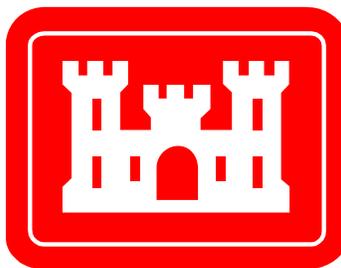


**LOWER PASSAIC RIVER  
COMMERCIAL NAVIGATION ANALYSIS**

United States Army Corps of Engineers  
New York District

Revised: December 29, 2008



**US Army Corps<sup>®</sup>  
of Engineers**

**LOWER PASSAIC RIVER RESTORATION PROJECT  
COMMERCIAL NAVIGATION ANALYSIS**

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**Lower Passaic River Commercial Navigation Analysis**  
**U.S. Army Corps of Engineers, New York District**  
**Revised December 29, 2008**

**1.0 Study Background and Authority**

The Lower Passaic River Restoration Project is an interagency effort to remediate and restore the complex ecosystem of the Lower Passaic River, which is a 17-mile tidally influenced river located in northern New Jersey. The Lower Passaic River is one of eight urban waterways that have been designated as pilot projects to demonstrate the planning and implementation of urban river cleanups and restoration as part of the Urban River Restoration Initiative (URRI) under both the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Water Resource Development Act (WRDA) authorities. This URRI program is a national initiative to foster cooperation between the U.S. Environmental Protection Agency (USEPA) and the U.S. Army Corps of Engineers (USACE) and is memorialized in a Memorandum of Understanding between these two agencies, which was signed in 2002 and renewed in 2005. The USACE component of this study was authorized in April 1999 by the U.S. House of Representatives, Committee on Transportation and Infrastructure, Docket Number 2596. The New Jersey Department of Transportation is the non-federal sponsor for the WRDA component of the Study.

**2.0 Study Purpose**

This document has been prepared to assist the New York District and other partner agencies in assessing the current status of commercial navigation on the Lower Passaic River. The draft of this report (March 2007) was presented in Appendix F in the Draft Source Control Early Action Focused Feasibility Study (USEPA, June 2007). The updated report utilizes information from two data sets obtained from the Institute for Water Resources' (IWR) publication, *Waterborne Commerce Statistics*. The first data set contains general information on commercial navigation trends over the period 1980 to 2006. The second dataset contains detailed information on the current uses of the waterway, berth by berth, for the most recent ten years available (1997-2006) to evaluate recent commercial use of the lower reaches of the Passaic River. *Waterborne Commerce Statistics* data is readily available through the IWR website.

**3.0 Location and Study Area Description**

The Lower Passaic River is the tidally influenced, lowest seventeen miles of the ninety mile Passaic River from Dundee Dam at River Mile (RM) 17 to the confluence with Newark Bay (RM 0.0). The Passaic River's authorized federal navigation channel, shown in Figures 1a and 1b, lies between the mouth of the river at the confluence with Newark Bay and the Eighth Street Bridge in Wallington, New Jersey (RM 15.4).

Most of the Lower Passaic River has been deepened as a result of various navigation projects. The federal navigation channel can be divided into segments based upon four different authorized depths. These segments include:

Figure 1a. Federal Navigation Channel (RMs 0.0-8.0)

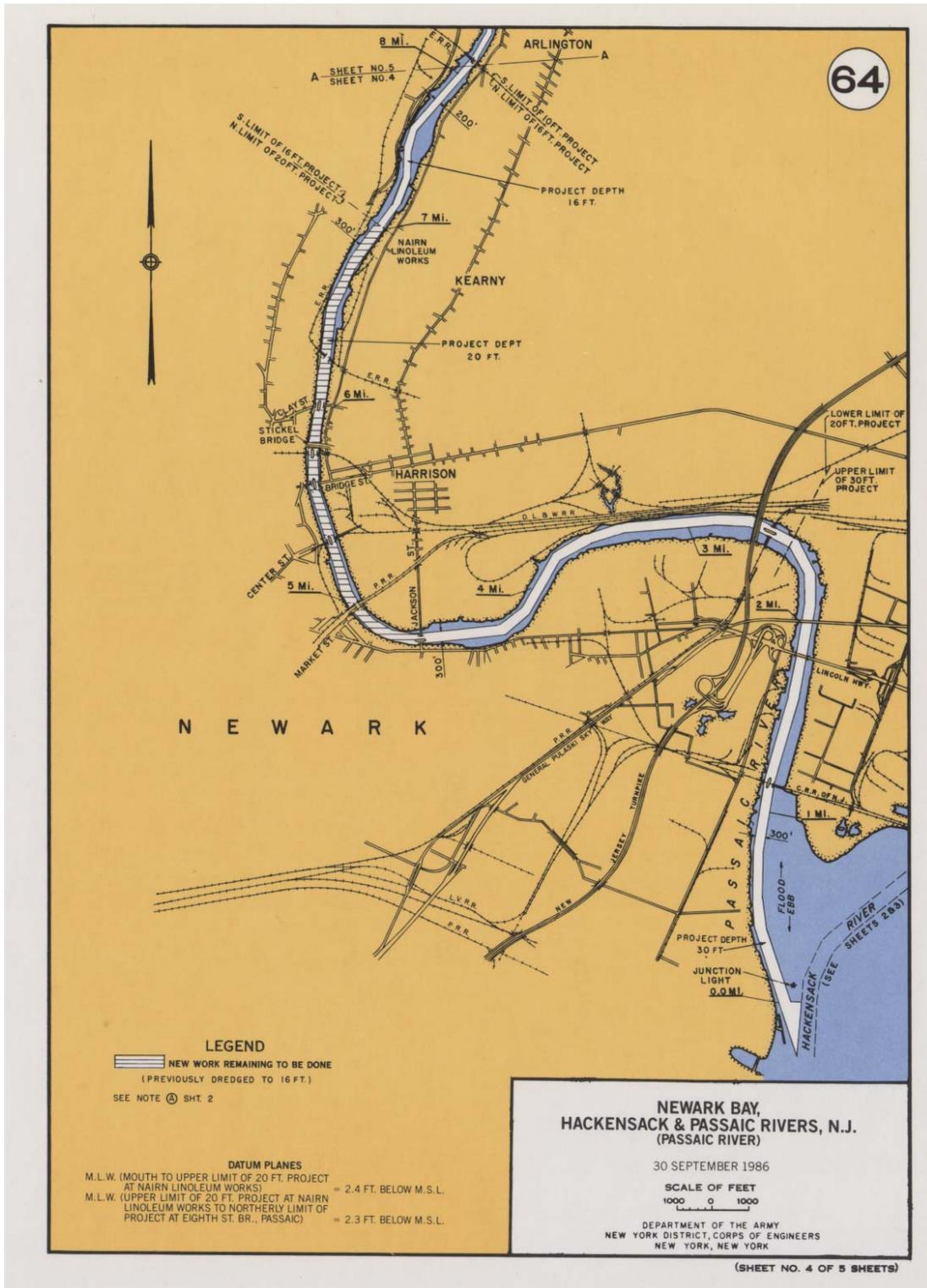
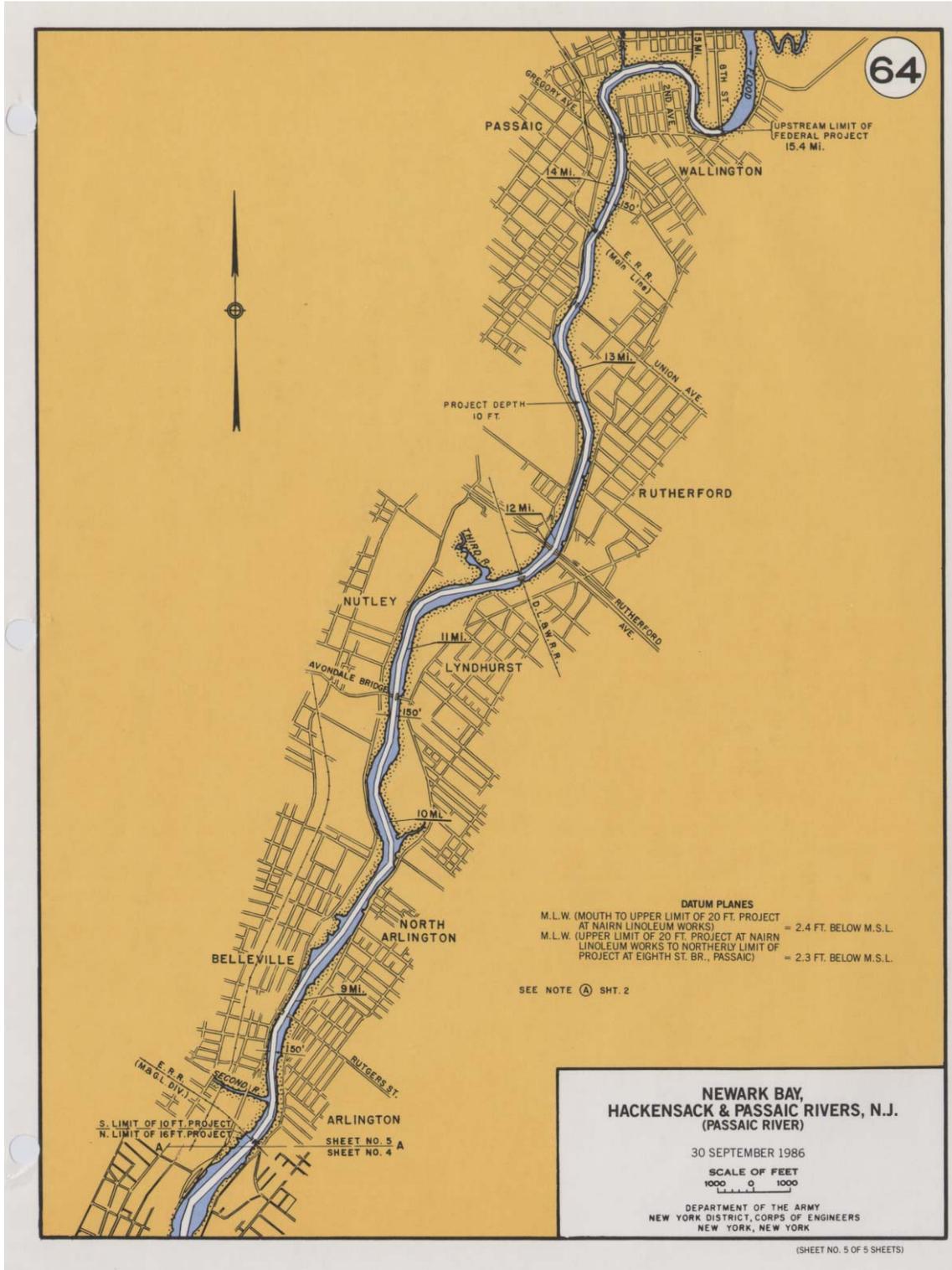


Figure 1b. Federal Navigation Channel (RMs 8.0-15.4)



- **30 foot segment:** From RM 0.0 upstream to RM 2.6 (Junction Light in the Newark Bay Turning Basin to the Point-No-Point Conrail Bridge) the channel has an authorized and constructed depth of 30 feet mean low water (MLW) and is 300 feet wide. The mean tidal range in this segment of the river is 5.5 feet.
- **20 foot segment:** From RM 2.6 upstream to RM 4.1 (Point-No-Point Conrail Bridge to Jackson Street Bridge in Harrison) the channel has an authorized and constructed depth of 20 feet MLW and is 300 feet wide. From RM 4.1 to RM 7.1 (Jackson Street Bridge in Harrison to the Nairn Linoleum Works facility in Kearny) the channel had an authorized depth of 20 feet MLW and is 300 feet wide; however, the project was only constructed to 16 feet MLW, and as of 1990 (see note below) is officially authorized to a depth of 16 feet.
- **16 foot segment:** From RM 7.2 to RM 8.1 (the Nairn Linoleum Works facility in Kearny to the Erie/Montclair and Greenwood Lake Railroad Bridge in Arlington) the channel has an authorized and constructed depth of 16 feet MLW and is 200 feet wide.
- **10 foot segment:** From RM 8.1 to 15.4 in Wallington, New Jersey, the channel has an authorized and constructed depth of 10 feet MLW and is 150 feet wide.

Land use along the Passaic River generally transitions from industrial uses closest to Newark Bay to park land further upstream. The 30 feet and 20 feet segments can best be characterized as fully industrially developed along the right descending bank of the river in Newark, where petroleum handling facilities are dominant in the lowest two miles. Further upstream in the Harrison reach, the left descending bank of the river is occupied by the railroad tracks of the Port Authority Trans Hudson (PATH) system and by an intermodal container-handling facility.

In the 16-foot to 10-foot segments, McCarter Highway continues north along the right bank. Both sides of the river just upstream of the Jackson Street Bridge (Figure 2) have recently been under construction. The right bank is dominated by McCarter Highway (NJ Rt. 21), and Joseph G. Minish Waterfront Park, a collaborative effort of the USACE, New Jersey Department of Environmental Protection (NJDEP) and the City of Newark. The left bank of the river is characterized by recreational park land, containing at least one small public marina and a few private docking facilities for recreational craft.

Further information on current and expected future land use patterns within the lower eight miles of the Passaic River have been compiled by NJDOT and are presented in Appendix F (NJDOT, 2007).

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Note: All uncompleted portions of the larger Newark Bay, Hackensack River, and Passaic River navigation project authorized prior to 1986 were deauthorized in 1990 (USACE-IWR, 1999). Therefore, the current authorized depth between RMs 4.1 and 7.1 is now 16 feet given deauthorization in 1990.

**Figure 2. Downstream View of Jackson Street Bridge and the City of Newark, May 2007.**



#### **4.0 Navigation & Maintenance Dredging History**

The Passaic River has been utilized primarily for commerce and industry for almost two centuries. The utility of the river for transportation accelerated the early development of the City of Newark and surrounding communities including Kearny, Harrison, Belleville and Nutley. The Passaic River was first used for sawmills and gristmills during colonial times, but soon after followed the industrialization and manufacturing that was first conceived in the City of Paterson's Great Falls area and later developed in the City of Newark. Newark's population boomed in the late 1700s with new jobs that came with a growing economy and the building of the first bridge over the Passaic River. Manufacturing in Newark, particularly shoemaking, grew rapidly from 1790 to 1850. The need for leather for shoemaking also brought the tanning industry to the banks of the Passaic River (Iannuzzi et. al., 2002).

Around the time of the Civil War, the Passaic also became a popular recreation destination for boating, rowing, swimming, fishing and ice skating. Post-Civil War times had a returned focus to industry on the river. Shortly thereafter, the Lower Passaic River was designated as a federal navigation channel, established to promote opportunities for cargo carrying commercial vessels on the river. The USACE first dredged the Passaic River for commercial navigation in 1874, initially only smaller areas on an as needed basis (Table 1: Dredging History). The first comprehensive dredging effort on the Passaic River was undertaken in 1884 to deepen the channel to ten feet from Newark Bay to the Pennsylvania Railroad Bridge at RM 5.0, removing about 165,000 cubic yards of dredged material. Another ten foot maintenance dredging project in 1899 was completed between RMs 1.9 and 5.4. In 1906, the channel from Newark Bay to the Nairn Linoleum Works at RM 6.5 was deepened to twelve feet and a ten foot channel was constructed from there to RM 8.0. Deepening and maintenance projects for commercial navigation in the new federal channel steadily increased over the first fifty years, from the initial construction of the channel in 1874 until the late 1920s.

**Table 1: Dredging History**

<b>Passaic River Reaches</b>	<b>Dredging History (<i>Iannuzzi, et. al. 2002</i>)</b>	
<p><b><u>Kearny Point Reach:</u></b> RM 0-1.2</p> <p>Authorized Depth: 30 feet</p>	<p>1884 – Constructed to 10 Feet 1906 – Deepened to 12 Feet 1913 – Deepened to 16 Feet 1914 – Deepened to 20-22 Feet 1916 – Maintained at 16-17 Feet 1917 – Maintained at 21-22 Feet 1921 – Maintained at 20 Feet 1932 – Constructed to 30 Feet 1933 – Maintained at 30 Feet 1941 – Maintained at 30 Feet</p>	<p>1946 – Maintained at 30 Feet 1951 – Maintained at 30 Feet 1957 – Maintained at 30 Feet 1962 – Maintained at 30 Feet 1965 – Maintained at 30 Feet 1971 – Maintained at 30 Feet 1972 – Maintained at 30 Feet 1977 – Maintained at 30 Feet 1983 – Maintained at 30 Feet</p>
<p><b><u>Point No Point Reach:</u></b> RM 1.2-2.5</p> <p>Authorized Depth: 30 feet</p>	<p>1884 – Constructed to 10 Feet 1899 – Maintained at 10 Feet (from RM 1.9) 1906 – Deepened to 12 Feet 1913 – Deepened to 16 Feet 1914 – Deepened to 20-22 Feet (to RM 1.9) 1916 – Maintained at 16-17 Feet 1917 – Maintained to 21-22 Feet (to RM 2.0) 1921 – Maintained at 20 Feet 1922 – Maintained at 20 Feet (from RM 1.4) 1932 – Constructed to 30 Feet 1933 – Maintained at 30 Feet</p>	<p>1941 – Maintained at 30 Feet 1946 – Maintained at 30 Feet 1951 – Maintained at 30 Feet (to RM 1.3) 1957 – Maintained at 30 Feet (to RM 2.1) 1965 – Maintained at 30 Feet (to RM 1.8) 1971 – Maintained at 30 Feet (to RM 1.5) 1972 – Maintained at 30 Feet (to RM 1.8) 1983 – Maintained at 30 Feet (to RM 1.9)</p>
<p><b><u>Harrison Reach:</u></b> RM 2.5-4.6</p> <p>Authorized Depth: 30 feet to RM 2.6</p> <p>Authorized Depth: 20 feet From RM 2.6</p>	<p>1884 – Constructed to 10 Feet 1899 – Maintained at 10 Feet 1906 – Deepened to 12 Feet 1913 – Deepened to 16 Feet 1916 – Maintained at 16-17 Feet 1916 – Deepened to 20-21 Feet (RM 2.6-4.5) 1921 – Maintained at 20 Feet 1922 – Maintained at 20 Feet (to RM 4.2) 1923 – Maintained at 20 Feet (RM 4.2-4.6) 1932 – Constructed to 30 Feet (to RM 2.6) 1937 – Maintained to 20 Feet (starting at RM 2.6)</p>	

**Table 1: Dredging History (Continued)**

<b>Passaic River Reaches</b>	<b>Dredging History (<i>Iannuzzi, et. al. 2002</i>)</b>
<p><u>Newark Reach:</u> RM 4.6-6.1</p> <p>Authorized Depth: 20 feet (Constructed Depth: 16 feet)</p>	<p>1884 – Constructed to 10 Feet (to RM 5.4) 1899 – Maintained at 10 Feet (to RM 5.4) 1906 – Deepened to 12 Feet 1913 – Deepened to 16 Feet (to RM 5.8) 1916 – Maintained at 16-17 Feet 1919 – Maintained at 16 Feet (starting at RM 4.6) 1933 – Maintained at 10 Feet (from RM 6.0) 1950 – Maintained at 16 Feet (from RM 5.5)</p>
<p><u>Kearny Reach:</u> RM 6.1-7.1</p> <p>Authorized Depth: 20 feet (Constructed Depth: 16 feet)</p>	<p>1883 – Constructed to 6 Feet 1906 – Deepened to 12 Feet (to RM 6.5) 1906 – Deepened to 12 Feet (from RM 6.5) 1913 – Deepened to 16 Feet (to RM 5.8) 1916 – Maintained/Deepened at 16-17 Feet 1919 – Maintained at 16 Feet (to RM 6.4) 1933 – Maintained at 16 Feet (to RM 6.3) 1950 – Maintained at 16 Feet (to RM 7.0)</p>
<p><u>Arlington Reach:</u> RM 7.1-8.1</p> <p>Authorized Depth: 16 feet</p>	<p>1883 – Constructed to 6 Feet 1906 – Deepened to 10 Feet (to RM 8.0) 1915 – Constructed to 6-7 Feet (from RM 8.0) 1916 – Deepened to 16-17 Feet (to RM 8.0) 1927 – Maintained to 6 Feet (from RM 8.0) 1929 – Maintained to 6 Feet (from RM 8.0) 1930 – Constructed to 10 Feet (from RM 8.0)</p>
<p><u>Belleville Reach:</u> RM 8.1-8.3 (Partial Reach)</p> <p>Authorized Depth: 16 feet</p>	<p>1915 – Constructed to 6-7 Feet 1927 – Maintained to 6 Feet 1929 – Maintained to 6 Feet 1930 – Constructed to 10 Feet 1931 – Maintained to 10 Feet 1932 – Maintained to 10 Feet</p>
<p><u>Above Erie/Montclair &amp; Greenwood Lake Railroad Bridge:</u> RM 8.3 – 15.4</p> <p>Authorized Depth: 10 feet</p>	<p>1915 – Constructed to 6-7 Feet (to RM 13.2) 1927 – Maintained to 6 Feet (to RM 9.0) 1929 – Maintained to 6 Feet (to RM 9.0) 1930 – Constructed to 10 Feet (to RM 9.0) 1931 – Maintained to 10 Feet (to RM 9.0) 1931 – Constructed to 10 Feet (RM 9.0 to 15.4) 1932 – Maintained to 10 Feet (to RM 15.4) 1950 – Maintained to 10 Feet (RM 14.3-15.4) 1976 – Maintained to 10 Feet (RM 9.0-10.2)</p>

By 1900 recreational activities were no longer feasible on the river due to the visibly apparent degradation in sanitary conditions (Iannuzzi et. al., 2002). In 1913, the channel was deepened from ten feet to sixteen feet from Newark Bay to the Morristown Line Bridge at RM 5.9. The following year in 1914, the lowest two miles of the river were deepened once more, but this time to twenty feet. These two projects, combined, removed over 5.5 million cubic yards of dredged material from the river. The project was extended upriver by deepening the channel to six feet

between RMs 8.0 and 13.2 in the City of Passaic in 1915. In 1916, the sixteen foot project was extended to RM 8.0 and the twenty foot project was extended to RM 4.5 near the Jackson Street Bridge. The twenty foot project between the Bay and RM 4.6 was maintained over the years 1921 to 1937. During this time, the health of the river was improved by the sanitary trunk sewer project which was completed in 1924 and spurred a brief return of recreational boating use on the river (Iannuzzi et.al., 2002).

The first thirty foot deepening project was constructed in 1932 from Newark Bay to RM 2.6, just above the Lincoln Highway Bridge (Figure 3), removing nearly 1.5 million cubic yards of material. A year prior, the ten foot project area was extended to its furthest point, from RM 8.0 to 15.4 at the Eighth Street Bridge. No further new construction was authorized after 1932 but the channel was regularly maintained for nearly fifty more years. The entire length of the new thirty foot project was first maintained in 1933, one year after construction, and again in 1941 and 1946. During the 1940s the river was busy with traffic as the height of industrialization and manufacturing industries on the Passaic River coincided with World War II. Post-war, the project was regularly maintained. However, maintenance typically focused only on the first mile or at times two miles. Portions of the thirty foot project were maintained in 1951, 1953, 1957, 1962, 1965, 1971, 1972, 1977 and 1983. The last maintenance dredging project was completed by USACE in 1983 when just over 500,000 cubic yards were removed from the lower 1.9 miles of the federal project area (Iannuzzi et al., 2002).

**Figure 3. View Upstream to the Lincoln Highway Bridge and the Pulaski Skyway, May 2007.**



Future maintenance dredging by the USACE would require economic justification of project costs to obtain federal funding. Economic analysis of maintenance dredging would be reevaluated in the future given changes in commercial usage and sediment conditions post-remediation. In addition, the decision to maintain the navigational channel would be further influenced by a commitment from the users to maintain their berths.

## **5.0 Physical Constraints including Bridges**

Bridges and dams are examples of constraints that may be obstacles to certain types of waterborne traffic. The dimensions and functionality of a bridge (lift, swing, etc) will restrict traffic that exceeds the available horizontal and vertical clearance. The commercially navigable

portion of the Lower Passaic River has fourteen bridges to be considered by commercial traffic traveling the river (Table 2). There are no berths located above the fourteenth bridge, the Erie/Montclair-Greenwood Lake Railroad Bridge. There are no locks on the Lower Passaic River and the first dam, Dundee Dam, is located upstream of the federal navigation channel.

**Table 2. Bridges on the Lower Passaic River.**

<b>Bridge Name</b>	<b>River Mile</b>	<b>Bridge Type</b>	<b>Maximum Horizontal Clearance</b>	<b>Maximum Vertical Clearance [Low Tide]</b>
<i>Point-No-Point Reach</i>				
Central Railroad of NJ (not in use)	1.2	Lift	145	NA
Lincoln Highway Bridge	1.85	Lift	300	45 (140) *
Pulaski Skyway	2.0	Fixed	520	140
<i>Harrison Reach</i>				
Point-No-Point Conrail	2.6	Swing	103	21
NJ Turnpike Bridge	2.7	Fixed	352	105
<i>Newark Reach</i>				
Jackson Street Bridge	4.6	Swing	72	20
Amtrak Dock Bridge	5.0	Lift	200	29 (143)
Penn RR at Market Street	5.0	Draw	75	21
Penn RR at Center Street	5.0	Draw	80	10
Bridge Street Bridge	5.7	Swing	80	12
Morristown Line RR Bridge	5.85	Swing	77	20
Stickel Bridge	5.9	Lift	200	40 (140)
<i>Kearny Reach</i>				
Clay Street Bridge	6.1	Swing	75	13
Fourth Ave Conrail Bridge	6.35	Bascule	126	12
<i>Arlington Reach</i>				
Erie/Montclair-Greenwood Lake RR Bridge	8.1	Swing	48	40

\* Vertical clearance in parentheses refers to clearance when the lift bridge is open.

NA: Not Applicable since bridge removed.

There are horizontal and vertical constraints within the Point No Point Reach. The abutments of a formerly utilized railroad freight bridge (Central Railroad of NJ) lie at approximately RM 1.2. These abutments limit channel width to 145 feet. However, NJDOT is currently investigating the feasibility of a new Lower Passaic River Bridge within the existing alignment of the former railroad freight bridge. If construction of the new bridge were to move forward, the derelict structure at RM 1.2 would be removed and would be replaced with a structure designed with adequate horizontal and vertical clearance for typical vessel traffic on the Lower Passaic River (Personal Communication, 2008a). At RM 2.6 the Point-No-Point Conrail Bridge (Figure 4)

limits vertical clearance to 16 feet at high water, requires four hours notice to open, and limits channel width to 103 feet.

Based on channel design guidance specifications (EM 1110-2-1613), safe navigation in the Lower Passaic River federal navigation channel recommends channel width to be three times the beam of the vessel for one-way traffic and five times the beam for two-way traffic. The Corps' design standards ensure that new construction will be safe for the transit of the design vessel, but do not, in and of themselves, prevent any vessel operator from employing any vessel in any manner or in any circumstance. As an example, if the recommended criteria were used, the largest vessel that could safely pass Kearny Point, beyond RM 1.2 (without removal of the abutment), would be a maximum of 48 feet in beam.

**Figure 4. View Upstream to the Point-No-Point Conrail Bridge & NJ Turnpike Bridge, May 2007.**



Another physical constraint that limits traffic would be the requirement that turning basins have a diameter of at least 1.2 times the length of the design ship and preferably 1.5 times the length of the ship. Therefore, the maximum length of vessel should not exceed 200 ft (up to RM 6.3 with authorized channel width of 300ft) and 130 ft in length (upstream of RM 6.3 with authorized channel width of 200 ft). This specification further limits the number of vessels that could use the Lower Passaic River.

If we assume the greatest depth vessel to reach or pass RM 2.5 (the upper limit of the thirty foot project) must draw 27 feet or less, assuming three feet of underkeel clearance, and have a beam of 45 feet or less, (34 feet or less beyond Point-No-Point) there are a number of inferences that can be drawn:

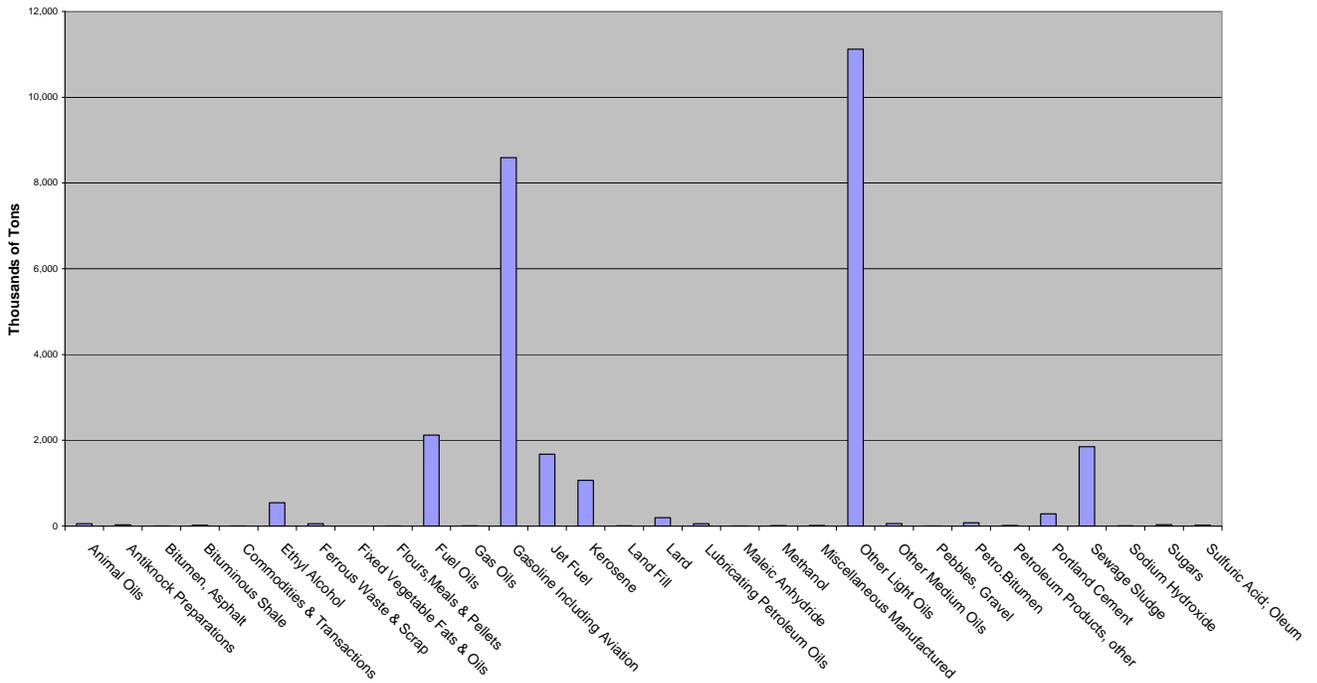
1) Of the three principal types of ocean-going cargo carrying vessels – containerships, car carriers, and bulk carriers – only bulk carriers could potentially be used efficiently on this waterway. This is because there are no vessels in the container fleet or the car carrying fleet that meet the dimensional requirements imposed by the configuration of the bridges and channel. Current use tends to confirm this constraint, as liquid and dry bulk tankers/barges are the only commercial vessels observed using the channel (see section 6.2 berth analysis). Car carriers or containerships would not be built with these smaller specifications as they do not allow for these vessels to operate in an economically efficient manner.

2) The number of bulk carriers/tankers that could be used is rapidly declining within the fleet because they cannot be operated in an economically efficient manner with such low payload. Interviews with barge operators in the area suggested that a tank barge with a 70-foot beam is considered small for efficient transport of fuel-based products. Unless intended for a specific physically-constrained waterway, a barge operator would not use or order a 70-foot beam vessel (which is at least two times the beam width of any vessel that could currently utilize the Passaic in a safe manner, even under one-way traffic conditions). Current fuel terminal operations use 60,000 barrel barges, which are light loaded, and therefore not being used optimally. Several fuel terminal operator has even decreased operations to use between 20,000 to 27,000 barrel barges.

## **6.0 Operational Information**

Despite competition from the more modern, easily accessible facilities of Ports Newark and Elizabeth, the Lower Passaic River, particularly within the Kearny Point Reach, has retained a niche of Petroleum commodity transportation. Of the estimated 28 million tons transported on the Passaic River over the most recent ten years (1997-2006), 11 million tons were classified as “other light oils from petroleum and bitum minerals.” Another 8.5 millions tons were classified as gasoline, while jet fuel and kerosene combined for another nearly 3 million tons. Another 2 million tons of fuel oil were also transported on the Lower Passaic River during 1997-2006. The major non-petroleum product transported during this time was an estimated 2 million tons of sewage sludge (Figure 5).

Figure 5. Commodities Transported, Lower Passaic River, 1997-2006

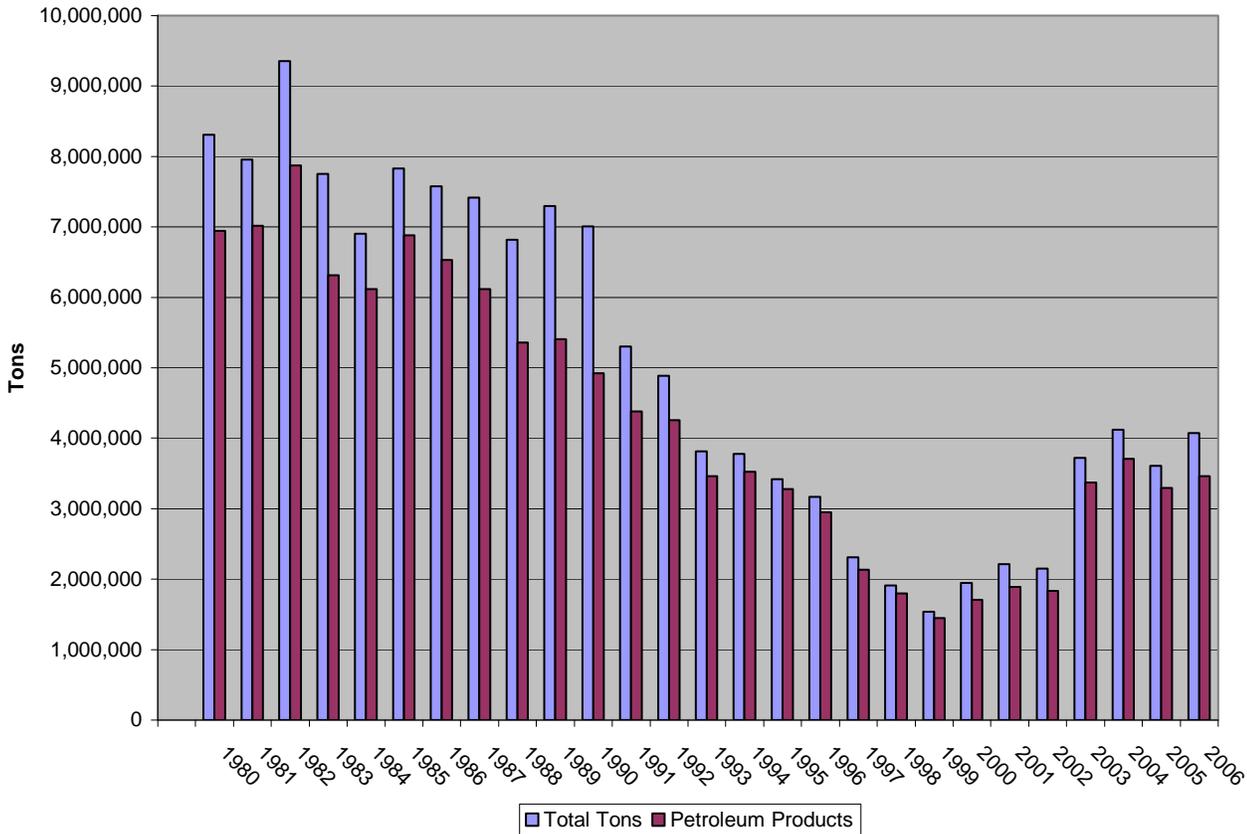


### 6.1 Summary Data for Commodity Flow, Trips and Drafts (1980-2006)

*Waterborne Commerce Statistics* reveal several interesting characteristics of the waterborne commerce conducted on the Passaic River over the period 1980 – 2006. For this period, three observations can be made.

- 1) From 1980 to 1999, the trend in the volume of commerce (measured in tons) was generally down, peaking at roughly 9.5 million tons in 1982 and reaching a trough of about 1.5 million tons in 1999. Since 1999, the volume of commerce has been rising, reaching just over 4 million tons in 2006 (Figure 6).
- 2) Throughout this period, the overwhelming bulk of this commerce consisted of petroleum and petroleum products. Over the last ten years petroleum and petroleum products have accounted for more than 90 percent of the total volume. The remainder is mostly sewage sludge (Figure 5).
- 3) Approximately 2/3 of this commerce is by vessels whose loaded draft is 13 feet or less; however, there are records of barges needing more depth, particularly for the petroleum facilities within the Kearny Point reach. Specifically, approximately 1/3 of the commerce needed greater than 13 feet ranging up to 27 feet (see specific berth usage in Section 6.2).

Figure 6. Petroleum Products as a Segment of Freight Traffic, Lower Passaic River, 1980-2006



Data collected by Essex County and Hudson County in 2004 indicate that a total of 384 bridge openings (representing a total of 48 round trips based on 4 bridges and 2 openings per round trip) were reported at the Jackson Street, Clay Street, Bridge Street and Avondale locations. In 2005, there were 230 bridge openings at the above locations. Bridge openings were limited due to necessary repair work. These bridges lie upstream of the Point-No-Point Conrail Bridge which, by virtue of its width constraints, limits vessel access upstream of that point. Therefore openings of the upstream bridges have little impact on the commercial navigation of the Passaic River.

### 6.2 Berth-by-Berth Analysis (1997-2006)

The purpose of the ten year berth-by-berth analysis was to describe the current state of commercial navigation on the Lower Passaic River. Detailed data was requested from USACE’s Institute for Water Resources (IWR), as the agency responsible for the data used in the *Waterborne Commerce Statistics* report. Another report produced by IWR is the *Port Series* report for The Port of New York, NY and NJ, and Ports on Long Island, NY (USACE-IWR, 1999), which describes all available berths by waterway in the larger port. Data requested from IWR included, for the most recent ten years available 1997-2006, all trips, drafts, commodities, vessel types for each berth in the Passaic River below Dundee Dam. Drafts described herein reflect the measured draft at the time of delivery, given the load, without consideration of underkeel clearance requirements as reported to IWR. Drafts of the vessels are dependent upon

bathymetric conditions and operational considerations. Operational considerations include market conditions, commerce flows, tidal restrictions, lightering and light-loading. Data provided to New York District for this analysis included approximately 4500 records for more than twenty berths located on the Lower Passaic River over those ten years. The data provided allowed for a qualitative description of total tons transported to and from each berth, vessels used, commodities transported, and range of drafts for the years 1997-2006. Berth locations are illustrated in the corresponding map in Figure 7. Berths are also described, reach by reach, below and in Tables 3 and 4.

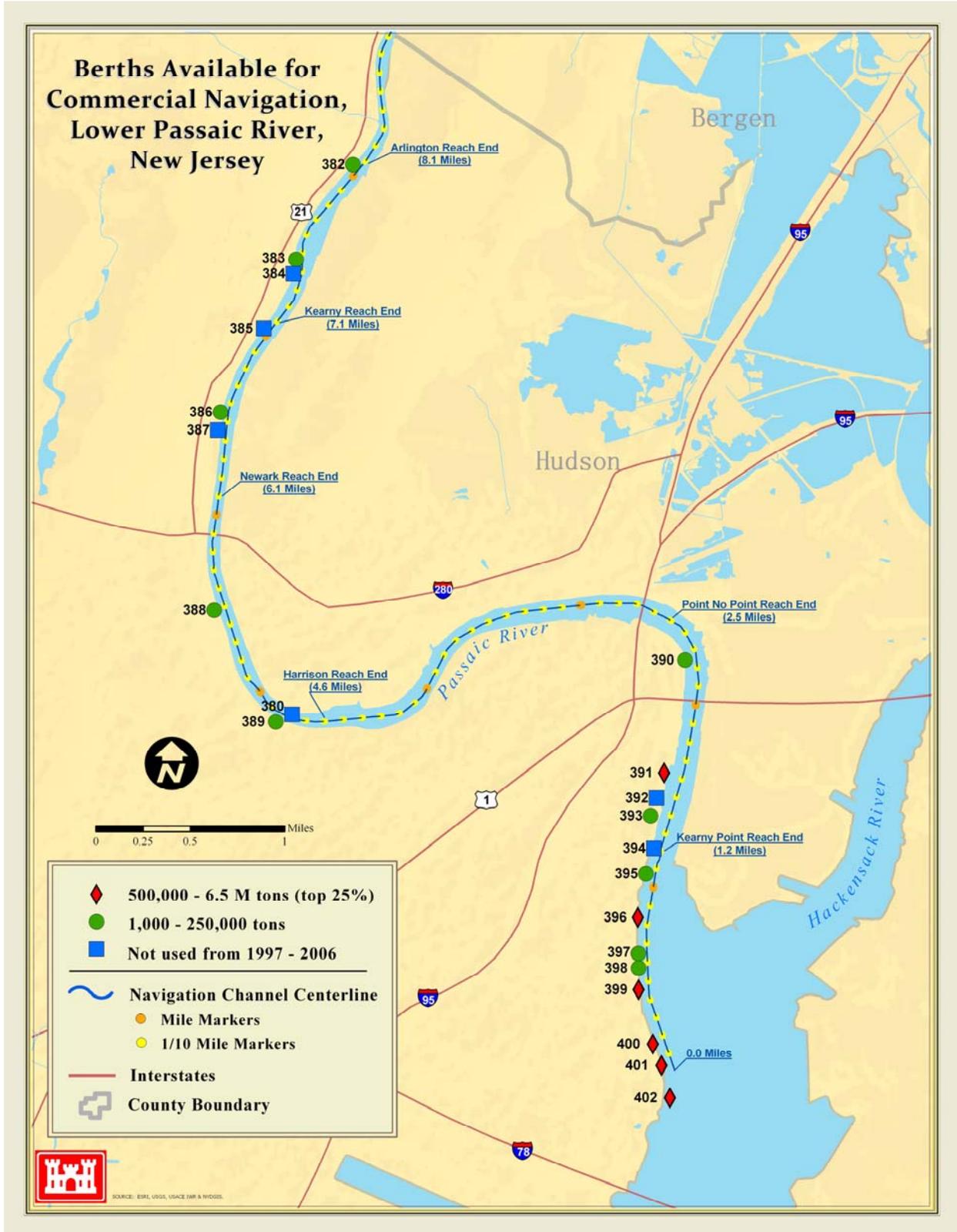
Kearny Point Reach – Newark Bay at RM 0.0 to RM 1.2:

The Port Series indicates eight berths are located within Kearny Point Reach between Newark Bay and RM 1.2. These berths include operations such as Amerada Hess Delancy Street Terminal, Cardolite Corporation, Darling International, Motiva Enterprises, Passaic Valley Sewerage Commissioners, Stratus Petroleum and Sun Company. These companies primarily transport petroleum and petroleum products.

The authorized and constructed depth of this reach is 30 feet. It is the busiest reach of the Lower Passaic River due to its conditions as the deepest and the most easily accessible. The channel width is 300 feet and no bridges restrict access to this reach. The 2008 Conditions Survey indicated that the minimum depth in the channel for vessels entering from seaward is 12.9 feet in the left outside quarter, 14.2 feet in the middle half and 10.8 feet in the right outside quarter (see USACE Operation's Division September 2008 Conditions Survey, Appendix 1). Depth within the channel ranged from 10 to 29 feet, with an average depth close to 19 feet.

**Motiva Enterprises** (#401) is the busiest berth in this reach, and in any part of the river, with an estimated 6.5 million tons passing over it during the period from 1997-2006. In any given year over that period, a minimum of 400,000 tons and a maximum of 1.1 million tons (in 2006) passed through the Motiva facility. The majority of trips to or from the Motiva Enterprises berth were made by vessels carrying gasoline (estimated 3 million tons), with a significant trips also made by vessels carrying jet fuel (estimated 1.5 million tons) or other light oils from petroleum and bitum minerals (estimated at another 1.5 million tons). Other commodities transported in lesser amounts included fuel oils, ethyl alcohol, antiknock preparations, kerosene, and other lubricating oils. Gasoline was transported to and from Motiva in liquid carrying barges, as were all of the other commodities transported. Liquid carrying barges loaded draft ranged up to 28 feet, but the vast majority of trips required less than 20 feet of water depth. Towboats using the berth drew as much as 18 feet.

Figure 7. Berths Available for Commercial Navigation (1997-2006)



**Table 3. Channel Reaches and Active Berths of the Lower Passaic River**

<b>Passaic River Reaches</b> (Aug 2008 Conditions Survey*)	<b>Existing Berths</b> (Port Series Data, USACE-IWR 1999)
<p><b>Kearny Point Reach:</b> RM 0-1.2            Authorized Depth: 30 feet            Controlling Depth: -14.2 feet            Average Depth: -18.9 feet            Range: -10.4 to -29.2 feet            Mode: -21.0 feet</p>	<p>#402 Amerada Hess, Delancy Street Terminal            #401 Motiva Enterprises            #400 Stratus Petroleum Corporation            #399 Passaic Valley Sewerage Commissioners Wharf            #398 Darling International            #397 Cardolite Corporation            #396 Sun Company            #395 General Chemical</p>
<p><b>Point No Point Reach:</b> RM 1.2-2.5            Authorized Depth: 30 feet            Controlling Depth: -4.0 feet            Average Depth: -14.6 feet            Range: +0.5 to -27.0 feet            Mode: -14.2 feet</p>	<p>#394 Nimco Shredding Company Wharf            #393 Blue Circle Cement            #392 Amerada Hess, Newark Terminal Wharf            #391 Getty Petroleum Marketing            #390 Public Service Electric &amp; Gas Co, Essex Generating Station Wharf</p>
<p><b>Harrison Reach:</b> RM 2.5-4.6            Authorized Depth:            30 ft to RM 2.6, 20 feet to RM 4.1            Controlling Depth: -3.7 feet            Average Depth: -12.3 feet            Range: +1.1 to -24.1 feet            Mode: -12.6 feet</p>	<p>No berths.</p>
<p><b>Newark Reach:</b> RM 4.6-6.1            Authorized/Constructed Depth: 20 ft/16 ft            Controlling Depth: -6.6 feet            Average Depth: -13.2 feet            Range: +5.6 to -22.6 feet            Mode: -12.4 feet</p>	<p>#389 City of Newark Municipal Dock            #388 Colonial Concrete Company            #380 Public Service Electric &amp; Gas Co, Harrison Gas Plant Wharf</p>
<p><b>Kearny Reach:</b> RM 6.1-7.1            Authorized/Constructed Depth: 20 ft/16 ft            Controlling Depth: -6.8 feet            Average Depth: -12.6 feet            Range: +1.5 to -20.9 feet            Mode: -13.6 feet</p>	<p>#387 Linde-Griffith Construction Company Wharf            #386 Passaic River Terminals            (Formerly W.A.S. Terminals Wharf)            #385 Napp-Grecco Company Wharf</p>
<p><b>Arlington Reach:</b> RM 7.1-8.1            Authorized Depth: 16 feet            Controlling Depth: -8.7 feet            Average Depth: -12.6 feet            Range: -0.1 to -19.6 feet            Mode: -12.0 feet</p>	<p>#384 Q Facility Petroleum Wharf            #383 Lionetti Oil Recovery Services Company Wharf            #382 Riverbank Petroleum Company Wharf</p>

\*Average Depth reflects the average of all recorded depths within the authorized channel by reach during the August 2008 Conditions Survey. Survey was conducted by NY District Operations Division in May 2008. Controlling Depth is the minimum observed depth in the middle half of the channel by reach. Range of depths show minimum, maximum and mode values for all recorded depths within the authorized channel. Depths are negative values, while positive values indicate a mudflat exists within the channel.

**Table 4: Most Active Berths, by Volume (tons) Transported on Lower Passaic River, 1997-2006**

Port Series #	Berth	Tons Transported (1997-2006)	Symbol
401	Motiva Enterprises	6,500,000	◆
391	Getty Petroleum Marketing	4,500,000	◆
402	Amerada Hess Corp., Delancy Street Terminal	3,600,000	◆
396	Sun Co.	2,900,000	◆
400	Stratus Petroleum Corp.	1,700,000	◆
399	Passaic Valley Sewerage Commissioners Wharf.	500,000	◆
393	Blue Circle Cement	250,000	●
389	City of Newark	200,000	●
386	Passaic River Terminal (Formerly W.A.S. Terminals Wharf).	150,000	●
398	Darling International	125,000	●
390	Public Service Electric & Gas Co., Essex	50,000	●
395	General Chemical	35,000	●
397	Cardolite Corp.	10,000	●
383	Lionetti Oil Recovery Services Co. Wharf.	2,500	●
382	Riverbank Petroleum Co. Wharf.	1,500	●
388	Colonial Concrete Co.	1,000	●
392	Amerada Hess, Newark Terminal Wharf	0	■
380	Public Service Electric and Gas Co., Harrison	0	■
384	Q Facility	0	■
385	Napp-Grecco Co. Wharf.	0	■
387	Linde-Griffith Construction Co. Wharf.	0	■
394	Nimco Shredding Co. Wharf.	0	■
<p>◆ = 500,000 - 6.5 M tons (top 25%)</p> <p>● = 1,000 – 250,000 tons</p> <p>■ = not used from 1997-2006</p>			

In 2007, Motiva was permitted by NJDEP Office of Dredging and Sediment Technology to dredge 4,000 cubic yards at their berth to a depth of 20 feet (plus two feet overdredge) below MLW (Personal Communication 2008k). Motiva had dredged their berth in December 2007, allowing vessels drawing 19.9 feet. Prior to December 2007, Motiva was limited to utilizing 20,000 barrel vessels. Since the dredging, Motiva is now capable of utilizing 40,000 barrel vessels (Personal Communication 2008b).

**Sun Company** (#396), also known as Sunoco, transported an estimated 3 million tons over the years 1997-2006, with a generally increasing trend over those ten years. Nearly all of the commodities transported through Sun Company's berth were classified as other light oils from petroleum and bitum minerals. Much smaller quantities of gasoline, kerosene, and fuel oils were also transported. The light oils were transported by tankers and liquid carrying barges. Tankers utilizing the berth at Sun Company drew between up to 18 feet and liquid carrying barges drew up to 24 feet with most needing only 20 feet or less. Towboats stopping here drew 18 feet or less. Sun was planning to dredge 6,654 cubic yards at their berth to a depth of 20 feet (plus two feet overdredge) below MLW in 2008 (Personal Communication 2008k).

**Stratus Petroleum** (#400) transported an estimated 1.7 million tons over the period 1997-2006, but the amount shipped per year has been declining to well under 100,000 tons in both 2005 and 2006. Trips show a decreasing trend at Stratus as well. The most commonly shipped commodity is other light oils from petroleum and bitum mineral (estimate 900,000 tons), followed by gasoline (estimated 700,000 tons). Other commodities included kerosene, fuel oils and ethyl alcohol. Tankers and liquid barges were used for the transport of these commodities. Tankers drafted up to 18 feet; liquid barges drafted up to 20 feet. Towboats using the berth drew up to 16 feet. Personal communication indicated that Stratus Petroleum's berth is limited to approximately 15 feet at low tide and must warn shipping lines prior to arrival of this restriction. Stratus has plans to rebuild their dock toward the channel in order to have access to greater water depths for their vessels (Personal Communication, 2008c). Stratus has a pending permit application to dredge 32,000 cubic yards from their berth to a depth of 22 feet (plus two feet overdredge) below MLW (Personal Communication 2008k).

**Amerada Hess' Delancy Street Terminal** (#402) has transported an estimated 3.6 million tons of petroleum from 1997 to 2006. Commodities shipped or received there included fuel oil, gasoline, kerosene, jet fuel, anti-knock preparations, ethyl alcohol, and other light oils from petroleum and bitum minerals. Vessels visiting this berth include liquid carrying barges, tankers and towboats. Drafts observed at this berth did not normally exceed 23 feet and were most frequently below 20 feet. A few tankers have drawn as much as 13 feet. A permit was issued in 2007 by NJDEP Office of Dredging and Sediment Technology for the removal of 10,000 cubic yards to a depth of 25 feet below MLW (Personal Communication 2008k).

Personal communication indicated that Amerada Hess dredged their berth to 24 feet in August 2007 after delays for almost 10 years. Prior to dredging in 2007, Hess could only load barges on an incoming tide. Recent soundings from June 2008, revealed that the current bathymetry within their berth is now 21 feet. Unfortunately, Hess now has to operate once again with tidal restrictions and has to light load shipments. At times, shipments are partially loaded at the

Delancy Street Terminal and are then filled to capacity at another terminal location outside the Lower Passaic River (Personal Communication, 2008d)

**Darling International** (#398) was one of the few berths specializing in liquid bulk, but not specifically in petroleum products. Darling's primary commodity over the period of 1997-2006 was transporting an estimated 75,000 tons of lard/rendered pig and poultry fat using tankers drawing about 19 to 25 feet. All of these trips were in 2005 and 2006. The second most transported commodity at Darling was the 35,000 tons of sewage sludge that passed through the facility in 1998. It was carried in liquid barges drawing about 17 feet. Other transported commodities included some fuel oils, gasoline, other animal fat products, lubricating oils, and sodium hydroxide. Most of the trips to and from Darling were made during the period between 2000 and 2006. A permit was issued in 2000 by NJDEP Office of Dredging and Sediment Technology for the removal of 22,000 cubic yards to a depth of 31 feet below MLW. This permit expired but a new permit was issued in 2005 and dredging of 21,000 cubic yards was performed to a depth of 31 feet below MLW (Personal Communication 2008k).

Personal communication indicated that Darling International has requested the channel and their berth to be deepened to the authorized and permitted depth of 30 ft, respectively. Darling has been restricted by shipping lines to utilize smaller vessels due to current depth constraints. Darling has also had to partially load shipments, followed by complete loading at Hudson Tank Terminal Corp located in Newark Bay (Personal Communication, 2008e).

**General Chemical** (#395) has mainly transported sulfuric acid/oleum during the period of 1997-2006 accounting for more than two-thirds of the total tonnage of all commodities shipped to or from that berth. The sulfuric acid/oleum has been transported roughly once per year until the last recorded trip of that commodity in 2003. It was transported using liquid tankers drawing twelve feet. Other products transported have included kerosene and, most recently, ethyl alcohol was shipped during one trip in 2006. The liquid barge used for that receipt drew 22 feet.

**Cardolite Corporation** (#397) did not regularly transport any commodities over the period 1997-2006, but did transport several shipments of "miscellaneous manufactured articles" in 2004 and 2005. The vessels used were dry cargo barges and did not require more than 4 feet of draft.

The **Passaic Valley Sewerage Commissioners (PVSC)** (#399) operates a berth within the Kearny Point reach of the Lower Passaic River. This berth was not as busy as some of the petroleum berths but has seen an increase in traffic over the period 1997-2006. From 1997 to 1999, the berth was used occasionally for the transportation of relatively small amounts of fuel oils. However, starting in 2000, the wharf was used more regularly for the transportation of sewage sludge. Transportation of sewage sludge increased steadily each year through 2006 for an estimated total of over 400,000 tons transported over the last seven years. Liquid barges using the berths have not drafted more than 16 feet. Personal communication between the USACE and PVSC has revealed that PVSC has recently been contracted to receive materials from the City of New York, which would have been transported using the City's own self-propelled tankers. However, these tankers need at least 25 feet, which is currently unavailable. Materials are instead transported on private barges hired by the City, which reportedly still need

to be light loaded significantly to be able to make the trip to PVSC's facility (Personal Communication, 2008f).

**Figure 8. Sunoco Berth in the Kearny Point Reach, September 2008**



Point No Point Reach – RM 1.2 to Pulaski Skyway at RM 2.5:

The *Port Series* reports five berths available in the Point No Point Reach of the Passaic River, located between RM 1.2 and the Pulaski Skyway at RM 2.5. These berths include Amerada Hess Newark Terminal Wharf, Blue Circle Cement, and Getty Petroleum Marketing.

The authorized and constructed depth of this reach is 30 feet and the constructed channel width is 300 feet. Two bridges cross the Passaic River in this reach, including the Lincoln Highway Bridge and the Pulaski Skyway. The Lincoln Highway Bridge is not vertically constraining when in the open position and provides 300 feet of horizontal clearance. The 2008 Conditions Survey reports that the minimum depth in the channel for vessels entering from seaward is +0.5 feet in the left outside quarter, 4.0 feet in the middle half and 8.6 feet in the right outside quarter (Appendix 1). Average depth in this reach is close to 15 feet with a range of mudflats (+0.5) to 27 feet deep.

**Amerada Hess' Newark Terminal Wharf** (#392) has been closed since 1993 (Personal Communication, 2008d).

**Getty Petroleum** (#391) operates another busy petroleum berth in the Point No Point Reach, transporting an estimated 4.5 million tons from 1997-2006. Getty Petroleum is ranked the second most active facility based on tonnage within the Lower Passaic River. Over that period, at least 250,000 tons were transported in each of the ten years, with one year estimated at about 600,000 tons. The majority of these trips were for the transportation of gasoline. Other commodities transported included fuel oils, kerosene, ethyl alcohol and other light oils from petroleum and bitum minerals. Getty's berth, relative to the other major petroleum operations on the Lower Passaic, is located furthest upstream of Newark Bay, at about RM 1.6. Commodities were transported to and from Getty in liquid carrying barges and tankers. The liquid carrying barges were used most often and drew up to 25 feet, but most commonly drew less than 16 feet.

The tankers ranged in draft up to 17 feet. Towboats also utilized the berth, drawing between 8 and 18 feet.

Personal communication with Getty Petroleum has indicated that historically (15 to 17 years ago), the facility received shipments carrying 50,000 barrels of gasoline and ethanol, but now can only receive smaller shipments of 20,000 to 27,000 barrels due to current depth restrictions. The facility could bring in much larger barges in the absence of current depth restrictions. The facility has two operable berths (one located between RMs 1.6 and 1.7) and the active current berth between RM 1.5 and 1.6) The upstream berth which is over 300 ft in length was historically used over 20 years ago for larger vessels. There would be plans to use this berth in the future given the opportunity. Currently, vessels are light loaded and must enter the channel under operational restrictions during high tide only (Personal Communications, 2008g).

The berth operated by **Blue Circle Cement** (#393) was used for the transportation of two types of commodities from 1997-2006: 1) pebbles, gravel or crushed stone; and 2) Portland, aluminous, slag, or supersulfate cement. From 1997 through 2006, it is estimated that less than 250,000 tons was transported. Dry cargo ships and towboats utilized this berth with the draft generally ranging between 10 and 16 feet.

Neither **Nimco Shredding** (#394) nor **PSE&G Co., Essex Generating Station Wharf** (#390) were regularly used for commercial navigation over the period 1997 to 2006.

**POTENTIAL FUTURE USE: Disch Construction** has recently leased (from Getty Petroleum at RM 1.7 to Harrison Creek) and purchased (upstream of Harrison Creek to RM 1.9) the waterfront property from Quality Carriers. Disch Construction is in the process of obtaining permits from NJDEP's Division of Land Use Regulation and the Tidelands Council. Disch plans to utilize their dock to transport empty and fully loaded scows of dredged material to minimize delays while waiting for a berth at dredged material processing facilities (solidification/stabilization) for the Harbor Navigational dredging program. Fully loaded barges brought to the facility could have a maximum of 16 ft draft and would potentially need a navigational channel with water depth of approximately 18 ft (Personal Communication, 2008h)..

**POTENTIAL FUTURE USE: Clean Earth's New Jersey (CENJ)** site is approximately 5.5 acres located on 115 Jacobus Avenue, S. Kearny, NJ at about RM 2.1 to 2.3. CENJ has adjacent property leased for an additional 8.25 acres. This site is currently an approved hazardous and solid waste storage, treatment and transfer facility that is served by truck and rail. Clean Earth is in the process of expanding to include the purchase or lease of an additional adjacent 15.5 acre site. Clean Earth is planning to develop the site including limited dredging and bulkheading of 780 feet to receive barges. The new site will operate as a treatment, storage, recycling and transfer facility concept: hazwaste, dredged material, multimodal trans-shipment facility. The combined property will be approximately 29.25 acres of uplands with over 780 feet of waterfront access. The site will have multi-modal capability including barge, truck and rail access. Current proposed operations will involve up to 4 barge trips per day, 6 days per week (1250 barge trips per year). Clean Earth will require controlling depth of 18 feet below water level at its dock plus

under keel clearance of 3 feet for a total required depth of 21 feet below water level (Personal Communication, 2008i).

Harrison Reach – Pulaski Skyway at RM 2.5 to Jackson Street Bridge at RM 4.6:

The Harrison reach is described as the area from a point 600 feet seaward of the Pulaski Skyway to the Jackson Street Bridge at RM 4.6. According to *Port Series* data, no berths for commercial navigation exist in the Harrison reach of the Lower Passaic River.

Channel depth in this 1.87 nautical mile reach was authorized and constructed to 20 feet, with the exception of RM 4.1 to 4.6 where the channel was authorized to 20 feet, constructed to 16 feet, and in 1990 authorized to 16 feet. The constructed channel width is 300 feet. Bridges located within the Harrison reach include the New Jersey Turnpike Bridge and the Point-No-Point Conrail Bridge. Of these, only the Conrail Bridge is constraining river traffic because this swing type bridge only allows for 103 feet of horizontal clearance and 21 feet of vertical clearance at low tide. Vertical clearance is not constraining when the Conrail swing bridge is open; however, width is still quite constrained at this bridge when it is open. The NJ Turnpike Bridge, with 105 feet of vertical clearance and 352 feet of horizontal clearance, does not constrain current river traffic. The 2008 Conditions Survey indicates that the minimum depth in the channel for vessels entering from seaward is +0.7 feet in the left outside quarter, 3.7 feet in the middle half and 0.7 feet in the right outside quarter (Appendix 1). Average depth in this reach is close to 13 feet and depths within the authorized channel range from mudflats (+1.1) to 24 feet deep.

Newark Reach – Jackson Street Bridge at RM 4.6 to Clay Street Bridge at RM 6.1:

The Newark Reach is located between the Jackson Street Bridge and the Clay Street Bridge located at RM 6.1. The *Port Series* reports three berths within the Newark Reach, including the City of Newark Municipal Dock, Colonial Concrete Company, and PSE&G Co.'s Harrison Gas Plant Wharf.

The former authorized depth in this reach was 20 feet, but was only constructed to 16 feet. In 1990 the authorized depth was changed to 16 feet. The constructed channel width is 300 feet in this 1.3 nautical mile stretch of the Lower Passaic River. This portion of the river is severely constrained by seven bridges, including Jackson Street Bridge, an Amtrak bridge, two Pennsylvania Railroad bridges, Bridge Street Bridge, NJ Transit's Morristown Line Bridge and the Stickel Bridge for Interstate 280 (Table 2). The Jackson Street Bridge, Bridge Street Bridge and three of the railroad bridges in this reach all provide a little more than 70 feet of horizontal clearance. Any vessel requiring vertical clearance greater than 12 feet will necessitate time consuming bridge openings. The 2008 Conditions Survey indicates that the minimum depth in the channel for vessels entering from seaward is +0.3 feet in the left outside quarter, 6.6 feet in the middle half and +0.7 feet in the right outside quarter (Appendix 1). Average depth in this reach is 13 feet and depths range from mudflats (+5.6) to 23 feet deep.

Neither **Colonial Concrete Company** (#388) nor **PSE&G Co.'s Harrison Gas Plant Wharf** (#380) were used for commercial navigation over the period 1997 to 2006. However, Colonial Concrete received 1,000 tons of pebbles, crushed stone, and gravel in 2002. The **City of Newark Municipal Dock** (#389) has been used occasionally over the period 1997 to 2006. In that time, an estimated 200,000 tons were transported using this berth, the majority of which was

light oils from petroleum or bitum minerals. Lesser amounts of gasoline, fuel oils and ethyl alcohol were also transported from the City of Newark Municipal Dock.

Kearny Reach – Clay Street Bridge at RM 6.1 to Nairn Linoleum at RM 7.1:

The Kearny reach is described as being located between Clay Street Bridge at RM 6.1 and the Nairn Linoleum Works at RM 7.1. The *Port Series* indicates three berths available for commercial navigation within the Kearny Reach of the Lower Passaic River, including the Linde-Griffith Construction Company Wharf, Napp-Grecco Company Wharf and W.A.S. Terminals Wharf. Neither **Linde-Griffith Construction** (#387) nor the **Napp-Grecco Company** berths (#385) were used for commercial navigation over the period 1997 to 2006.

The former authorized depth in this reach was 20 feet, but the channel was never constructed deeper than 16 feet. In 1990 the authorized depth was changed to 16 feet. The constructed channel width is 300 feet in 0.9 nautical miles of river. Only the Clay Street Bridge, with only 75 feet of horizontal clearance constrains river traffic in this reach. Also, when this swing bridge is not open, vertical clearance at low tide is limited to 13 feet. The 2008 Conditions Survey indicates that the minimum depth in the channel for vessels entering from seaward is +0.7 feet in the left outside quarter, 6.8 feet in the middle half and +0.7 feet in the right outside quarter (Appendix 1). Average depth in this reach is nearly 13 feet with depths within the authorized channel ranging from mudflats (+1.5) to 21 feet deep.

**W.A.S. Terminals Wharf** (#386) was used until 2001 for the transportation of fuel oils. An estimated 130,000 tons of fuel oil was transported through W.A.S. from 1999 to 2001 using liquid carrying barges. W.A.S. was sold in 2006 to **Passaic River Terminals**. Starting in Fall 2008, Passaic River Terminals is now barging petroleum products, including biofuels and diesel, in 10 to 20,000 barrel barges. They plan to transport about 40 million gallons per year or just under 150,000 tons (Personal Communication, 2008j). On 3 December 2008, **Innovation Fuels** transported about 14,280 barrels (or nearly 600,000 gallons) of biodiesel at Passaic River Terminals berth using a barge that drafted ten feet with that load. The barge used has a 50 foot beam, was 236 feet long, had a maximum draft of 14.6 feet and a maximum carrying capacity of 23,500 barrels (Personal Communication, 2008l).



**Figure 9.**  
**Barge Cold Spring Harbor transporting Biodiesel Fuel from the Passaic River Terminals berth, December 2008.**

### Arlington Reach – Nairn Linoleum at RM 7.1 to Erie Railroad Bridge at RM 8.1:

The Arlington Reach is described as the Lower Passaic River between the Nairn Linoleum Works at RM 6.3 and the Erie Railroad Bridge at RM 7.2. The *Port Series* reports three berths within the Arlington Reach, including Lionetti Oils Recovery Services Company Wharf, Q Facility Petroleum Wharf, and Riverbank Petroleum Company Wharf.

The authorized and constructed depth in this reach is 16 feet. The river narrows here with a constructed channel ranging from 200-250 feet wide over 0.9 nautical miles. Two railroad bridges are located in the Arlington reach of the Passaic, one of which is an unused bascule style bridge permanently left in the up position. The second is the Erie Montclair-Greenwood Lake Railroad swing bridge, located further upstream in the reach and also constraining with only 48 feet of horizontal clearance and 40 feet of vertical clearance at low tide. More bridges, including the recently reconstructed lift style bridge for Rutgers Street/Route 7 (locally known as the Bellville Turnpike), are located upstream of the rail bridge but no active berths are located above Erie Montclair-Greenwood Lake Railroad swing bridge. The 2008 Conditions Survey indicates that the minimum depth in the channel for vessels entering from seaward is 6.6 feet in the left outside quarter, 8.7 feet in the middle half and 0.1 feet in the right outside quarter (Appendix 1). Average depth in this reach is nearly 13 feet, with depths within the authorized channel ranging from approximately 0 to 20 feet deep.

**Q Facility Petroleum Wharf (#384)** was not used for commercial navigation over the period 1997 to 2006. **Lionetti Oils Recovery Services Company Wharf (#383)** had one receipt of gasoline under 3,000 tons in 2005 and **Riverbank Petroleum Company Wharf (#382)** had one shipment of under 2,000 tons of fuel oils in 1997.

## **7.0 Conclusions**

The commercial navigational analysis utilized data from the *Waterborne Commerce Statistics* for navigation trends over the period of 1980 to 2006 and detailed berth usage for 1997 through 2006. This evaluation concluded that commercial navigation on the Lower Passaic River is constrained by several factors. The most significant of these factors are the channel dimensions of the river. Channel depth, for the last 25 years, has been constrained by accretion from the natural siltation process in the system combined with a lack of maintenance dredging. Although not discussed in detail herein, the presence of more modern, larger, and more accessible facilities in Newark Bay, on the Kill Van Kull, and on the Arthur Kill are also known to be a factor influencing commerce on the Lower Passaic River. How those facilities will impact commerce has not been evaluated and, as competition for capacity continues throughout the larger Port of New York and New Jersey, Passaic River berths could be considered as a location for expansion of capacity.

Horizontal and vertical clearance from bridge structures presents an additional constraint to navigation in the Lower Passaic River. The presence of the derelict former railroad freight bridge (RM 1.2) and Point-No-Point Railroad Conrail Bridge (RM 2.6) restrict width of the channel by 145 and 103 feet, respectively. However, NJDOT is investigating construction of a new Lower Passaic River Bridge, which would result in the removal of the former freight bridge structure, thereby removing any width restrictions within the Point No Point Reach. In addition,

the channel is 300 feet at its widest location, which currently would restrict the turning radius of larger vessels.

Despite formidable challenges, the Lower Passaic River has established a niche for the transportation of petroleum products to or from major facilities, including those of Motiva Enterprises, Amerada Hess, Sun Company, Status Petroleum, and Getty Petroleum (among others), which are all located below RM 1.7. The findings of the Berth-by-Berth analysis for the period 1997 to 2006 have been summarized in Table 5 showing vessel drafts and tonnage for berths in the lower two miles. Commercial navigation within the Kearny Point and Point-No-Point Reaches of the Passaic River have been most successful for these commodities due to accommodating channel depth, width and absence of bridges restricting passage to Petroleum berths. There is also a potential future use for dredged material management facilities up to RM 2.3 and recent (December 2008) transport of biodiesel to Passaic River Terminals up to RM 6.5.

**Table 5. Summary of Berth-by-Berth Analysis, below RM 2.0, 1997-2006.**

Berth	River Mile	Max. Drafts Observed	Total Tonnage (1997-2006)
Amerada Hess	0.0	23 feet (33 feet*)	3,600,000
Motiva Enterprises	0.0	23 feet (28 feet*)	6,500,000
Stratus Petroleum	0.1	19 feet (21 feet*)	1,700,000
PVSC	0.4	16 feet	500,000
Darling International	0.6	26 feet (34 feet**)	125,000
Cardolite Corp	0.7	4 feet (8 feet**)	10,000
Sun Company	0.9	20 feet (26 feet*)	2,900,000
General Chemical	1.1	15 feet (22 feet**)	35,000
Blue Circle Cement	1.4	18 feet (26 feet*)	250,000
Getty Petroleum	1.6-1.7	20 feet (25 feet*)	4,500,000
<p>* Drafts presented here parenthetically were reported to Waterborne Commerce Statistics but appear to be outliers and represent less than 1% of all trips recorded over the period 1997-2006.</p> <p>** These drafts represent less than 5% of all trips recorded over the period 1997-2006.</p>			

Future maintenance dredging by USACE is subject to receipt of funding through the federal appropriation process. This project would be competing for funds with other projects nationally, with priority for funding given to projects that provide the greatest benefits relative to the cost of maintenance. The decision to maintain the navigational channel would also be influenced by the commitment from the terminal operators to maintain their berths.

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**Appendix 1. May 2008  
USACE, Operations Division Conditions Survey**

**REPORT OF CHANNEL CONDITIONS  
100 TO 400 FEET WIDE  
(ER 1130-2-306)**

**PAGE** 1 **OF** 1

**DATE** August 6, 2008

**TO:** The Record

**FROM:**  
U.S. Army Corps of Engineers  
26 Federal Plaza, ATTN: CENAN-OP-ST  
New York, NY 10278-0090

**RIVER/HARBOR NAME AND STATE:**  
Newark Bay, Hackensack and Passaic Rivers – Passaic River, New Jersey

**MINIMUM DEPTHS IN  
CHANNEL ENTERING FROM  
SEAWARD**

NAME OF CHANNEL	DATE OF SURVEY	AUTHORIZED PROJECT			LEFT OUTSIDE QUARTER (feet)	MIDDLE HALF (feet)	RIGHT OUTSIDE QUARTER (feet)
		WIDTH (feet)	LENGTH (nmiles)	DEPTH (feet)			
<b>Reach A:</b> Kearny Pt. Reach Begins at the junction between the Hackensack and Passaic Rivers at a point approximately 2,250 feet seaward of RED LIGHT #2 to a point approximately 1,900 feet landward of RED #4.	Map 891 Pg 1 thru 2 of 14; 5 - 8, 23 & 27 May 2008	300	1.01	30	12.9	14.2	10.8
<b>Reach B:</b> Point No Point Reach From a point approximately 1,900 feet landward of RED #4 to a point approximately 600 feet seaward of the GENERAL PULASKI SKY WAY.	Map 891 Pg 2 thru 5 of 14; 5 - 8, 23 & 27 May 2008	300	1.13	30	+0.5	4.0	8.6
<b>Reach C:</b> Harrison Reach From a point approximately 600 feet seaward of the GENERAL PULASKI SKY WAY to a point at JACKSON ST BRIDGE in Harrison, NJ.	Map 891 Pg 5 thru 8 of 14; 5 - 8, 23 & 27 May 2008	300	1.87	20	+0.7	3.7	0.7
<b>Reach D:</b> Newark Reach From a point at JACKSON ST BRIDGE in Harrison, NJ to a point at CLAY ST BRIDGE in Newark, NJ.	Map 891 Pg 8 thru 11 of 14; 5 - 8, 23 & 27 May 2008	300	1.28	20*	+0.3	6.6	+0.7
<b>Reach E:</b> Kearny Reach From a point at CLAY ST BRIDGE in Newark, NJ to a point where the river narrows to 200 feet wide and the project depth becomes 16 feet at Nairn Linoleum Works.	Map 891 Pg 11 thru 13 of 14; 5 - 8, 23 & 27 May 2008	300	0.85	20*	+0.7	6.8	+0.7
<b>Reach F:</b> Arlington Reach From a point where the river narrows to 200 feet wide and the project depth becomes 16 feet at Nairn Linoleum Works to a point at the E.R.R. BRIDGE in Arlington, NJ.	Map 891 Pg 13 thru 14 of 14; 5 - 8, 23 & 27 May 2008	200 – 250	0.89	16	6.6	8.7	0.1
<b>Partial Reach G:</b> Belleville Reach From a point the E.R.R. BRIDGE in Arlington, NJ to a point approximately 1,000 feet landward of the start of this Reach G.	Map 891 Pg 14 of 14; 5 - 8, 23 & 27 May 2008	235 – 205	0.16	10	+0.8	2.9	10.7

**REMARKS:**

- All depths in Mean Low Water (MLW).
- Channel length is in nautical miles.

**PASSAIC RIVER**

- **All Reaches:** Shoaling occupies the entire length and width of all channel reaches described above. Authorized project depths are available only in a few isolated areas.

\* Reaches D & E were never completed to a 20 foot depth. Previous dredging was to 16 feet only.