Mobilizing the Waterways: The Mississippi River Navigation System

by Michael C. Robinson

The Mississippi River and its navigable tributaries have been a bulwark of national economic expansion and defense since the 18th century. During World War II, this vast navigation system proved an important strategic asset. Prewar mobilization planners drew from the World War I experience when the waterways averted a transportation catastrophe by relieving the country's overburdened railroads. Faced with calamity, various federal government agencies struggled to awaken a dormant waterways industry, stimulating a revival of river commerce and newfound awareness of its role in national defense. The next two decades witnessed concurrent and reciprocal federal investments in river improvements and waterborne commerce. Consequently, after Pearl Harbor the Mississippi River navigation system facilitated home-front industrial mobilization as well as victory abroad. The war years also reshaped and strengthened inland navigation, setting the stage for subsequent peacetime growth.

The Lower Mississippi River served as the trunk of a tree-like navigation system that extended into the heart of the nation. By the onset of World War II, this waterway network was highly regulated and developed. On the great stream's main stem, some seven decades of Corps river engineering had transformed the unruly, meandering giant into a relatively safe transportation artery. In its natural condition, the Mississippi featured sandbars, snags, and split channels that claimed hundreds of antebellum steamboats. However, by 1941 channel stabilization measures such as bank protection, dikes, and maintenance dredging sculpted and fixed reliable channels far different than in the days of Mark Twain.

Congress authorized the Corps to remove snags from the river in 1824, but the transformation of the Mississippi began

a half century later. In the 1870s, improving the mouth of the Mississippi for oceangoing ships became a great national issue. Dredging efforts by the Corps failed, so it proposed building a ship channel that would reroute the deep-draft traffic into and out of the river. James B. Eads, a brilliant civilian engineer, offered another approach. He proposed to build jetties in one of the passes and allow the river to scour out a deeper channel. The Corps attacked his plan, but Congress accepted Eads' vision because he agreed to work on a "no cure, no pay" basis. The jetties succeeded, and by June 1879 a 30-foot depth existed in South Pass that stimulated a bold federal approach to addressing the river's other navigation and flood hazards. Concurrent with the successful completion of the jetties project, Congress established the Mississippi River Commission (MRC) and charged it with creating a comprehensive plan to facilitate navigation and prevent destructive floods.

The daunting task of the MRC required its engineers to study, test, adopt, and discard river engineering techniques employed in Europe and elsewhere throughout the world. Congress initially prohibited flood control work since it viewed levee construction as a local responsibility. Until the authorization of federal flood control in 1917, the MRC field work focused on mapping the Mississippi, studying its hydrologic patterns, and making navigation improvements. The latter consisted of closing crevasses in levee lines that caused shoaling in the river, building experimental dikes, and placing great mattresses formed out of willows on the banks to prevent scouring and caving.

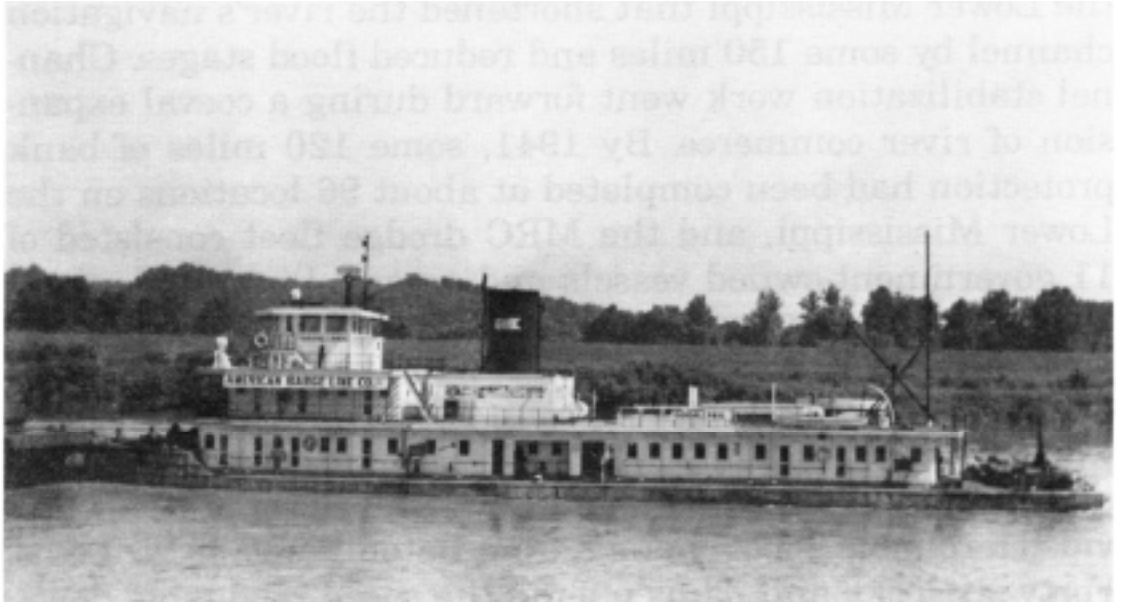
These tentative measures did little to deepen channel crossings. Pressed by commercial interests, the MRC began experimenting with dredges, and in 1896 Congress authorized the development and maintenance of a 9-foot channel 250 feet wide from Cairo, Illinois, to Head of Passes. Between 1896 and 1928, dredging and bank revetment became the principal means of sustaining reliable low-water navigation as dikes were dropped from the river engineering inventory. The MRC examined several alternatives, and by the early 1920s adopted articulated concrete mattress as the best means of armoring the banks. First developed in Japan, the technique consisted

of joining together small concrete blocks with wires and cables to form resilient, flexible mats.

The cataclysmic 1927 flood resulted in the 1928 Flood Control Act which put in place the massive, comprehensive Mississippi River and Tributaries (MR&T) Project. Even though the valleywide undertaking focused on flood control, it included channel stabilization provisions. Dikes and other contraction works returned as a river engineering option, and the MRC began stepping up revetment work and the acquisition of larger, more efficient dredges. Generous funding for navigation work continued throughout the 1930s thanks to MR&T appropriations, as well as additional support under the National Industrial Recovery Act and other work-relief programs. The MRC also conducted a cutoff program on the Lower Mississippi that shortened the river's navigation channel by some 150 miles and reduced flood stages. Channel stabilization work went forward during a coeval expansion of river commerce. By 1941, some 120 miles of bank protection had been completed at about 96 locations on the Lower Mississippi, and the MRC dredge fleet consisted of 11 government-owned vessels and several hired under contract. After seven decades, the river stood ready to play its part in national defense.

By December 1941, more than 12,000 miles of navigable waterways existed within the Mississippi River basin. Improvements on the Middle and Lower Mississippi River provided a reliable 9-foot channel from Baton Rouge to St. Louis. Forty-six locks and dams offered the same navigable depth up the Ohio River to Pittsburgh, and similar works extended barge traffic to vital industrial and mining areas on the Allegheny, Monongahela, and Kanawha rivers. The once treacherous and unreliable Upper Mississippi featured a stair-step system of navigation pools created by 26 locks and dams that linked Minneapolis to other major transportation routes. Canalization of the Illinois River connected the Mississippi and the Great Lakes; while further south the Gulf Intracoastal Waterway (GIWW) neared completion, providing 12-foot navigable depths from Corpus Christi, Texas, to Florida's west coast. As war clouds gathered, the Mississippi River navigation system seemed prepared to meet the challenges of mobilization.

Providing a sound navigation system comprised only half of the World War II inland navigation mobilization story. Direct federal investment in the revival of the towing industry proved equally important. The glory days of Mississippi River packet boats lasted until the Civil War but the river fleet was devastated and only partially rebuilt after the end of hostilities. Waterways traffic fell off due to railroad expansion, and competitors expedited the demise of waterborne transportation by buying up Mississippi River packet lines to destroy the industry. By World War I, common carrier use of the Mississippi navigation system was at a virtual standstill. Steel, oil, and coal companies owned the few towboats and barges that plied the river.



The Defense Plant Corporation towboat Guadalcanal.
(St. Louis Mercantile Library Association)

Wartime demands so congested the railroads that Congress federalized all existing navigation equipment and allotted $3.9 million for the construction of new towboats and barges. In 1920, this federal barge service became the Inland and Coastwise Waterways Service that struggled because year-to-year funding inhibited effective planning. In 1924, Congress accepted proposals to transform the fleet into a publicly owned corporation with the creation of the Inland Waterways Corporation (IWC). The legislation provided for $5 million in stock subscribed entirely by the

federal government. Colonel Thomas Q. Ashburn, a Corps officer, became chairman-president of the IWC and enjoyed a free hand in managing its affairs. The legislation further stipulated that the corporation would be sold once private river traffic revived on the Mississippi River system.

The IWC met the expectations of its founders. From 1924 to 1938 the IWC achieved a total net profit of $2.9 million. Its books were in the black for 11 years of the 15-year period. In fact, 1938 was the most profitable in the corporation's history due to a 32.5 percent increase in tonnage handled throughout the system. Congress gradually extended the scope of IWC operations from the Mississippi and Warrior rivers to all improved tributaries of the Mississippi system. Federal barge traffic on the Illinois River opened in 1931 and by June 1933 operations opened to Chicago.

Throughout its first 15 years, the IWC demonstrated to the private sector the profitability of navigation on the inland waterways. The federal barge fleet complemented and vindicated Corps river improvement projects and attracted private carriers to the rivers. The IWC also made important advances in the field of navigation technology, fought tenaciously to establish joint rates and through routes with railroads, and helped communities build terminal facilities.

One of the IWC's first priorities was developing floating equipment designed for variations in river conditions. During the 1920s and early 1930s, the IWC was virtually the sole source of technological innovation in this field. Building on experimental towboat work conducted largely by the MRC before World War I, the IWC led the way in research and development of towboats, barges, methods of propulsion, and fuel economy. Much of this effort redounded to the benefit of the emerging private waterways industry.

The IWC also promoted the development of river terminals to handle freight. It loaned funds to state and municipal harbor commissions as well as private industries. Once built, the terminals were initially leased to the IWC for operation and maintenance. The corporation paid the owners 15 cents per ton of freight handled until the original investment was amortized—after which the IWC entered into a straight annual contract with the owners. To encourage river communities to build terminals, the IWC offered the services of

engineers who conducted traffic surveys, determined economic feasibility, and prepared preliminary designs. By the mid-1930s, 12 cities had built terminals either with direct aid or encouragement by the IWC.

Ironically, the IWC became the victim of the industry it revived. As private navigation companies developed on the Mississippi system, opposition to the corporation became strong and articulate. The once highly touted savior was deemed a government-owned competitor that stifled private investment in the waterways. Opposition also came from seaboard port interests, railroads, and river communities not served by the IWC.

After 1940, the IWC showed successive annual losses primarily due to shipping huge amounts of freight during World War II. The corporation, which was only reimbursed for direct expenses, was left at war's end with worn, obsolete equipment and no means of acquiring the capital to replace it. Consequently, profitable operations appeared hopeless, and its assets were sold to a private company for $9 million in 1953. The IWC was a unique, innovative undertaking that revitalized navigation on the inland waterways. Working in tandem with Corps navigation improvements, it helped resurrect the navigation industry that proved to be of significant strategic value during World War II.

Clearly the Corps and the towing industry were in a strong posture when the challenges of mobilization presented themselves. Some 1,000 towboats and 5,000 barges plied the inland waterways in 1941, confirming the successful stimulus of the IWC to waterborne transportation. The network of regulated rivers and channels performed admirably. The only additional major construction work involved deepening and widening the GIWW in 1942 to expedite the movement of petroleum.

The civil works program naturally suffered as materials, personnel, and machinery shifted to wartime objectives. The Corps sharply curtailed construction of dikes and levees although some bank revetment work continued. The MRC districts even returned to using willow mats for bank protection due to shortages of concrete, cable, and wire. Corps dredges remained in service keeping shallow crossings open during low water. Many employees joined the military while

the districts shifted their focus from river improvements to building air bases, camps, depots, coastal fortifications, barges, and industrial plants.

The appalling destruction of shipping by German submarines off the Atlantic and Gulf coasts in 1941 and 1942 required shifting much of the coastwise shipping to protected shallow-draft navigation routes. This placed an additional annual burden of some 100 million tons on inland barge lines and operators using the Gulf and Atlantic coastal waterways. The challenge to transportation planners far exceeded the daunting task of developing additional capacity to meet wartime demands. The burden placed on the transportation system included changing the pattern of commodity flow and exchange. Barge lines, railroads, and truckers found themselves moving unfamiliar commodities between unaccustomed origins and destinations. The war upset the normal balance of distance, load, and back haul. Furthermore, reallocations of strategic materials such as steel made it difficult to obtain new equipment, and terminals became badly congested. A complete realignment of rolling and floating equipment was required to coordinate the movement of commodities and determine which of the overtaxed transportation modes should carry specific categories of goods.

Clearly, all transportation mediums—waterways, highways, railways, pipelines, and airlines—needed coordination to ensure efficient movement of commodities, equipment, and military personnel. This effort also required careful consideration of civilian needs and the overall health of the economy. By early 1942, all ocean tankers not sunk by enemy submarines were withdrawn from the Gulf-Atlantic coastwise trade and assigned to convoy duty. This decision presented difficult circumstances. The task of moving vast quantities of petroleum products from Texas and Louisiana oil fields and refineries, normally handled by coastwise shipping, fell to other forms of transportation. Meeting this challenge required major changes in the movement of waterborne traffic and direct federal regulation of the industry. Less than two weeks after Pearl Harbor, President Franklin D. Roosevelt signed an executive order creating the Office of Defense Transportation (ODT) and charging it with coordinating the nation's transportation system. River transportation fell under the

auspices of the Inland Waterways Division of the ODT Waterways Transportation Department. Two other divisions covered Great Lakes and coastal traffic.

In June 1942, ODT issued its General Order Number 19 that sought to increase the flow of petroleum and its products to Atlantic Coast ports by regulating the routes of inland vessels. Under its provisions, all inland craft designed or converted for moving bulk liquid cargo could be operated only when authorized by the ODT. The ODT required permits for tows or vessels moving oil and gasoline in any direction other than generally north and east—the areas of deficit. Cross hauls and back hauls were thus eliminated and the flow of barges speeded up. Subsequent ODT orders regulated the leasing, chartering, and operation of all inland towboats and barges to ensure these important resources met strategic needs and expectations.

For most of the war, ODT focused its efforts on moving petroleum products from west to east to meet domestic and military fuel requirements. Most naval ships and oceangoing transports bunkered on the East Coast and required a reliable supply of fuel. Virtually all tankers carrying refined products to overseas destinations merged into large convoys of other merchant ships transporting military personnel and the implements of war to the European theater.

A shortage of available barges, particularly tanker barges, delayed the towing industry's ability to shoulder its added responsibility. Obtaining new equipment was difficult since shipyards competed with other strategic manufacturers for steel and essential equipment. Nevertheless, an "energy crisis" on the East Coast required the inland waterways to play a major part in mobilization. In the spring of 1942, the government wrestled with an oil shortage on the Atlantic Coast. The daily domestic and export demand exceeded 1.3 million barrels; the daily shortfall stood at 175,000 barrels.

In 1942, the Corps, at the request of the Director of Defense Transportation, transmitted a report to Congress prepared by the Board of Engineers for Rivers and Harbors entitled *Use of Barge Transportation for the Movement of Petroleum*. The study estimated that railroads and pipelines could move only 700,000 barrels per day, requiring tankers

and barges to handle 600,000. With most oceangoing tankers engaged in merchant shipping, it seemed apparent that the inland waterway system should take up the slack.

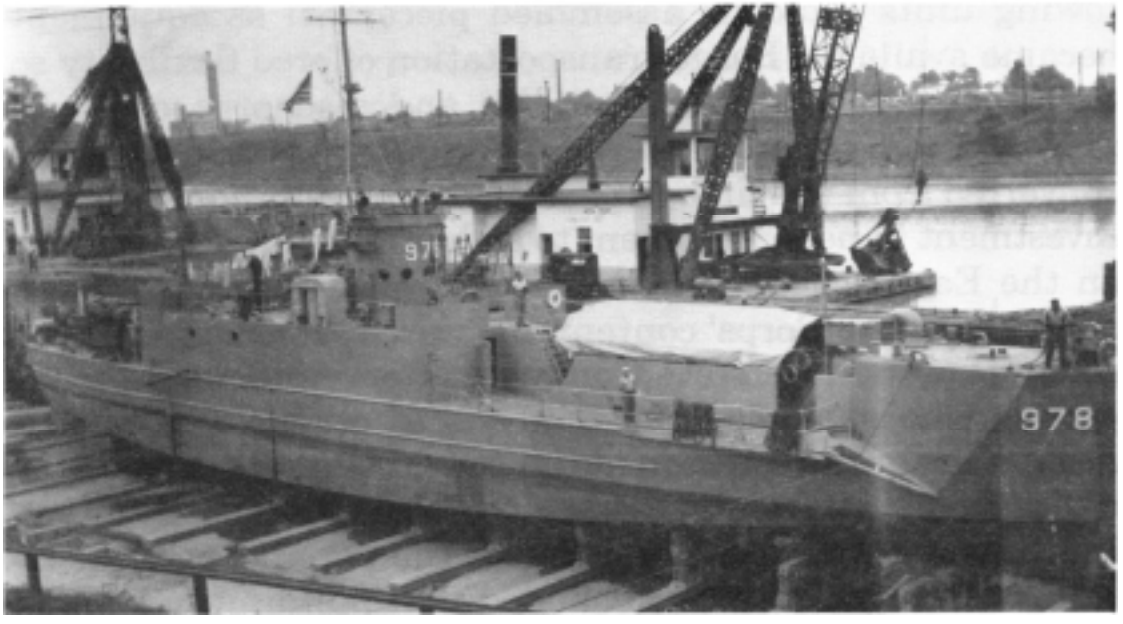
The Corps' report discussed three alternative routes for supplying petroleum to the East, each using a combination of transportation modes. However, they all featured a prominent role for barges. While acknowledging some obvious shortcomings in barge utilization—such as their slowness and the need for new equipment—the report noted many advantages. The first was cost. At that time, the average unit cost of transporting oil by barge was 1.25 mills per ton mile; by pipeline 3.2 mills; and by rail 8.3 mills. The study also noted that shifting more oil to barges could be done quickly since towing units could be assembled piecemeal as equipment became available. Barge transportation offered flexibility so that routes and points of pickup and discharge could be rapidly altered. Finally, barges and towboats could be easily converted from wartime to peacetime use. Consequently, the investment in new equipment to address the immediate crisis on the East Coast would not be lost once the war ended.

Many of the Corps' contentions were corroborated by the findings of the Interstate Commerce Commission and other groups who expanded the analysis to other commodities. *Fortune* magazine examined the cost of shipping 5,000 tons of finished steel from Pittsburgh to New Orleans. The cost, it discovered, was $32,550 by barge compared to $72,000 by rail. The magazine also concluded that building railcars to carry 60,000 barrels of oil would consume five times as much steel as a corresponding barge capacity. In 1942, the largest steel barges could carry 3,000 tons of freight, the equivalent of 75 box cars. A large towboat could push 30 or more barges, the equivalent of 375 freight cars or 7 average trains. During the war, the average tow was 5,000 tons or roughly 126 freight cars.

Without doubt, the movement of crude oil and refined petroleum products constituted the greatest contribution of the inland waterways and towing industry to the nation during World War II. Throughout the war, IWC and privately owned towboats pushed tank barges with a capacity of 5,000 to 18,000 barrels, assembled into 120,000-barrel units capable of moving the equivalent of two full trainloads or one large

oceangoing tanker. On the intracoastal waterways, tugboats handled tows up to 40,000 barrels, while on the Great Lakes, self-propelled barges and lake tankers carried large cargoes of petroleum. From mid-1942 to the close of the war, this vast inland fleet handled more than 1 million barrels per day.

During April 1943, petroleum products moved north and east along the inland routes in the following daily pattern: 52,000 barrels passed New Orleans going east along the GIWW, 62,000 barrels passed Baton Rouge heading north, 98,000 barrels passed Memphis going north, 78,000 barrels passed Cairo heading east on the Ohio River, and 28,000 barrels passed Cincinnati going east on the Ohio River.



Navy ship in dry dock at Lock and Dam 41 on the Ohio River.
(St. Louis Mercantile Library Association)

Meeting the mobilization challenge meant establishing new waterways shipping patterns, expanding old ones, and working out intermodal transfers with railroads and pipelines. Heating oil, gasoline, and aviation fuel began moving up the Mississippi River system in great quantities to points as far north as the Twin Cities and Pittsburgh. Tows of crude oil passed up the Mississippi, Ohio, and Kanawha rivers to inland refineries that converted it to gasoline which reached the East Coast by rail and pipeline. The products of Texas refineries moved eastward along the GIWW to Carabelle, Florida, where a rapidly constructed pipeline carried gasoline

to Jacksonville. From there it moved northward by barge along the Atlantic Intracoastal Waterway.

The linkage of barges and pipelines proceeded apace. In addition to the critical Carabelle connection, pipeline-barge terminals operated at locations such as Helena, Arkansas; Richmond, Virginia; Wood River, Illinois; Mt. Vernon, Indiana; and Steubenville, Ohio, among others. Thus, towboats and barges assumed the responsibility for one lap of the long journey from wells and refineries to points of consumption.

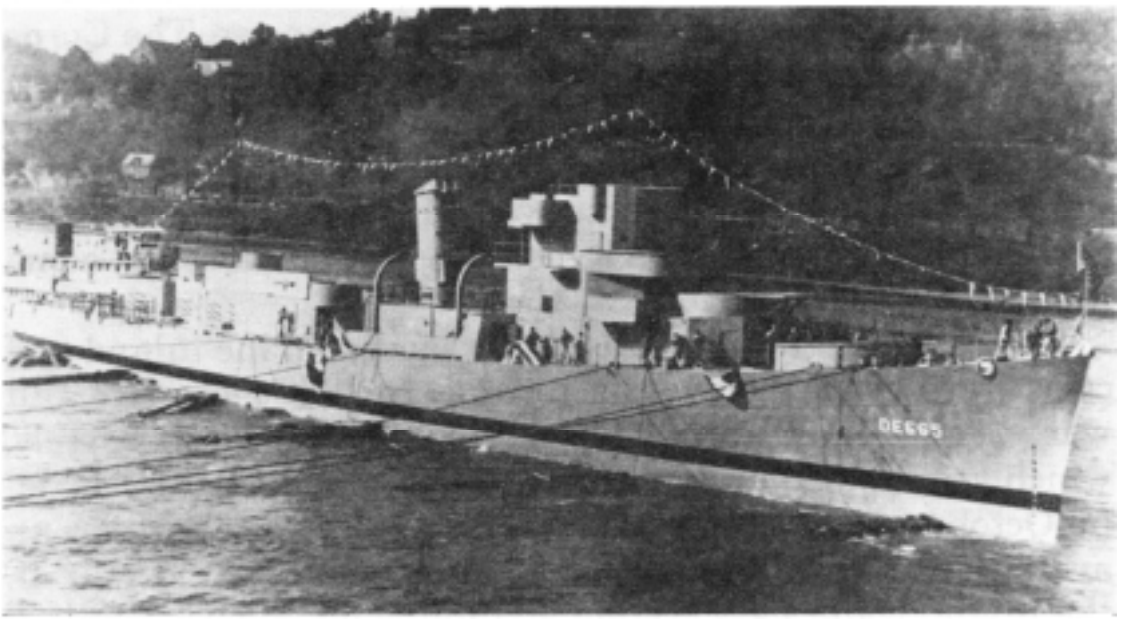
The incessant demand for petroleum products required the conversion and construction of additional floating equipment. The ODT sponsored an extensive power boat and barge building program funded by the Reconstruction Finance Corporation and executed by the Corps' Philadelphia District. This effort added 21 modern 2,000-horsepower towboats and 125 new steel tank barges to the inland fleet. In addition, 116 dry cargo steel barges were taken from the IWC and private carriers and converted to liquid cargo use. The Corps also managed construction of 100 powerful tugboats for operation overseas and on the GIWW, as well as 245 emergency wooden tank barges put into service due to the lack of steel. Collectively, the new and converted barges increased the petroleum carrying capacity of the inland fleet by some 2.2 million barrels.

The former stream of petroleum moved on the inland and coastal waterways grew to a torrent. In 1942—the first full war year—inland waterways carried 406.2 million barrels, which grew to 528 million in 1944. The peak month occurred in October 1944. Tows delivered 50.4 million barrels, an average of 1.7 million barrels a day. During World War II, the inland waterways system accounted for some 1.8 billion barrels, a daily average of some 1.3 million barrels. When one considers that the daily refinery capacity of the United States was 5 million barrels, it is apparent the inland waterways comprised the vital link in the petroleum transportation network.

Even though petroleum comprised the major commodity of inland waterborne traffic, barges also handled other strategic materials such as coal, steel, sulfur, toluene, and other chemicals. The improved waterways of the Mississippi

River system also served as a highway for thousands of Army and Navy vessels built at inland shipyards along the Mississippi and Ohio rivers. This enabled the large coastal shipyards to focus on constructing warships and large merchant vessels.

Inland shipyards built nearly 4,000 craft of various types during World War II. These boats that came down the Mississippi River included submarines, frigates, destroyer escorts, minesweepers, small cargo vessels, and landing craft. New shipyards sprang up throughout the Mississippi and Ohio river valleys, often on land purchased by the federal government. The Cargill Corporation, for example, created a shipyard in former cornfields at Savage, Minnesota, and on the Minnesota River near Minneapolis. The "Meadowland Shipyard" produced small oil and gas tankers for the Navy that remained in service until the 1970s. The *Namakakon*, launched on 28 October 1944, delivered fuel



Destroyer escort built at Pittsburgh, Pennsylvania.
(Mississippi River Commission History Center)

oil to Pearl Harbor and shuttled oil and gas to the central Pacific island naval bases. The *Mattabesset*, launched in November 1944, also made fuel runs to Pacific islands before being transferred to the Atlantic Fleet. Inland shipbuilding firms pridefully noted that many of these vessels were built by former tradesmen and farmers with no prior experience in marine engineering and construction.

Some 40 river pilots joined the Coast Guard and assumed the responsibility of ferrying vessels built at inland shipyards down the tributaries and main stem of the Mississippi to the Gulf. In many instances, innovations enabled larger craft such as submarines to safely pass through the inland navigation system. For example, 28 submarines built at Manitowoc, Wisconsin, on Lake Michigan, entered the Illinois waterway at Chicago before being placed in special floating dry docks at Lockport, Illinois. The largest IWC towboats, especially the *Minnesota*, moved the submarines under strict security. They went southward only at night, and military as well as local law enforcement authorities stopped traffic on all bridges as they passed beneath them.

Landing craft comprised the largest category of inland shipyard production. Landing ships, tank (LSTs) and similar vessels built far from the Atlantic and Gulf coasts collectively could accommodate the movement of more than a million tons of cargo or 175,000 invading troops. One LST, the 512, participated in war bond sales and other public affairs activities before going to war. It visited a host of river towns with its deck converted into a Pacific island scene featuring a Japanese Zero, two artillery pieces, and a Sherman tank. The display also included a miniature beachhead operation painted by combat artists. When the LST arrived at St. Louis, the bow ramp opened and an "alligator" amphibious landing vehicle and a tank splashed into the water and went ashore.

The waterways industry underwent a painful transition during the war despite the upsurge of petroleum movement. River commerce experienced a renaissance in the 1930s thanks to navigation improvements and the stimulus of the IWC. Total annual tonnage on the Mississippi system increased by 70 percent between 1939 and 1941—from 58.4 million to 99.6 million tons. Nevertheless, from 1942 to the end of the war, tonnages generally stagnated and fell to a low of 95.5 million in 1945. Clearly, in one sense the war disrupted a healthy towing industry growth that did not recover until 1947 (118 million tons). Yet, the opening of new markets, traffic patterns, and intermodel linkages laid the foundation for huge postwar expansion that climbed to 138.1 million tons in 1950.

Total Tonnage of Traffic on Mississippi River Navigation System, 1939-1950	
1939	58,420,985
1940	88,980,317
1941	99,595,957
1942	100,351,044
1943	93,561,533
1944	101,340,788
1945	95,543,335
1946	95,648,203
1947	117,973,935
1948	125,437,742
1949	122,313,602
1950	138,144,871

Total tonnage of traffic on Mississippi River navigation system, 1939–1950. (Commercial Statistics, 1940–1951, *Volume 2,* Annual Reports, Chief of Engineers)

In the first year after Pearl Harbor, the navigation system experienced a painful transition. By 1941, a balanced pattern of river traffic had developed with roughly 55 percent moving upstream and 45 percent downstream on the Mississippi River and its navigable tributaries. Coal moved downstream to mills throughout the Ohio Valley; grain arrived at Baton Rouge and New Orleans for the export and coastwise trade; barges delivered steel to locations throughout the inland and coastal system; and many types of manufactured items moved south for foreign and coastal markets.

The war radically altered this comfortable and prosperous pattern. Hostilities shut off export movements of grain and many other commodities. The government requisitioned all coastwise boats, further limiting the southbound movement of goods. The transport of steel shifted almost entirely to rails since it was urgently needed at coastal shipyards. The towing industry gradually recovered steel contracts, but the annual volume never attained prewar levels. Bulk shipments destined for the West Coast through the Panama Canal shut down before the war began. Finally, government restrictions on warehousing nonstrategic items further retarded the flow of

commodities such as sugar to the Gulf. Some new southbound movements sprang up of commodities such as soybeans, benzol, and naval craft; but, for the most part, the once balanced pattern changed to 85 percent northbound and 15 percent southbound. The mix of northbound commerce also altered considerably. Prior to the war, petroleum products, sulfur, sugar, and imports such as coffee, cocoa, and rubber moved northward via barge. After December 1941, imports were choked off and sugar was tightly rationed. However, increased demand for petroleum, sulfur, and scrap metal more than compensated for these losses.

Expanded commerce prompted Lower Mississippi interests to advocate a deeper channel between Cairo and Baton Rouge. As a result, the 1944 Flood Control Act authorized a 12-foot channel for this reach of the river. A channel improvement program consisting of revetments, dikes, and dredging would achieve the channel improvement. Bottlenecks on the GIWW induced Congress to approve a dredged canal from the Rigolets (an outlet of Lake Pontchartrain) to the inner harbor at New Orleans. This expedient measure sparked interest in a deep-water ship canal project that resulted in the subsequent authorization (1956) and completion of the Mississippi River-Gulf Outlet in 1965. Further north, the disruption of strategic transportation prompted the Corps and Congress to address the treacherous chain of rocks that jutted from the Mississippi's west bank between the mouth of the Missouri River and St. Louis. In 1945, Congress authorized a bypass canal and locks system (No. 27) that eliminated this major hazard.

The contributions of the inland waterways during World War II lubricated congressional approval for navigation and harbor projects at Minneapolis, Memphis, Baton Rouge, and other inland cities. The influx of federal dollars spurred municipal and private sector investment in terminal facilities which stimulated river commerce following the war. Petitioners besieged Congress for assistance in creating and upgrading harbors. The anticipation of a 12-foot channel from Cairo to Baton Rouge and improvement of the ship channel through the passes encouraged commercial interests to expeditiously develop port facilities.

At Memphis, the existing topography limited port expansion. The crowded shore facilities strained under a wartime burden of nearly 4 million tons per year. The existing 36 port terminals failed to accommodate the anticipated growth in river traffic, and expansion seemed improbable due to the geologically constrained site. In October 1945, Brigadier General Max Tyler, president of the Mississippi River Commission, presented a plan to Memphis city fathers that served as the precursor for ports elsewhere on the river. The "Tyler Plan" proposed blocking off a chute that carried a portion of the Mississippi's flow around President's Island just south of Memphis. The remainder of the chute would be dredged out as a slackwater harbor for Memphis. The enlarged chute would open a huge expanse of land for the development of port facilities by city and private interests. The project was authorized in 1946 and work began in 1948, but due to funding cutbacks, it was built in stages and not completed until 1967. By that time, the harbor was already handling nearly 8 million tons of cargo annually.

The Devil's Swamp Harbor near Baton Rouge also sprang from the World War II experience. Because the city stood at the upper end of a corridor of heavy industry that flanked the river south to New Orleans, developers correctly assumed that Baton Rouge should be a major deep-water port with facilities to match. Devil's Swamp, just north of the city and a former chute of the Mississippi, offered a logical port site. The harbor, authorized in 1948, called for 5 miles of dredged channel in increments of 2.5 miles each. Construction of the first portion began in January 1958 and finished in July of the following year. Within ten years, annual harbor tonnage grew from 41 to 77 million tons.

The waterways of the Mississippi River navigation system provided a vital transportation link during World War II. Thanks to the Corps and the IWC, the nation reaped the benefits of a revived towing industry and a safe, reliable waterway system. World War II also stimulated the latent growth of waterborne commerce, which did not manifest itself until after the war. During the conflict, tonnages carried by barges fell slightly even though certain bulk commodities could be transported more efficiently by river than rail.

Ultimately, the vast network made two major contributions to victory: providing a thoroughfare for military vessels built at inland shipyards and facilitating the flow of petroleum products to the oil-short East Coast. In every other respect, the waterways played an essentially backup and supplementary role.

Yet, the war years served as a transition period beginning with the renaissance of the inland navigation industry and closing with the dawn of a new golden era of unprecedented growth. The cost-effectiveness of waterborne transportation, the abundance of new equipment built at federal expense and sold after the war, the continuing efforts of the MRC and other Corps entities to make the rivers more navigable, and the general boom of the postwar period reaffirmed that waterways are a cornerstone of economic prosperity and national defense.

Sources for Further Reading

An overview of wartime transportation challenges may be found in Chester Wardlow, *United States Army in World War II. The Technical Services. The Transportation Corps: Movements, Training, and Supplies* (Washington, DC: GPO, 1956).

For specific information on the Mississippi River and other waterways see T. Michael Ruddy, *Mobilizing for War: St. Louis and the Middle Mississippi During World War II* (St. Louis: St. Louis District, U.S. Army Corps of Engineers, 1983) and Edward Hungerford, *Transport for War*, 1942–1943 (New York: E.P. Dutton and Co., 1943).