02%
Broward	1,623,018	1,740,987	1,905,477	2,059,647	27%	1.79%	2,200,116	2,324,355	2,347,962	2,439,260	18%	1.23%
Palm Beach	1,131,191	1,265,900	1,417,323	1,556,078	38%	2.50%	1,686,223	1,803,110	1,825,572	1,912,380	23%	1.53%
Lee	440,888	549,442	648,395	741,728	68%	4.55%	828,515	906,245	921,196	979,040	32%	2.13%
Collier	251,377	317,788	386,809	451,465	80%	5.31%	512,418	567,364	577,933	619,095	37%	2.48%
St. Lucie	192,695	240,039	280,806	320,491	66%	4.42%	356,702	389,022	395,246	419,225	31%	2.05%
Martin	126,731	141,059	156,350	170,305	34%	2.29%	183,103	194,410	196,590	205,079	20%	1.36%
Indian River	112,947	130,043	146,980	162,546	44%	2.93%	176,964	189,720	192,148	201,555	24%	1.60%
Monroe	79,589	82,413	84,136	85,756	8%	0.52%	87,243	88,563	88,807	89,789	5%	0.31%
Hendry	36,210	38,376	42,817	46,523	28%	1.90%	50,082	53,143	53,705	55,981	20%	1.36%
Okeechobee	35,910	37,765	39,539	41,221	15%	0.99%	42,825	44,304	44,582	45,713	11%	0.73%
Glades	10,576	10,729	11,619	12,202	15%	1.02%	12,743	13,229	13,315	13,659	12%	0.80%
	6,294,911	6,976,616	7,726,169	8,419,503	34%	2.25%	9,064,535	9,640,427	9,750,754	10,177,547	21%	1.39%

Product Consumption Trends.

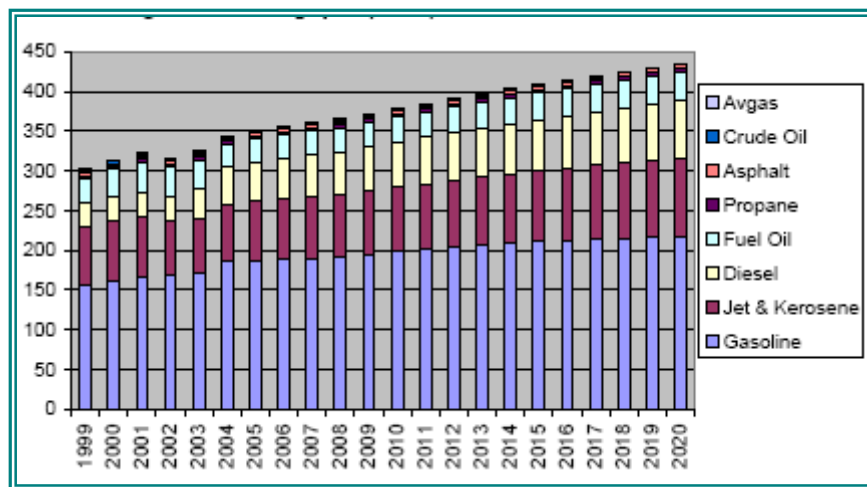
- **Gasoline.** According to the study, unless the U.S. legislates very stringent mileage standards, gasoline consumption should continue to increase, although at lower than historic rates. After somewhat of a decline, growth in average vehicle miles traveled is projected to return to 1.6 percent. Fleet efficiency is essentially flat through 2010, but starts to take an upward turn as the effect of a gradual increase in more fuel-efficient vehicles materializes. The fuel efficiency of new cars and trucks will be even more pronounced after 2020 due to emerging new technologies. Due to its proximity to the U.S., Latin America will continue to be a major supplier of gasoline to the U.S. In addition, gasoline demand is declining in most countries in Europe, so gasoline will be even more readily available for export to the U.S.
- **Diesel.** The major diesel trend is the continuation of sulfur reduction. Overall, the U.S. will remain a net importer of diesel, with substantial trade with Latin America, the Caribbean, and Canada.
- **Other Trends.** Other trends in the petroleum forecast are as follows:
 - Jet fuel and kerosene are expected to resume growth, but at lower than historical rates. Only modest growth at best is expected.

- The sulfur content of residual fuel oil is being reduced. Residual fuel oil consumption is expected to decline slowly as natural gas continues to displace residual fuel oil. With some growth in bunker fuel, overall demand for residual fuel oil will be essentially flat.
- Bunker fuel is forecast to increase at a rate in line with growth in petroleum demand.

During the forecast period, Florida’s light product annual demand growth rates are forecast to range from 2.4 percent to 2.2 percent by 2010, slowing to 1.2 percent by 2020. For the same period, the 12-county market served by Port Everglades will experience annual light product growth rates of about 2 percent per year until 2010 and then taper off to 0.3 percent by 2020.

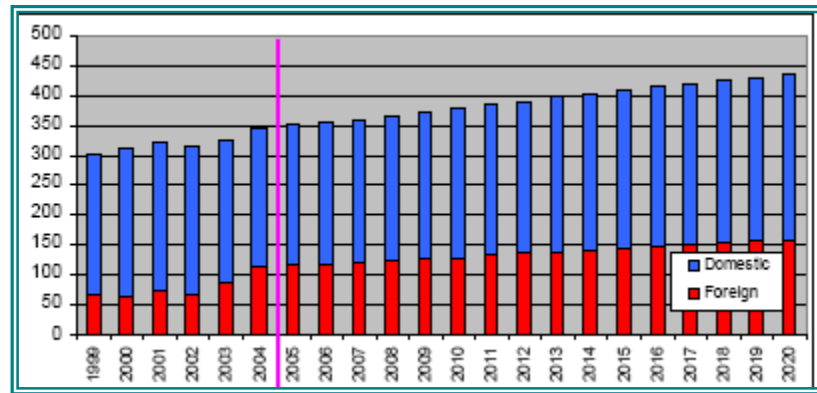
Petroleum Product Volume Projections. Total throughput volumes at Port Everglades, as presented in the P&G study, are forecast to grow from over a projected 350,000 barrels per day in 2005 to over 435,000 barrels per day by 2020. As shown in Figure 2.5-17, gasoline continues to be the leading product; however, due to a more rapid diesel demand growth, the percentage of the throughput attributed to gasoline falls slightly over the forecast period from over 54 percent of the total in 2004 to exactly 50 percent by 2020.

Figure 2.5-17
Port Everglades Petroleum Throughput Forecast
1999-2020
(Thousand Barrels per Day)
Source: P&G Study



Future Supply Patterns. As shown in Figure 2.5-18, the P&G study forecasts that an increasing percentage of the total supply to the Port Everglades market will be sourced from foreign locations. Port Everglades’ throughput of foreign supply accounted for nearly 10 percent of the total PADD I supply in 2004, up from just a 6 percent average from 2000 through 2002.

Figure 2.5-18
Forecast Domestic and Foreign Supply
1999-2020
(Thousand Barrels per Day)
Source: P&G Study



To estimate the future imports of specific products, P&G analyzes the capability of individual suppliers, taking into account their ability to meet the product specifications. Their conclusions are cited below:

The U.S. Gulf Coast is the major refining center in the U.S. Although refinery utilization in the U.S. has reached record rates and capacity is presently considered tight, future expansions that include planned, unannounced and creep capacity will occur to meet the growing petroleum product requirements. In meeting the Port’s market demand, domestic supply will remain a significant base load. Due to the availability of suitable quality and sufficient quantity of petroleum products from the U.S. Gulf Coast refiners to meet the Port’s growing requirements, reliance on this trade to meet a majority of the demand will continue.

Foreign supplies of various products will continue to increase. Latin America is a principal supplier of gasoline to the U.S. because of its proximity to the U.S. East Coast. Venezuela has a policy of maintaining refinery capacity in excess of local demand and is expected to continue to export to the U.S. The Virgin Islands is home to the HOVENSA⁹ refinery, which primarily supplies the joint venture partners of PDVSA and Hess with products for their marketing activities on the U.S. East Coast. Expansions at HOVENSA have occurred in recent years. Imports from Europe in aggregate are the largest source of gasoline imports to the U.S. and have steadily increased. An analysis of the refining industry balance in Europe indicates that an increase in exports can be expected over the forecast period.

⁹ HOVENSA is a joint venture between a subsidiary of the Hess Corporation and a subsidiary of Petroleos de Venezuela, S.A. (PDVSA), and operates a merchant refinery in St Croix, USVI. The facility has a crude oil processing capacity of 495,000 barrels per day, one of the largest in the world.

Future Vessel Calls. A wide range of U.S.- and foreign-owned vessels will continue to call at Port Everglades through 2020. These vessels will include both ocean-going tankers and ocean-going barges.

To establish the basis of vessel calls for facility planning purposes through 2020, the P&G study projects that the size characteristics of the four main vessel groups -- foreign tankers, U.S. Jones Act tankers, petroleum barges, and LPG barges -- will remain similar to that of the present fleet calling at the Port between 2000 and 2004, as discussed in Section 2.5.4. The “mix” of calls by these four vessel groups is, however, expected to change significantly in the future because of the impact of the Oil Pollution Act of 1990 (OPA 90) , which will result in the scrapping of Jones Act tankers, and the limited U.S. shipbuilding capacity to produce new Jones Act compliant tankers.

Foreign petroleum volumes are projected to increase from a four-year average of 25 percent of total throughput to 35 percent through the forecast period. As the total throughput of petroleum products grows and the percent supplied by foreign sources increases, the Port will likely see deeper-draft foreign tankers if future channel depth increases permit.

The foreign-owned tanker fleet calling on Port Everglades will comprise tankers mostly in the DWT range of Handymax 30,000 to 60,000 tonnes, with a distribution of smaller and larger vessels similar to the present vessel fleet. The U.S.-owned tanker fleet calling on Port Everglades will comprise tankers mostly in the DWT size range of Handymax 30,000 to 52,000 tonnes.

Figure 2.5-19 illustrates projected annual tanker calls through 2020. The number of foreign tanker calls will increase by nearly 29 percent from 2004 through 2020, due to the increasing petroleum product demand in the Port’s market and the OPA 90 impacts mentioned above. The U.S.-owned barges expected to call at the Port Everglades should range in size from 50,000 – 280,000 barrels, with a mean size of 160,000 to 180,000 barrels. The barge LOA will vary between 300 and 562 feet.

Figure 2.5-19
Annual Tanker Calls at Port Everglades
1999-2020
Source: P&G Study

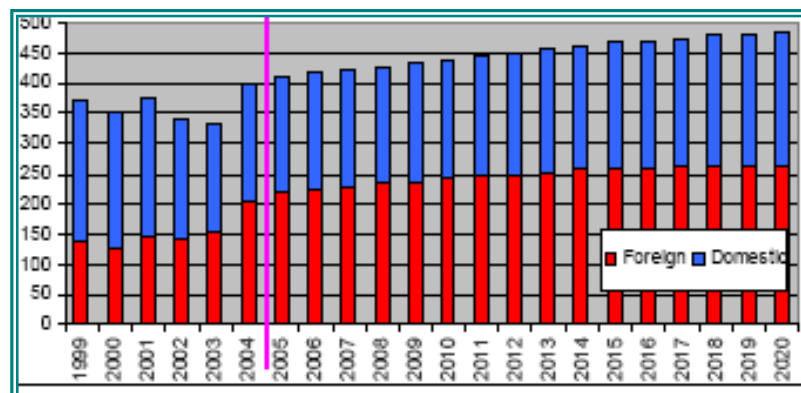
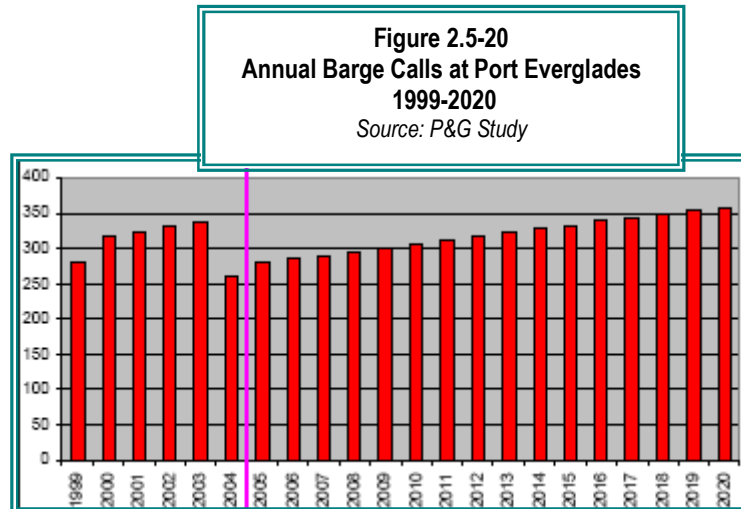
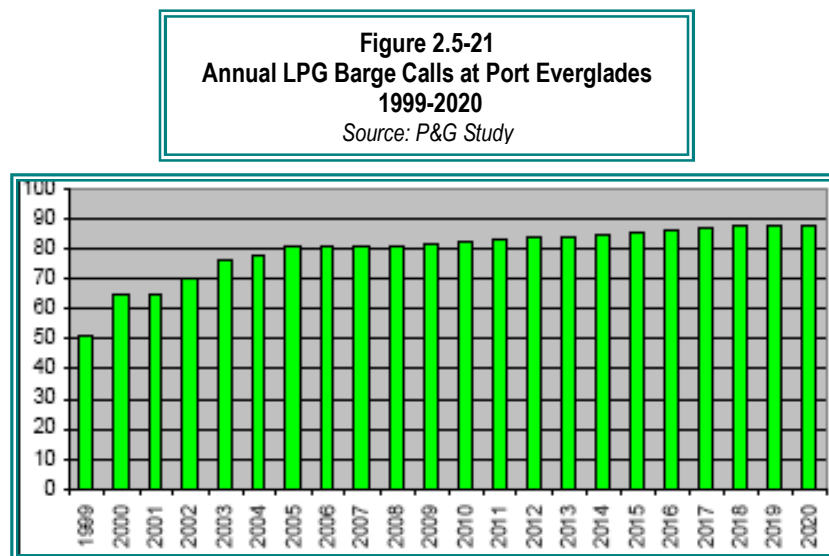


Figure 2-5.20 illustrates the projected number of barge calls per year. As shown, it is expected that calls by Jones Act barges should increase from a 260- to 275-range to nearly 360 by 2020, a 28 percent growth through 2020. Growth is primarily driven by increasing demand and the constrained future availability of Jones Act compliant product tankers.



LPG demand growth in the Florida market, primarily for home heating and cooking, makes the shipping and storage of this product an important consideration for Port Everglades. LPG barges are smaller than other petroleum product barges. The LPG barge fleet comprises seven dedicated barges in the range of 10,000 to 23,000 barrels. These barges are newer than the other product barges and, therefore, not subject to scrapping prior to 2020.

Figure 2.5-21 illustrates the projected number of annual calls for LPG movements at the Port. As shown, the number of LPG barge calls is expected to increase by 13 percent through 2020, due to the LPG demand growth.



2.5.7 Berth Utilization and Operational Enhancement Recommendations

The P&G study forecasts overall petroleum berth utilization to grow by 15 percent from 64 percent in 2004 to over 79 percent by the year 2020 if no changes to the Port's current facilities or no improvements in operating procedures are made. To cite the study:

The current utilization rate is already higher than desirable and can result in long delays following weather or berth outages. The current throughput projections suggest that berth occupancy will reach an overall annual average of 70 percent by 2010, a level that is generally considered unacceptable in the industry for long-term operation. This high level of utilization would be further exceeded during high demand periods or following weather-related delays during the year. Therefore, it is imperative that action be taken to implement improvements in the petroleum operations in the near term.

With the rapid growth in petroleum throughput at Port Everglades forecasted to keep pace with population growth and economic conditions, the P&G study suggests that enhancements in current operating practices and procedures be pursued in a timely manner. As these enhancements are discussed in detail in that study, they are just noted below for reference in this document.

- Performance stewardship.
- Vessel scheduling.
- Clearance and product testing.
- Operating unloading systems at higher pressure.
- Berth upgrades.

In addition to the operating practices and procedures recommended in the P&G study, several navigation and mooring improvements are also suggested to maintain continued safe operations. These relate to potential beam restrictions caused by the channel width and slip widths; fendering capacity to serve the larger tankers (an upgrade the Port has already undertaken); and possible mooring bollard upgrades and repositioning.

According to the P&G study, ideally, the present volume of petroleum throughput could be handled on three berths, if the berths were connected to all terminals and provided with larger arms and larger pipelines with higher operating/discharge pressure; and if clearance/gauging/sampling/testing procedures were improved. Four berths would, however, be required to handle the predicted higher future throughput prior to 2020.

Ideally, the berths should be designed to handle the full range of barges and tankers, be 1,000 feet long to accommodate vessels up to 800 LOA. The slip width should be based on handling

typical Panamax tankers up to 106-foot beam (with spot vessels up to 140 feet), and be dredged to 46 feet to accommodate vessels up to 44-foot draft.

2.5.8 Summary

Based on the findings of the P&G study, updated information through 2006, and interviews with Port tenants and senior staff, the Consultant Team has concluded the following about the petroleum industry at the Port:

- The percentage of vessel calls is shifting from barge to tanker, with more product coming from international sources.
- Tankers coming from international markets are larger than those from domestic sources.
- Existing petroleum berths are utilized to capacity.
- Fully loaded larger tankers can experience constraints (berth length, slip width, water depth).
- Emergency situations such as hurricanes during peak seasonal demand can stress tenants' storage and distribution capabilities.
- Both physical and operational enhancements are required to optimize the Port's petroleum throughput through the planning period.

These conclusions inform the 5-, 10-, and 20-year vision planning for the Port.