ANALYSIS OF RECENT VESSEL TRAFFIC IN THE CHICAGO RIVER

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Chicago Department of Transportation, in planning for the development of a Riverwalk along the Main Branch of the Chicago River, is in the process of evaluating the traffic conditions of vessel that travel through that area. This report is designed to provide information on the recent history of vessel types and quantities that may be affected by this development. The major effort in this analysis focuses on the Main Branch up to and including the confluence of the North, South and Main Branches of the Chicago River at Wolf Point.

While overall traffic increased up through the early nineties, the trend has been fairly level, at least as far as total traffic passing through the Chicago Lock. Since 1995 there has been an average of a little more than 54,000 vessels going through this lock each year. (This includes traffic in both directions, since the concern is for total traffic). Approximately 70 percent of these transits were recreational and 24 percent, commercial vessels. Of the remaining six percent, less than one percent were tow/tug combinations.

Since 1997, there has been a slight increase in the number of recreational and commercial vessels traveling through the Main Branch. The greatest increase was in the Commercial category. This is due to an increase in the number of tour boat trips that originate within the Main Branch. About 25 percent of these boats never enter the locks but remain within the Chicago River system. In addition, the recent introduction of gondolas and "Riverbikes" has contributed to this growth. There is no strong evidence that recreational boating will increase significantly in the near future, but the development of more marinas on the North and South Branches may change this.

Cargo tonnage has increased significantly since 1997, as has the number of barges carrying that cargo. In 1997 about 150 barges passed into the Main Branch on their way to or from the Chicago Lock. By 1999 that number had doubled. While this is a dramatic increase in percentage, the actual number of barges in the river system remains small by comparison. The largest barge, carrying petroleum products, enters the Main Branch from Lake Michigan only four or, at most, 6 times per year. Also, a significant

amount of barge traffic passes by Wolf Point traveling on the North and South Branches without entering the Main Branch.

All vessel traffic in the Chicago River system is concentrated in the months from mid-spring to mid-fall with the peak traffic occurring in mid-summer. And within those months, peak recreational and commercial passenger traffic occurs on the weekends, while barge traffic tends to travel during the weekdays.

In summary, it appears that while the Chicago Lock may be one of the busiest in the nation, the vast majority of the traffic is comprised of recreational and passenger traffic. It can be expected that recreational traffic will remain about the same in the near future with, perhaps, moderate growth. Commercial traffic may experience growth rates of up to five percent a year, especially as a result of the development of the Riverwalk project and the resulting increase in tourists along the river. Examination of the data on barge traffic over the past several years, however, leads to the conclusion that there could be significant proportional increases such traffic over the next several years. This traffic could increase up to 25 percent a year. Economic development factors will have an important impact on actual future growth.

1. INTRODUCTION

1.1 Problem Statement. The Chicago Department of Transportation (CDOT) is in the process of proposing the development of an enhanced Riverwalk project along the south side of the Main Branch of the Chicago River from the Wabash Street Bridge to the Lake Street Bridge. This project, as currently planned, will extend into the Chicago River in widths ranging from 25 to 100 feet. A number of the user groups on the river have raised concerns that the resulting decrease in river width will decrease the area available for safe navigation. The design of the Riverwalk plan calls for the development of a contiguous pedestrian walkway from the confluence of the three branches of the Chicago River eastward, connecting with an existing walkway at the Wabash Street Bridge and continuing to the lakeside walkway. The intent is to provide continuous access to the river for pedestrian traffic without requiring going up to street level to cross each of the bridge abutments, as is now the case. In order to achieve this continuity, CDOT is planning to expand the current walkways out into the river, at locations between the bridges and around each of the bridge abutments, thus extending into the river to some degree.

The Chicago River flows a distance of 14.4 miles along a North and South Branch into a confluence at Wolf Point in the heart of downtown Chicago where the Main Branch joins from Lake Michigan. Because of a diversionary canal built on the South Branch 100 years ago, the river flows from the North Branch and from Lake Michigan into the South Branch and on into the Illinois River, on to the Mississippi. A breakwater and lock system creates the Chicago Harbor and regulates water flow into the river and waterborne traffic to and from the river. The Main Branch of the Chicago River runs from the Lake Shore Drive Bridge to Wolf Point, a distance of approximately 6,500 ft (1,980 meters) with an additional 1,650 ft (503 meters) from the bridge to the Chicago Lock.

Traffic in the three branches of the river is usually moderate with a mix of tour boats, water taxis, recreational powerboats, canoes, kayaks, sculls, water bikes, and an occasional barge.

1.2 Approach. This report, the first of two, serves to document recent vessel traffic trends in the Chicago River system, with particular reference to the project area in and around the Main Branch of the river. (See Figure 1 for a graphic representation of the project area). Reference is made to an earlier study conducted for the Illinois Transportation Research Center (Khisty et al, "Waterway Systems Traffic Analysis" Project IIA-W1, FY93, Report #ITRC FR 93-6). The Khisty study characterized Chicago River Main Branch traffic, as well as Chicago Lock operations and waterway usage.

1.3 Data Sources and Analysis. Understanding the interplay between the Riverwalk project and vessel traffic requires accurate characterization of Main Branch traffic, as well as that passing the Wolf Point confluence where the Main Branch joins with the North and South Branches. Available data obtained from Chicago Lock records, commodities movements summaries, and inputs from stakeholder interviews conducted in September 2000 are the major sources for this analysis. This analysis has the following focus:

- Characterization of cargo (tow and barge) movements in the Chicago area, considered as a component of the eastern portion of the Illinois River system; thereby allowing accurate study of the barge traffic passing Wolf Point.
- Analysis of commercial, recreational, and government traffic in the Main Branch, based on Chicago Lock data.

2. AREA VESSEL TRAFFIC

Figure 2 contains data indicating the total amount of vessel traffic passing through the Chicago Locks, both upriver and downriver directions, from 1986 through 1991 (Khisty data) and 1997 through 1999 (Current ACE data). From this figure it appears that total traffic increased to a level of about 27 thousand in 1989 and increased only slightly since then. From the figure it can be seen that the yearly differences between upriver and downriver traffic are quite small.

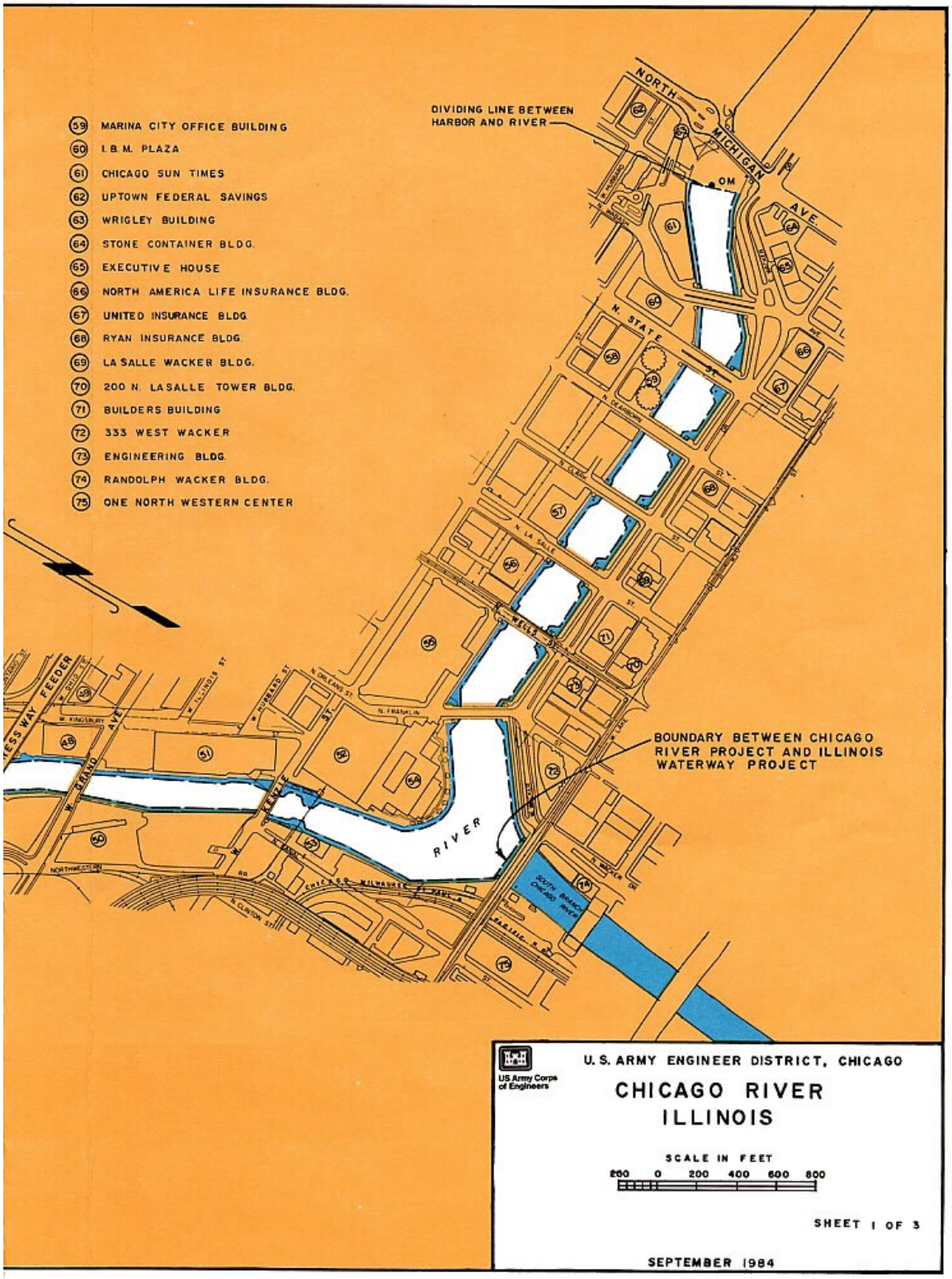

Figure 1. Chicago River Project Area.

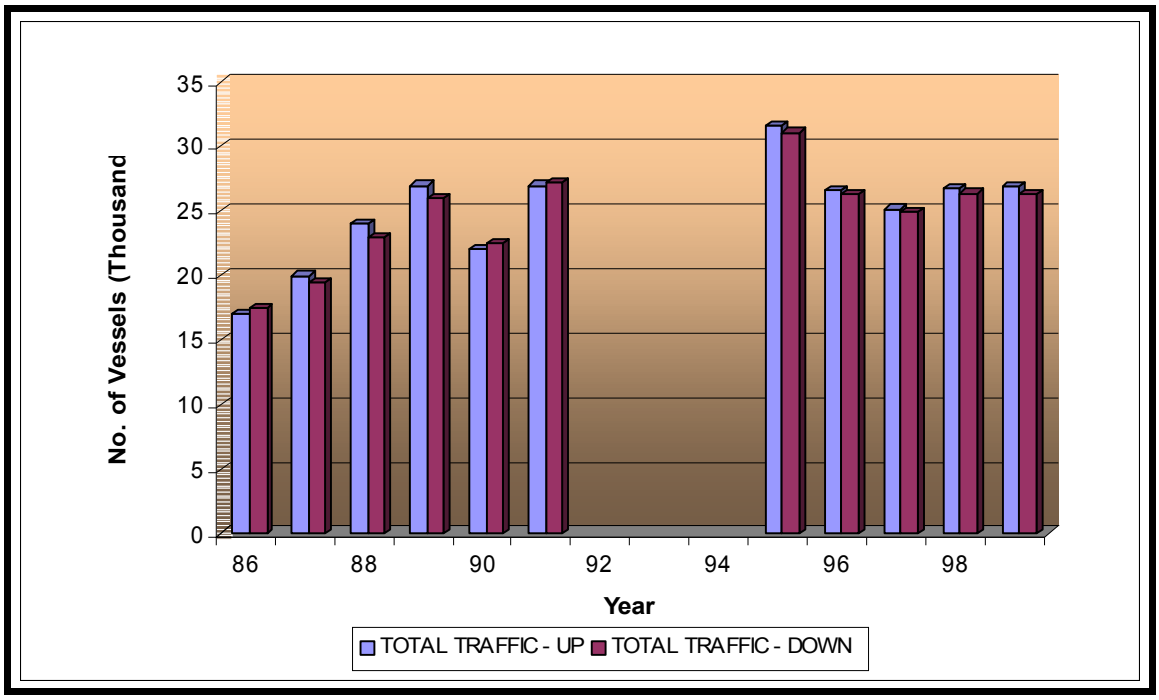

Figure 2. Total traffic volume through Chicago Locks. (1986 - 1991 data from Khisty, 1993).

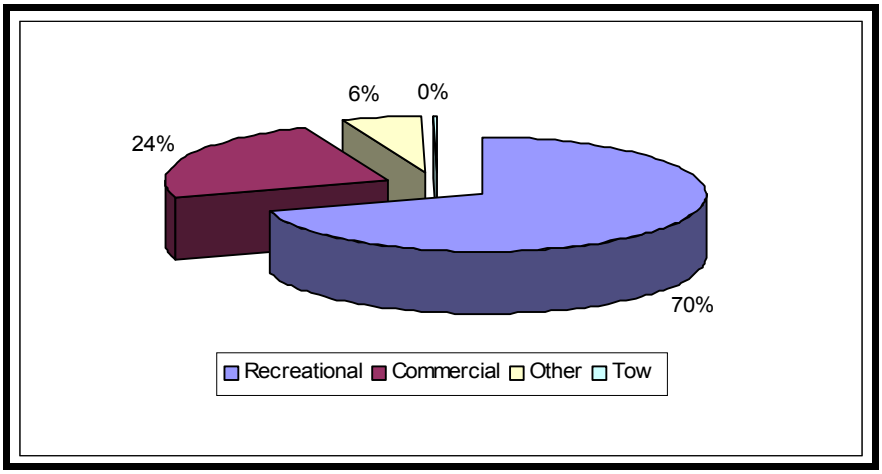

Figure 3. Vessel Type Transiting Chicago Lock. Average for all Vessels = 54.5 Thousand per Year. (Years: 1995 – 1999).

The average traffic count passing through the Chicago Lock, from 1995 through 1999 was 54,429 vessels. Recreational, Commercial (mostly tour boats), and Other made up the vast majority of those transits (70, 24, and 6 percent, respectively). Tow/barge combinations made up less than one percent.

3. CARGO MOVEMENTS

Army Corps of Engineers (ACE) Waterborne Commerce data and lock characteristics reports, as well as interviews with local operators, are the basis of the analysis to determine the nature of barge movements through the Riverwalk project area. The main features of the approach taken are the following:

- A rough balancing and reconciliation of annual commodity quantities among five Illinois River system segments designated by the ACE. These segments are:

    1. Chicago River, Main and North Branches.
    2. Chicago River South Branch, Lake Street to Damen Street.
    3. Sanitary and Ship Canal from Damen Street to Lockport, Illinois.
    4. Illinois River, from mouth of Illinois River to Lockport, Illinois.
    5. Calumet-Sag Channel from junction with Sanitary and Ship Canal[1] to Turning Basin #5 (near O'Brien Lock).

- Development of upriver and downriver commodities flow diagrams. (Division of commodities quantities by average tonnage/tow values reported at the locks to estimate annual barge traffic values expressed in numbers of tows and average barges per tow).
- Estimates of the numbers of empty barges in the waterway, based on lock data.

[See Appendix A for discussion of analysis techniques and problems].

3.1 Recent History. There has been a slight decrease in commodities tonnage in this part of the Illinois River since 1994. Figure 4 contains a graph showing the trend in vessel transits through the three major locks regulating traffic in this river system. Since 1995 there has been a significant drop in total tonnage passing through the O'Brien Lock

[1] Henceforth, referred to as the Canal.

and approximately level or slightly increasing quantity through the Lockport and Chicago locks.

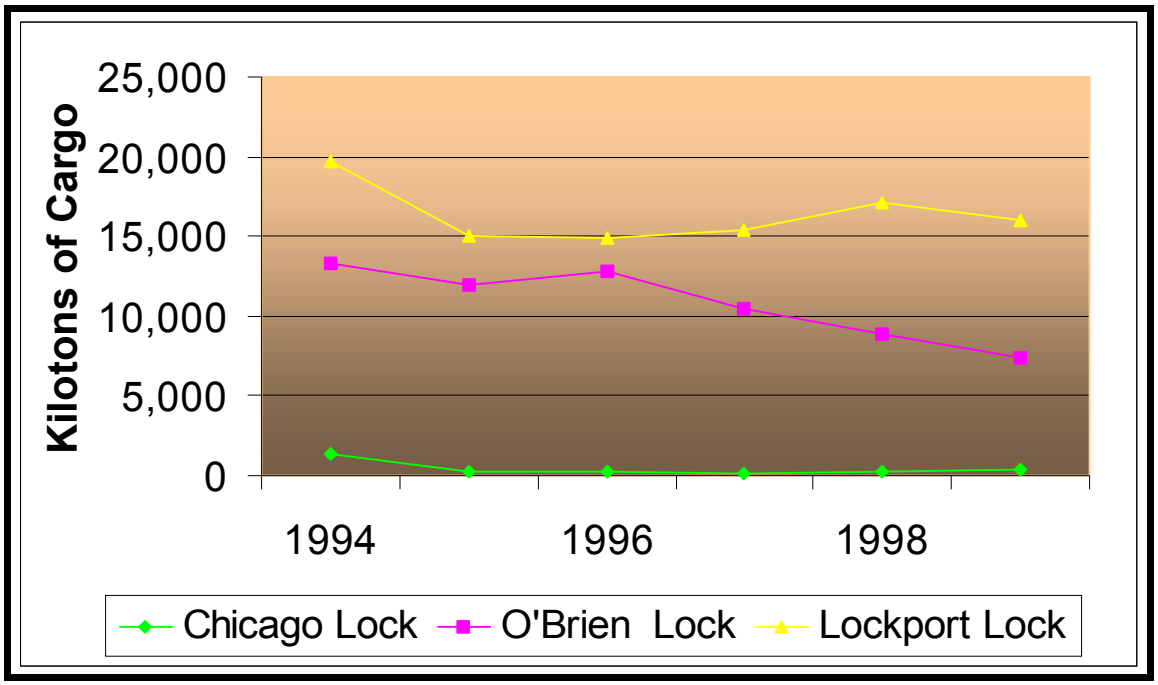

Figure 4. Annual Total Cargo Transiting Chicago Area Locks from 1994 – 1999.

In Figure 5, a graph of cargo tonnage through the Chicago Lock is shown. The average tonnage from 1995 through 1999 was approximately 200 kilotons per year. In 1994, however, an exceptionally large quantity of cargo (1,341 kilotons) was shipped through the Chicago Lock, more than four times the amount in any other year since. This event was not due to service problems at the O'Brien Lock, but may have originated in a major construction project or projects requiring large amounts of building materials.

The most recent year for which comprehensive commerce data are available is 1998. The data presented for recent years indicate that to be suitably representative for more detailed traffic analyses.

3.2 Regional Cargo Flow Balance. The relevant ACE Waterborne Commerce data for the year 1998 (obtained from the ACE Website) are summarized in Table 1. The

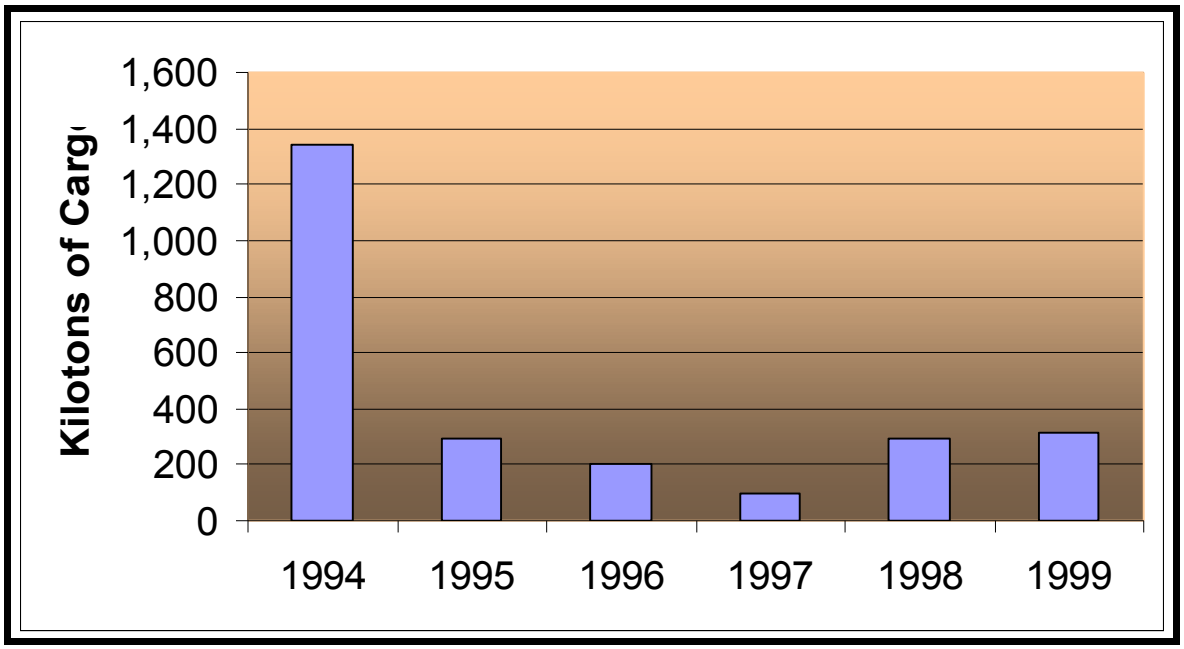

Figure 5. Chicago Lock Cargo Throughput, from 1994 through 1999.

data for commodity movements through the Main Branch are confounded with that for the North Branch. However, cargo movements in the Main Branch can be determined by adding the values for "Outbound" and "Through" movements in that segment (See Table 1). Since no cargo originates or terminates in the Main Branch, it can be assumed that all "Inbound" cargo came up from the South Branch bound for North Branch terminals. Therefore, it appears that in 1998, a total of 293 kilotons of commodities went through the Main Branch to or from the North Branch and an additional 641 kilotons entered the North Branch from the South Branch. The result is a total of 934 kilotons of commodity cargo passing through the Wolf Point confluence. This analysis is expanded below, in the Project Area Detail section.

[See Appendix B for discussion of traffic analysis approach].

3.3 Traffic Flow. The next step is the development of upriver and downriver flow diagrams, for which gross commodities flows are first determined. Table1 (and Tables 1A and 1B in Appendix C) contains the data used to develop the results reported in this section. The only area for which some inferential logic was required is the Canal,

Table 1: Cargo Movements, all Commodities, 1998 Short tons X 1,000									
Waterway Area	**Total**	**Inbound**		**Outbound**		**Through**		**Intra**	
Endpoints		Up-River	Down-River	Up-River	Down-River	Up-River	Down-River	Up-River	Down-River
Between Lockport & mouth of Ill. River	**38,623**	5,785	968	1,329	17,566	8,948	3,823	60	144
Between Damen St. & Lockport, & the Canal	**18,164**	5,463	157	1,254	2,656	5,561	2,333	480	260
Chicago River South Branch, Between Damen Ave. & Lake St.	**1,500**	505	0	0	60	828	107	0	0
Cal-Sag Channel & The Canal to Basin #5	**8,805**	659	17	38	321	5,021	2,749	0	0
Chicago River, Main and North Branches	**934**	641	0	0	4	102	187	0	0
Note 1: Chicago River, Main & North Branches through traffic and outbound, down-river traffic totals 293K tons, the exact equal of tonnage reported at the Chicago Lock. All inbound up-river traffic from the South Branch is therefore destined for North Branch termini.									
Note 2: All figures from Army Corps of Engineers Waterborne Commerce Data.									

where traffic in the sub-segments north and south of the CAL-SAG Channel western node had to be characterized without explicit numeric data.

Downloaded ACE navigation charts for the Illinois Waterway system provided source data for a rough characterization of identified marine transportation terminals (e.g., wharves, docks) along the Canal. Inbound and outbound traffic was then proportionally divided between the north and south sub-segments according to the number of terminals identified on these charts (27, south of the junction and 38, north -- 41 and 59 percent, respectively). The results, shown in Table 2, indicate that 289 kilotons traveled as "Through" traffic via the Main Branch. The difference of four kilotons between this analysis and the 293 kilotons stated above is due to the fact that four kilotons of cargo are indicated as outbound, downriver from the North Branch. This cargo, as indicated in the former discussion, probably goes out to the lake through the Main Branch, bringing the total to 293 kilotons. In either case, the discrepancy is small.

The data in Table 2 are graphically displayed in Figure 6, indicating total gross tonnage in each waterway segment, with lines of thickness proportional to the traffic. Segment nodes appear as red circles. The approximate number of barges traversing each segment also appears, based upon average tonnage per tow data available from the three locks in the area.

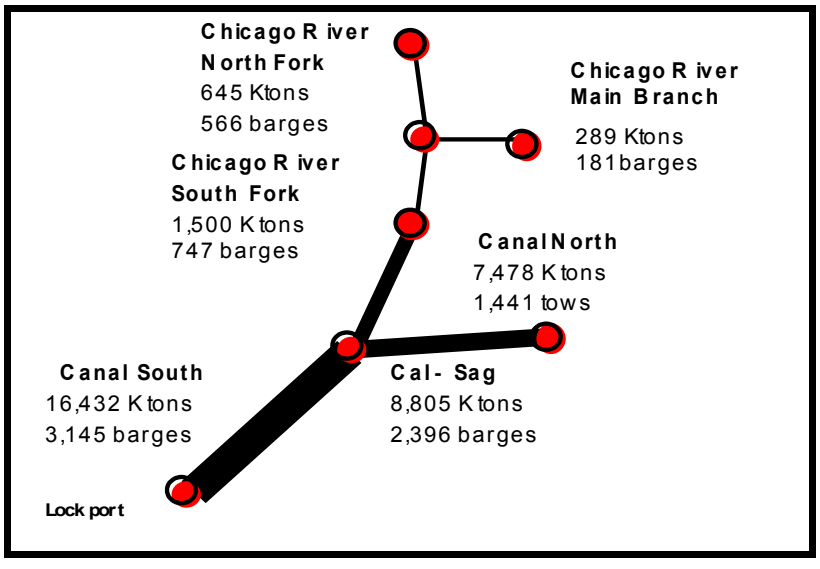

Figure 6.

Commodity Flows, Chicago area south, to Lockport, 1998

Table 2: Total Commodities Flows (Ktons)						
	U p r i v e r					
	Canal south	**Canal north**	**CAL-SAG**	**ChiRiv SBr**	**ChiRiv NBr**	**ChiRiv MnBr**
Through*	5,561	1,088	5,021	828	0	187
Inbound-upriver**	5,463	3,664	659	505	641	0
Inbound fm CAL-SAG, turning north	-747	747	0	0	0	0
Outbound upriver*	1,009	245	38	0	0	0
TOTAL	**11,286**	**5,744**	**5,718**	**1,333**	**641**	**187**
	D o w n r i v e r					
	Canal south	**Canal north**	**CAL-SAG**	**ChiRiv SBr**	**ChiRiv NBr**	**ChiRiv MnBr**
Through***	2,333	156	2,749	107	0	102
Inbound-downriver***	157	11	17	0	0	0
Outbound-downriver****	2,656	1,567	321	60	4	0
TOTAL	**5,146**	**1,734**	**3,087**	**167**	**4**	**102**
GRAND TOTAL	**16,432**	**7,478**	**8,805**	**1,500**	**645**	**289**

* Through and outbound-upriver traffic in the Canal north must sum to 1,333 Ktons (ChiRiv SBr). These values are assigned proportional to total through and outbound-upriver traffic in the Canal (1,088 and 245 Ktons). Remaining outbound-upriver traffic from the Canal south is assumed to go to CAL-SAG. Through and outbound-upriver traffic to CAL-SAG therefore totals 5,561 - 1,088 + 1,009 = 5,482, with 3.5% difference from total CAL-SAG through plus inbound-upriver traffic, an adequate approximation.

** 100% of inbound-upriver traffic passes through southern portion of the Canal. 59% goes to northern portion, per the proportion of marine transportation facilities named on ACE charts.

*** The Canal, north through and inbound-downriver traffic must equal total southbound from ChiRiv SBr (167 Ktons). It is apportioned in ratio to the totals for these traffic types in the Canal (94% - 6%).

**** 59% originates in northern portion of the Canal. 100% passes through southern portion.

3.4 Project Area Detail. An accurate picture of the barge traffic in the project area requires additional detail, for which the Chicago Lock data and information from interviews are added. Chicago Lock data from the ACE Water Resources Support Center Navigation Data Center and 1998 ACE commodities data are the sources of this characterization.

In Figure 7 the total annual barge traffic in both directions through the Chicago Locks is represented for 1995-1999. It can be seen that there has been a steady increase in barge traffic over the recent years. The graph shown in Figure 8 indicates the mean

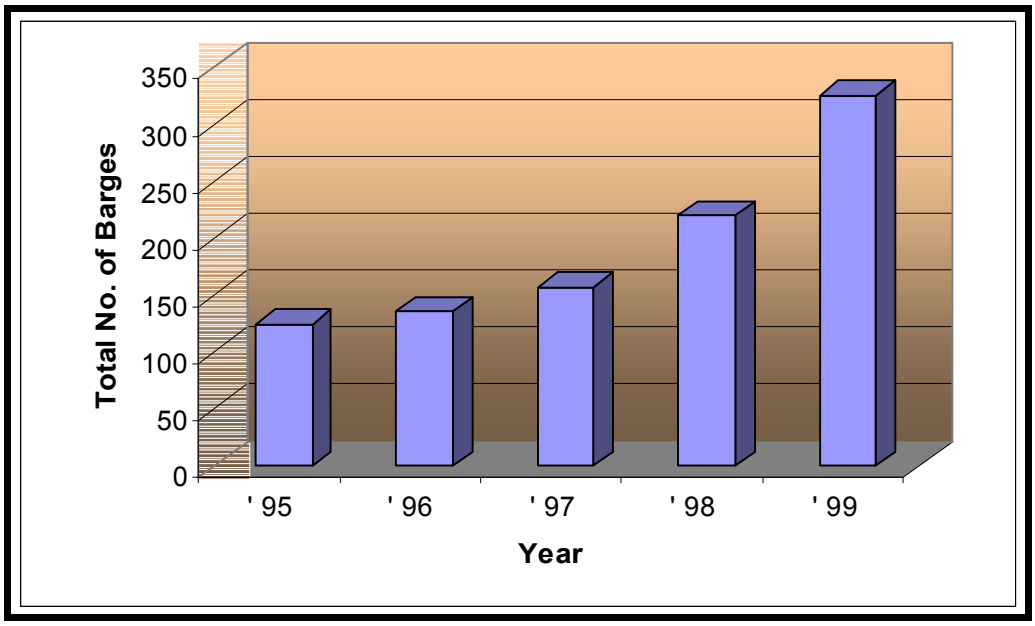

Figure 7. Annual Number of Barges Through Chicago Lock.

monthly distribution of the barge traffic transiting the lock during those years to be concentrated in the late spring to mid autumn months, with a large spike in October. Using ACE commodity data for 1998 (selected as a representative year) it is revealed that soil, sand, gravel, rock, and stone account for 73% of all commodities through the Main Branch.

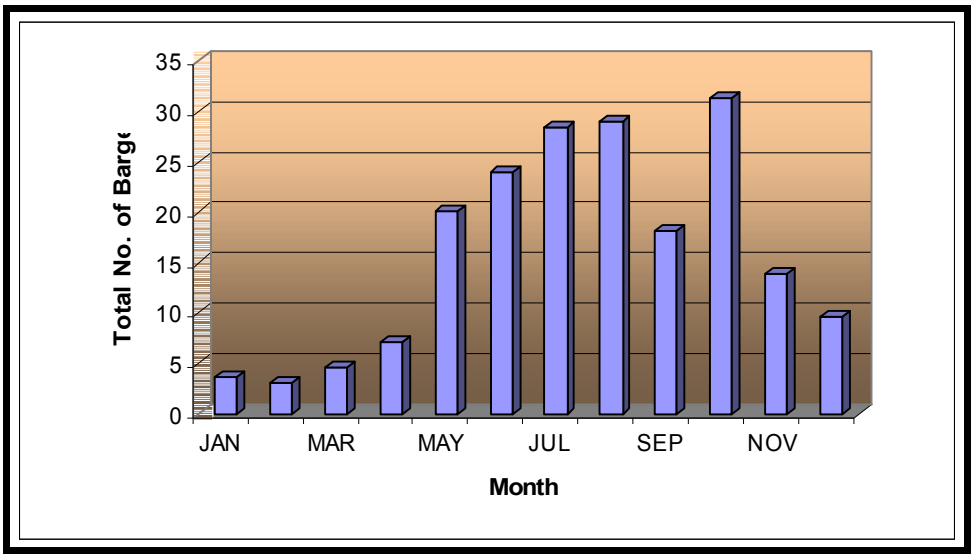

Figure 8. Mean Monthly Barge Traffic Through Chicago Locks: 1995-1999

Specific data examinations of this traffic from 1998 were selected for more detailed analysis. The following conclusions can be drawn from these data:

- All traffic in the Main Branch (187 kilotons upriver and 102 kilotons downriver) is through traffic. Chicago Lock data indicate that upriver traffic is generally heavier than downriver (by 36% and 30% in 1997 and 1998, respectively). Most tows involve single barges, although statistics indicate that tows with multiple barges also transit the Main Branch (all assumed to be double barges); these numbered 6, 40, and 12, respectively, from 1997 through 1999.
- 1998 data indicate that 828 kilotons of cargo passed Lake Street on the South Branch, heading north; all of it "through" traffic in the South Branch reporting area (i.e., zero outbound-upriver commodities). This amount resolves into 641 kilotons inbound-upriver in the North Branch and 187 kilotons upriver through the Main Branch. Average tonnage per tow into the North Branch is not explicitly available in the ACE data. There are indications that many are multiple tows of up to three barges.
- All inbound traffic into the North Branch is upriver. None originates in the Main Branch or from points further north. The data further indicate that all the upriver-inbound traffic in 1998 (828 kilotons) originated at least as far south as the Canal and none from the South Branch, per se. It appears that all traffic into and out of the North Branch passes Wolf Point without making the turn into or out of the Main Branch.
- There is little or no outbound commodity traffic originating in the project area. There appears to be no trade between the North Branch and the South Branch originating between Lake Street and Damen Avenue.
- There are significant numbers of empty barges moving through the project area. For empty barge traffic from the North Branch to the South Branch, it is assumed that all loaded tows return empty and pass Wolf Point southbound. This would have amounted to 248 empty tows downriver in 1998.
- There is no indication from any of the data that self-propelled cargo vessels transited the Lock between 1997-1999; it is assumed that current and future traffic patterns will continue this pattern.

Figure 9 contains a graphic representation of commodity tonnage and number of barges transiting the project area. All traffic represented in this figure passes through the North, South, Main Branch confluence, although only the traffic indicated for the Main Branch actually makes the turn at Wolf Point. Tug/tow operators have identified the Wolf Point confluence as the area of greatest concern for safety if the Riverwalk project is developed as planned, in particular for tows making the turn either into or out of the Main Branch. Table 3 contains data showing barge traffic movements and directions in the Wolf Point confluence area.

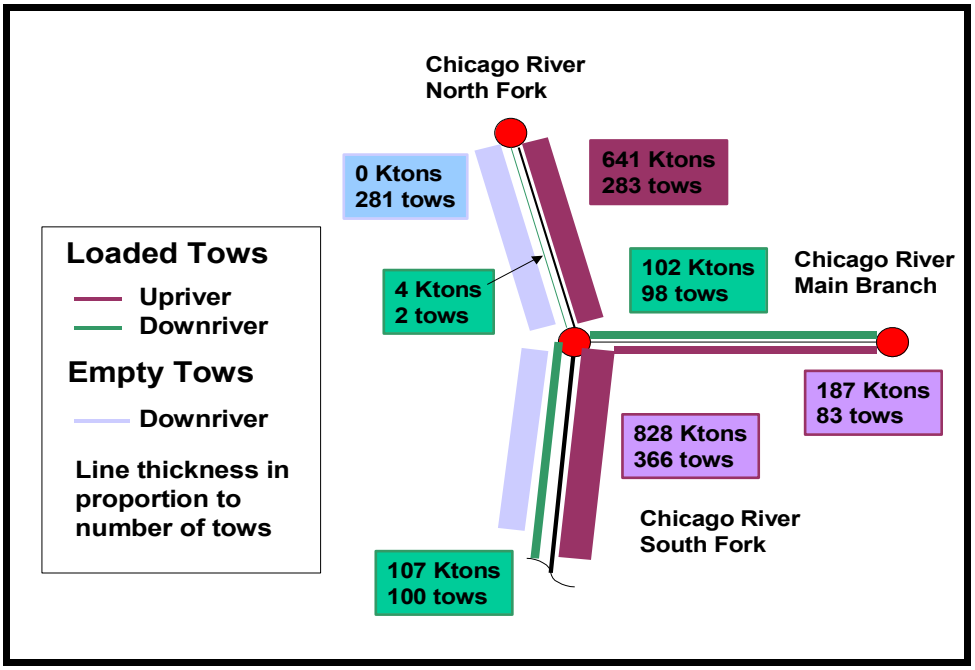

Figure 9. Barge-Tow Traffic Flows Through Riverwalk Project Area (1998 Data).

Table 3: Barge Tows Passing Wolf Point, 1998			
South Branch to North Branch	283	South Branch upriver, turning east	83
North Branch to South Branch	283	Main Branch, downriver turning south	98

The 1998 commodities data indicate that a total of 45,000 short tons of petroleum products moved through the Chicago Lock, 30,000 downriver and 15,000 upriver.

It is assumed that the Hannah Marine barge moved 100% of that petroleum product; the downriver tonnage clearly drove this schedule, but this barge was able to carry a smaller amount of product upriver as well. The further assumption that the downriver trips were at 75% capacity leads to the inference that there were 4 trips upriver on the Main Branch and 4 trips (of necessity) downriver.

4. PASSENGER AND RECREATIONAL VESSEL TRAFFIC

The overwhelming majority of vessel traffic in Riverwalk project area during the "good weather" months is comprised of recreational and passenger vessels. As such, the annual tally of total vessels through the Chicago Lock is essentially a reflection of passenger and recreational vessels. Examination of Figure 2 shows the trend of all vessel traffic through the Lock. The numbers certainly trended upwards in the late 1980s, but remained nearly level in the 1990s.

Figure 10 puts more focus on data of the last five years for passenger and recreational traffic passing through the Chicago Locks. It can be seen that there was a decrease in both types of traffic from 1995 to 1997 but the trend has since been on a slight increase to a level of about 35,000 total transits per year.

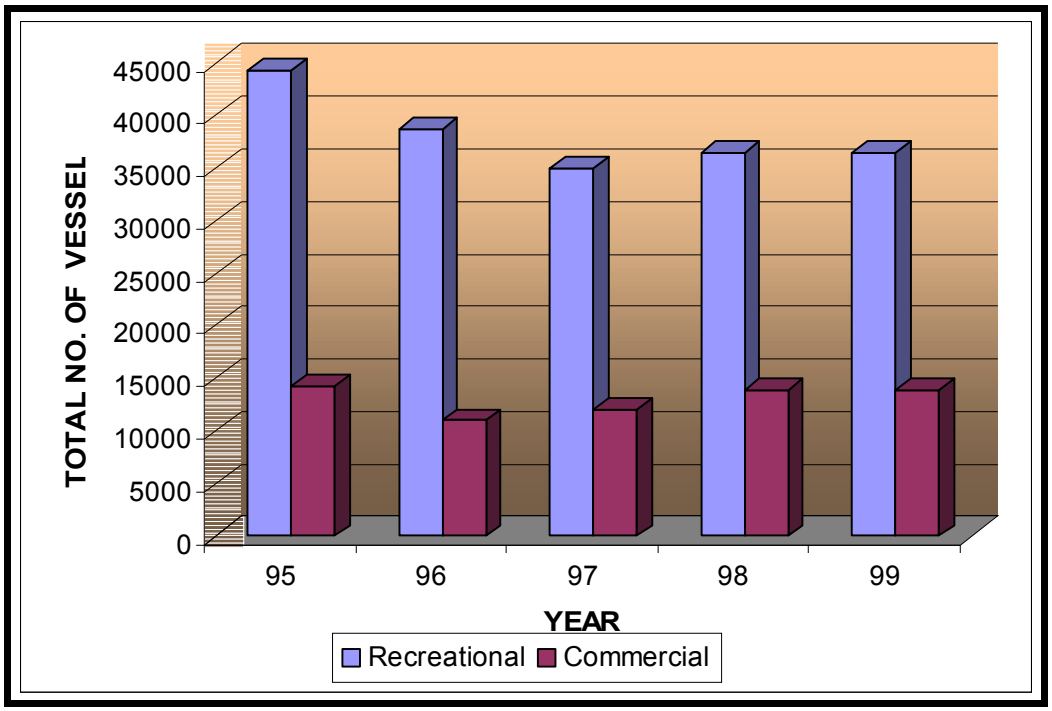

Figure 10. Chicago Lock Traffic by Vessel Type, 1995-1999

4.1 Peak Demand Characterization Army Corps lock data allows for quite detailed temporal analysis, since passage data for all types of vessels is gathered and compiled on an hourly basis. Figure 11 contains data for the mean monthly totals for 1995 through 1999. Inspection of this figure reveals the following:

- Clear peaks of recreational boat activity occur during the months of May through September, particularly during July and August. An average of almost 10,000 boats passed through during July.
- Commercial vessel activity is also concentrated in the good weather months and follows the same basic pattern as recreational vessels. Monthly levels run from approximately 2000 to 3000 from May to September, also peaking during July and August. The data from the ACE indicate that passenger vessels comprise about 95 percent of all commercial vessel traffic during these months.

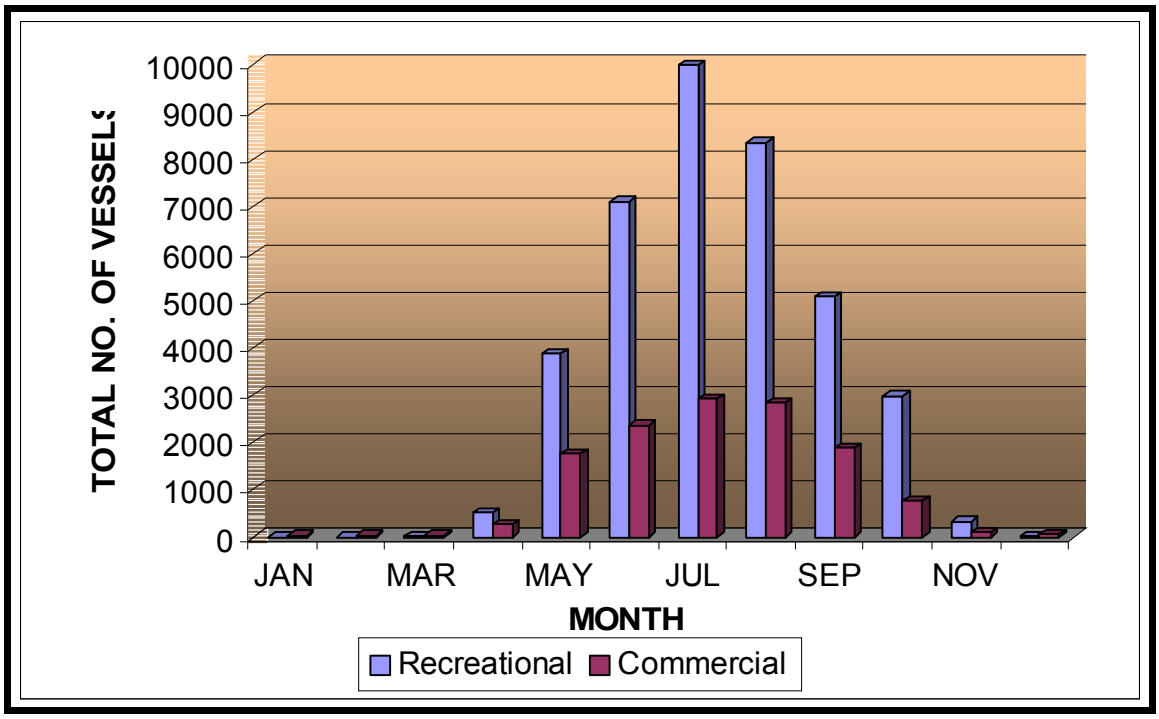

Figure 11. 1998 Lock Traffic, Upriver and Downriver Combined.

Waterway managers must ultimately plan for safe navigation of the river by multiple use types during the good weather months, particularly the periods of peak usage during summer weekends and holidays. The Chicago Lock data also provide hourly transit statistics and excellent detail for mapping River use at these times. Time lines for two representative weekends (August 23, 1998 and July 3-4, 1999) indicate the volumes of recreational and commercial passenger vessel traffic, both downriver and upriver (from and to Lake Michigan, respectively).

Figures 12 and 13 show the upriver (heading into Lake Michigan) and downriver (heading into the Main Branch from Lake Michigan) time lines for August 23, 1998. It is apparent that substantial recreational vessel traffic (peaking at 60-70 boats per hour) begins in mid-morning (Figure 12) with the trend reversing somewhat in the mid- to late afternoon (Figure 13). Passenger vessels follow a similar pattern, flowing toward the Lake during the morning and returning later in the day. It should be noted that the Lock data showed no barge passages during this period of time. The total traffic for the day was 390 recreational craft and 49 passenger vessels upriver, and 305 and 51 downriver.

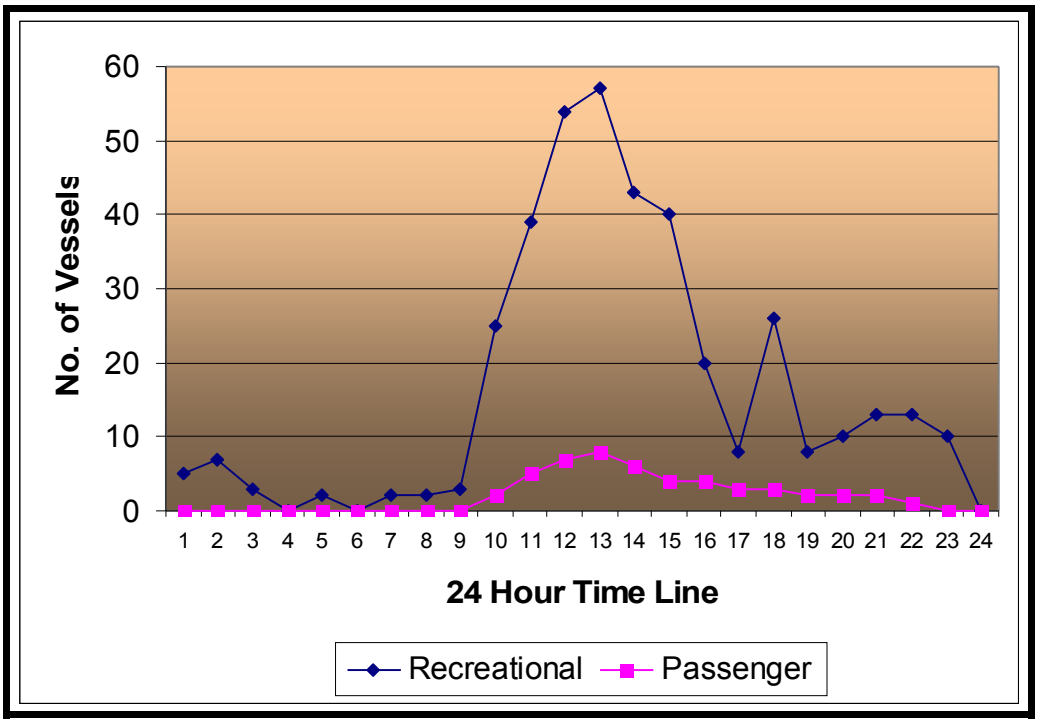

Figure 12. Outbound Recreational and Passenger Traffic Through Chicago Lock (August 23, 1998)

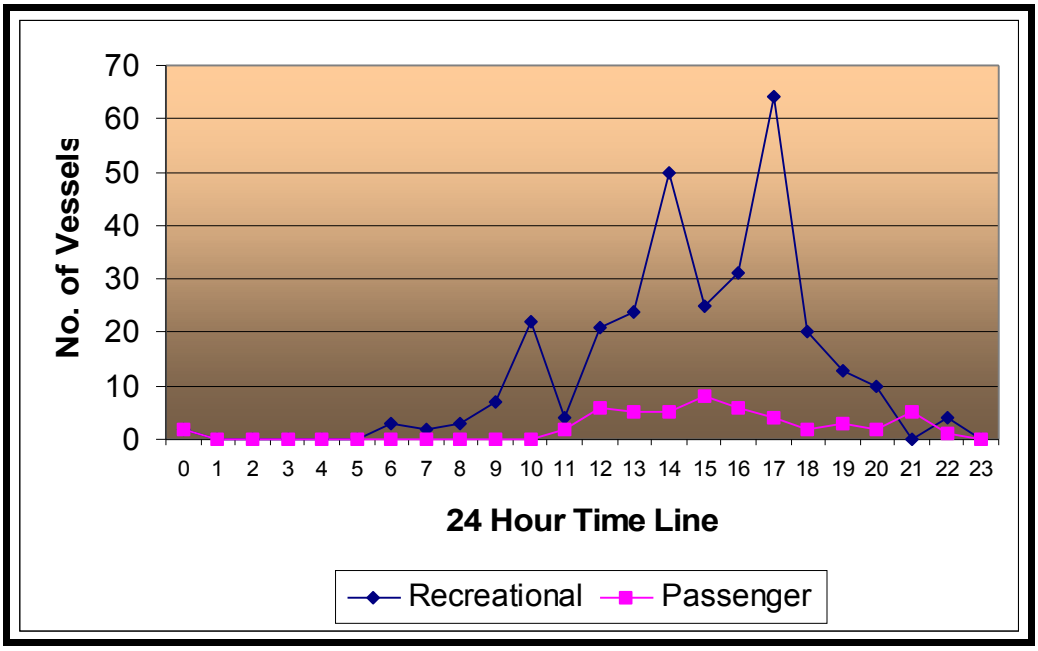

Figure 13. Inbound Recreational and Passenger Traffic Through Chicago Lock (August 23, 1998).

Table 4 contains several indicators for traffic totaled in both directions for the day.

Table 4 August 23, 1998 Chicago Lock Traffic, Totaled Both Ways

	Total, day	12 pm – 6 pm, hourly average	12 pm – 6 pm, hourly high	12 pm – 6 pm, hourly low
Passenger vessels	100	9.4	12	4
Recreational craft	695	62.4	90	39

Figures 14 and 15 show similar timelines for the 48 hours of the July 4th holiday in 1999. The graphs do not show the single barge that passed through on the night of the July 3 between 10:00 and 11:00 PM, apparently towed by a Government vessel. Peak demand at the Lock does not appear to exceed that for the August 23, 1998 weekend; both may be considered representative examples of summer weekend traffic.

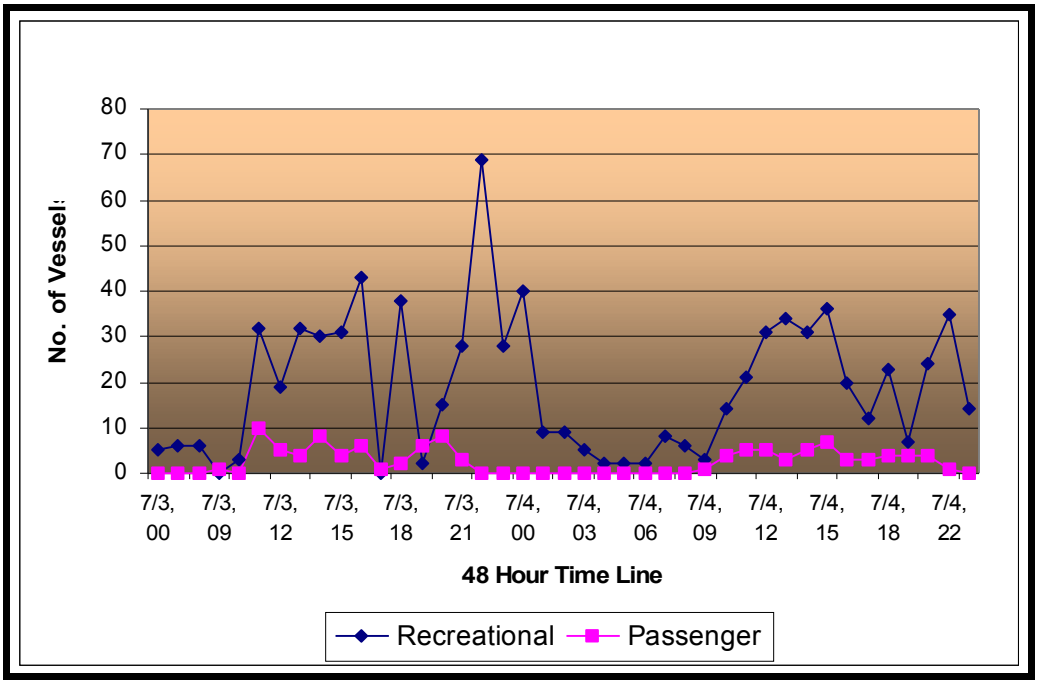

Figure 13: Recreational and Passenger Traffic Through Chicago Lock, Upriver, (Midnight, July 3 – Midnight July 4, 1999).

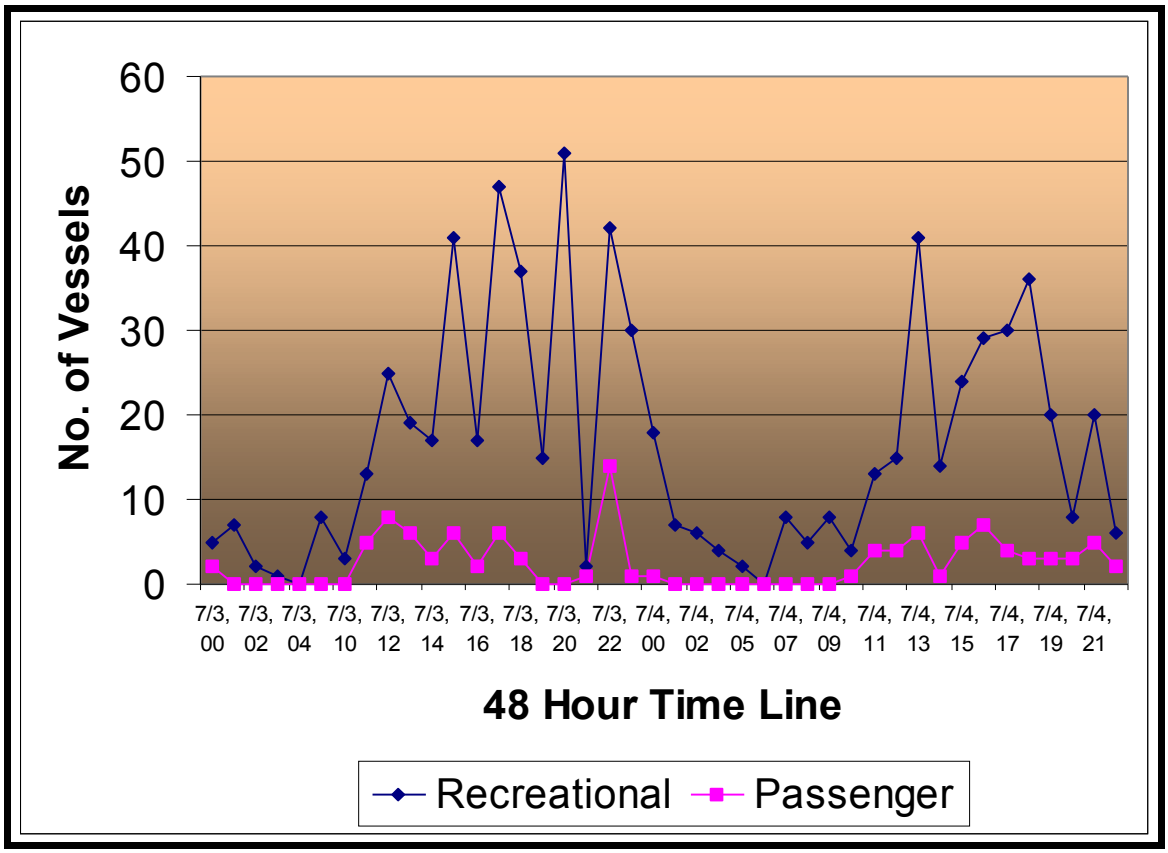

Figure 15: Inbound Recreational and Passenger Traffic Through Chicago Lock (Midnight, July 3 – Midnight July 4, 1999).

Weekday use is also of interest during the summer since it represents the majority of time available for river transits by commercial vessels. Figure 16 contains data expressing the average number of hourly transits by several vessel types in each of eight 3-hour segments of the 24-hour day. The source data is the ACE's hourly record at the Chicago Lock, for Monday through Friday during the period of July 6 until August 27, 1998. The types included are recreational craft, commercial passenger vessels, barge tows, and "others" (i.e., Government vessels, commercial fishing boats, and tugboats without tows). Barge traffic numbers are too small to be discerned graphically in Figure 16 so they are presented in tabular form in Table 5.

Weekday traffic is, not surprisingly, much lighter than that on the weekends. Recreational traffic topped 20 vessels (in one direction) in an hour only 18 times; the maximum occurred twice at 28. Passenger vessels averaged 4 or less per hour each way at all times, not once exceeding 10 per hour one way.

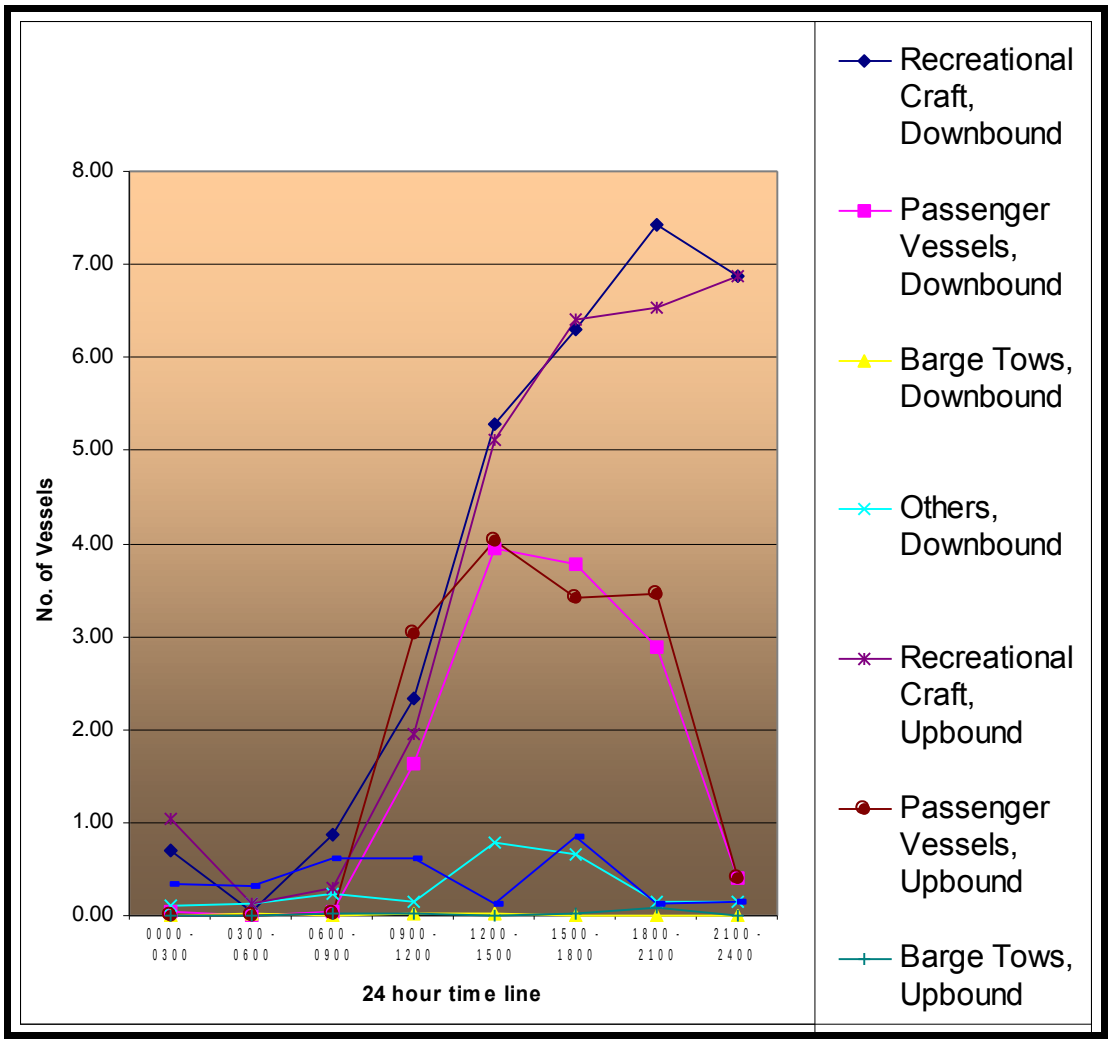

Figure 16. Chicago Lock, Average Hourly Transits, Summer Weekdays, 1999

Table 5: Average Hourly Barge Passages, Summer 1998 Weekdays

Hours at Chicago Lock	0000 - 0300	0300 - 0600	0600 - 0900	0900 - 1200	1200 - 1500	1500 - 1800	1800 - 2100	2100 - 2400
Barge Tows, Inbound	0.0000	0.0167	0.0083	0.0167	0.0167	0.0083	0.0000	0.0083
Barge Tows, Outbound	0.0000	0.0000	0.0167	0.0167	0.0083	0.0167	0.0750	0.0083

5. COMMERCIAL PASSENGER TRAFFIC

The Coast Guard reports that passenger vessel companies made a total of 20,686 trips on the Chicago River in 1999, carrying over 553,140 passengers. Most of these trips were made during the six-month period from April through October, and the most concentrated period of activity within this time period was June, July, and August, when the boats operate on more frequent schedules. To estimate peak period activity, it is assumed that 80 percent of the trips occur from June through August and 35 percent occur during the weekend, which are the busiest days of the week for sightseeing cruises. The resulting average peak season tour boat traffic on Saturday or Sunday would be approximately 180 trips per day. The five companies operate sightseeing cruises, charter cruises, and water taxis, as follows:

- Chicago's First Lady/Mercury Yacht Charters—Chicago River architecture trips (no lock passage); Lake and River public sightseeing trips; private charters
- Wendella Boats—sightseeing cruises (between lake and river through lock)
- Shoreline Sightseeing—water taxis and river sightseeing cruises (no lock passage)
- Wagner Charters—transit down river to lake
- Chicago from the Lake—architectural tours departing from lakeside dock

In addition, sometimes a sixth company, Seadog, provides up to 4 river cruises per day on weekends, originating from the Navy Pier. Based on schedule and itinerary data obtained for the individual services, it is estimated that approximately 20-25 percent of total daily trips do not go through the Chicago lock. It is reasonable to expect continued growth in commercial passenger traffic for the foreseeable future, as downtown Chicago becomes an increasingly attractive draw for both out of town tourists and metropolitan area residents. Recent trends indicate that annual growth is likely to be in the range of 2 to 4 percent. At this rate, by 2010, total commercial passenger traffic would increase to 223 - 277 vessel trips per day.

Recent additions to commercial passenger traffic on the main branch of the river are "riverbikes" and gondolas. Maximum riverbike traffic during the first year of operations

was between 12 and 18 vessels in operation simultaneously. The operator's license allows for a maximum of 30-36 "seats," which is equivalent to about 20 vessels. A maximum of 2 gondola trips per hour are currently provided, using a single boat. The addition of one more gondola vessel is possible next year, which would result in a maximum of 4 gondola trips in a single hour.

APPENDIX

APPENDIX A

The main difficulties with the analysis are 1) estimating numbers of tows and barges with the available ACE data, and 2) characterizing the traffic within the Sanitary and Ship (S & S) Canal, since it is considered as a whole in the ACE data base, while the Calumet-Sag Channel's downriver node resides about midway in the canal. In the first instance, ACE lock data enable an accurate estimate of the number of tows (total tonnage divided by average tonnage per tow), but give "barges/tow" in whole numbers only. The aim of characterizing the size of barge tows in the project area is somewhat hampered by this datum, but interview information was used to supplement the data.

More significantly, there is an apparent imbalance in traffic flows into the Canal, both upriver and downriver. Part of the underlying problem is that the distribution of downriver traffic from the CAL-SAG Channel into the Sanitary and Ship Canal becomes temporarily upriver when turning north at the junction. The imbalance is partly resolved by the numbers themselves, as one disparity resolves itself by cancellation of equal and opposite discrepancies at two different points. The remaining disparity is very small relative to overall traffic volume in the Canal (1.6 percent) and is assumed to have negligible impact in the project area to the north.

APPENDIX B

For a determination of traffic passing by the Wolf Point confluence at the west end of the Main Branch, however, a more comprehensive picture was needed, including an understanding of movements through the Canal into the South Branch. Characterization of the Canal required an inclusion of CAL-SAG Channel traffic. In all, the study encompasses the Chicago Lock, the Main, North, and South Branches of the Chicago River, the Canal south to Lockport, Illinois, and the CAL-SAG Channel from the O'Brien Lock west to the Canal.

The Canal is the nexus of the area under consideration, connecting the Chicago River, the CAL-SAG Channel, and the Illinois River system. Tables 1A and 1B (Appendix C) show the flow balancing approach and data for both the south end and north end (defined to include the end nodes of both Chicago River South Branch and the CAL-SAG Channel).

The general idea is that "through" and "inbound/outbound" commodity quantities should equal out among the involved waterway segments "Intra"-segment shipments are ignored, except in the project area where the Corps reports that there are none. The results of the exercise are the following:

- The movements into and out of the Illinois River through the Lockport Lock do not sum to zero in either direction (Table 1A). The indication is that an extra 747,000 short tons enter the Canal upriver than leave the Illinois River. In the downriver direction, 498,000 short tons more apparently exit the Canal than enter the Illinois River.
- Similarly, movements into and out of the north end of the Canal (CAL-SAG and South Branch Chicago River nodes) show 747,000 short tons less entering the S &S than leaving those two waterways and 198,000 short tons more leaving the Canal than entering those waterways.
- The case of cargo entering the CANAL resolves neatly as +/- 747,000 short tons equals zero net (see green shaded cells and note in the tables). The probable

explanation lies in the terminology of "upriver" and "downriver" cargo. "Upriver-inbound" (5,463,000 short tons) appears at first to be heading upriver through Lockport exclusively. However, the extra 747,000 short tons "outbound-downriver" from CAL-SAG probably takes a right turn at the junction and becomes "inbound-upriver" in the Canal.

The case of cargo exiting the CANAL is not so neat (see blue shaded cells and comment in the tables). The apparent excess of "outbound-downriver" cargo at Lockport (498,000 short tons) is partially offset by the apparent shortfall into the CAL-SAG (198,000 short tons), which in the latter case could be considered downriver from the northern sub-segment of the CANAL. The resulting net difference of 300,000 short tons is not easily explained; it makes up, however, only 1.6% of the total cargo in the CANAL and most likely has a negligible effect in the Chicago River project area.

APPENDIX C

Table 1A: Cargo Flow Balance in Chicago Ship and Sanitary Canal, south end at Lockport Lock

	Upbound				Downbound			
	In south end		Out north end		In north end		Out south end	
	Through	Outbound	Through	Inbound	Through	Outbound	Through	Inbound
	8,948	1,329	5,561	5,463	2,333	2,656	3,523	968
Totals	**10,277**		**11,024**		**4,989**		**4,491**	
	delta =	**-747**	**Upriver**		**delta =**	**498**	**Upriver**	

Table 1B: Cargo Flow Balance in Chicago Ship and Sanitary Canal, north end at Cal-Sag and South Chicago nodes

	Upbound					
	From the Canal		To Cal - Sag		To South Chicago	
	Through	Outbound	Through	Inbound	Through	Inbound
	5,561	1,254	5,021	659	828	505
	6,815		**7,013**			
	delta =		**-198**		**Upriver**	
	Downbound					
	To the Canal		From Cal - Sag		From South Chicago	
	Through	Inbound	Through	Outbound	Through	Outbound
	2,333	157	2,749	321	107	60
	2,490		**3,237**			
	delta =		**747**		**Upriver**	

Note 3: The apparent disparities in commodity quantities into the S&S Canal (+/- 747 Ktons) add to zero. The Cal-Sag terminus is at the midpoint of the S&S Canal segment and some cargo categorized as "downbound" there probably becomes upbound to destinations in the Canal north of the juncture.

Note 4: The disparity in quantities out of the S & S Canal sums to 300 Ktons (1.6% of S & S total) and its cause is not immediately apparent. The effect on the characterization of barge traffic in the project area is negligible.