NPS Form 10-900
(Rev. 8-86)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations of eligibility for individual properties or districts. See instructions in *Guidelines for Completing National Register Forms* (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property

historic name LONESTAR

other names/site number Towboat LONE STAR

2. Location

street & number Buffalo Bill Museum ☐ not for publication

city, town LeClaire, ☐ vicinity

state Iowa code IA county Scott code 163 zip code 52753

3. Classification

Ownership of Property	Category of Property	Number of Resources within Property	
		Contributing	Noncontributing
☒ private	☐ building(s)		buildings
☐ public-local	☐ district		sites
☐ public-State	☐ site	1	structures
☐ public-Federal	☒ structure		objects
	☐ object	1	Total

Name of related multiple property listing:

Number of contributing resources previously listed in the National Register 0

4. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this ☐ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. ☐ See continuation sheet.

Signature of certifying official — Date

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. ☐ See continuation sheet.

Signature of commenting or other official — Date

State or Federal agency and bureau

5. National Park Service Certification

I, hereby, certify that this property is:

☐ entered in the National Register.
☐ See continuation sheet.

☐ determined eligible for the National Register. ☐ See continuation sheet.

☐ determined not eligible for the National Register.

☐ removed from the National Register.

☐ other, (explain:)

Signature of the Keeper — Date of Action

6. Function or Use

Historic Functions (enter categories from instructions)	Current Functions (enter categories from instructions)
TRANSPORTATION—Water-related	RECREATION AND CULTURE—Museum
INDUSTRY	

7. Description

Architectural Classification (enter categories from instructions)	Materials (enter categories from instructions)
N/A	foundation N/A
	walls N/A
	roof N/A
	other N/A

Describe present and historic physical appearance.

Lone Star, official no. 222089, is a wooden, steam-powered, sternwheel-propelled, towboat. She is owned by the Buffalo Bill Museum and open to the public in a dry-berth located on the Mississippi waterfront at LeClaire, Iowa. Both the hull and superstructure are built of wood, and the hull is supported by a hogging truss system in the traditional manner of Western Rivers steamboats. Lone Star's large sternwheel is propelled by a simple high-pressure, non-condensing, reciprocating steam engine.

Lone Star was built in 1868 at Lyons, Iowa, as a short trade packet. She was converted to a towboat in 1876. She was lengthened in 1890 at Rock Island, Illinois and re-enrolled with a new official number, 141082. The boat was rebuilt in 1922, when worn and rotten parts were replaced and another official number, 222089, was assigned. She is one of only three remaining Western Rivers steam towboats and the only remaining example of a wooden-hull boat built in the traditional Western Rivers fashion. Though enlarged, Lone Star retains much of her original fabric from 1868 and most of her appearance from her last major rebuilding in 1922.

Hull

Lone Star's wooden hull has a pointed bow, a flat bottom, hard chine, and a gentle upswept stern run. The hull form and construction are typical of the period between 1860 and 1900. She measures 90 feet long, with an overall length including sternwheel of approximately 105 feet. She is 24.5 feet wide and her depth of hold is 4.1 feet. [1] When built, she was 68.4-feet long, 19.3-feet broad and 3.2-feet in depth of hold. [2] She was rebuilt in 1890, increasing her length to 84 feet and her breadth to 20 feet. [3] The boat was lengthened and broadened in 1922 for sand and gravel dredging duties. The length was increased by adding 6 feet to the hull and superstructure ahead of the pilothouse and the boilers for greater coal stowage. The additional width probably offset the added weight of the sand pump installed in the engine room. [4]

[X] See continuation sheet

8. Statement of Significance

Certifying official has considered the significance of this property in relation to other properties:

[X] nationally [ ] statewide [ ] locally

Applicable National Register Criteria [X] A [ ] B [X] C [ ] D

Criteria Considerations (Exceptions) [ ] A [ ] B [ ] C [ ] D [ ] E [ ] F [ ] G

Areas of Significance (enter categories from instructions)	Period of Significance	Significant Dates
Maritime History	1868-1956	1868
Transportation		1876
Engineering		1890
Industry		

Cultural Affiliation
N/A

Significant Person
N/A

Architect/Builder
Various

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.

Towboats have been employed moving barges on all the navigable waters of the Western Rivers, and have been an important component of the American transportation system since the 1850s. Lone Star, was built in 1868 at Lyons, Iowa, as a short trade packet. She was converted to a towboat in 1876, lengthened in 1890, and rebuilt in 1922. Although enlarged, Lone Star retains much of her original fabric from 1868 and most of her appearance from her last major rebuilding in 1922. She is the oldest of three remaining Western Rivers steam towboats and the only surviving example of a wooden-hull boat built in the traditional Western Rivers fashion. [1]

The preceding statement of significance is based on the more detailed statements that follow.

The Development of Western Rivers Watercraft

The Western Rivers system, composed of the Mississippi, Ohio, Missouri, and other tributary rivers, carried most of the immigrants and freight that settled the Midwest. Starting in the late 1700s, most settlers traveled from the East Coast overland to Pittsburgh, Wheeling, or Redstone, and then down the Ohio River to points west. [2] Only a small number traveled north from New Orleans and southern regions using the Mississippi and other rivers flowing from the North.

To reach the new lands of the West, Europeans adapted boat types already in use by Native Americans and on the East Coast. Explorers used birch bark canoes, and settlers used larger dugouts to open the West to settlement. As more people moved west, boats with greater capacity were needed, which called for new boat types. A form of enlarged dugout, called a pirogue, was developed first. Pirogues were more capacious than dugouts and were themselves adapted into more useful forms. The first adaptation changed the method of construction

[X] See continuation sheet

9. Major Bibliographical References

[X] See continuation sheet

Previous documentation on file (NPS):

- [ ] preliminary determination of individual listing (36 CFR 67) has been requested
- [ ] previously listed in the National Register
- [ ] previously determined eligible by the National Register
- [ ] designated a National Historic Landmark
- [ ] recorded by Historic American Buildings Survey # _____
- [ ] recorded by Historic American Engineering Record # _____

Primary location of additional data:

- [ ] State historic preservation office
- [ ] Other State agency
- [ ] Federal agency
- [ ] Local government
- [ ] University
- [ ] Other

Specify repository: _____

10. Geographical Data

Acreage of property _____

UTM References

	Zone	Easting	Northing
A	15	722605	4609408
B			
C			
D			

[ ] See continuation sheet

Verbal Boundary Description

All that area encompassed within the extreme length, beam, and draft of the vessel.

[ ] See continuation sheet

Boundary Justification

The boundary incorporates the entire area of the vessel.

[ ] See continuation sheet

11. Form Prepared By

name/title Kevin J. Foster/Historian

organization National Park Service (418) date July 10, 1989

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Like most Western Rivers steamboats, Lone Star's hull is supported by a hogging truss system, which in effect makes the hull one large girder. Lone Star is divided internally into three watertight compartments by two athwartships bulkheads. Two longitudinal bulkheads rise from side keelsons, parallel to the center keelson, and are firmly bolted to the deck beams. Two rows of three wooden beams, called braces, rise from the side keelsons high above the hull. Iron rods, called hogging chains, tie the braces together, and to the hull at bow and stern. These allow the buoyancy of the entire hull to support the weight of heavy fittings such as the engines and boilers. On Lone Star, the hogging braces and chains are visible where they extend through the superstructure. Construction details survive from before each rebuilding, and are the best source of identifying the types of changes made over time. [5]

Access to the hull is through two small hatches set into the forward face of the superstructure, two small hatches let into each side of the superstructure, and a single hatch offset to port of the centerline in the engine room. The engine room hatch gives access to the rose box where the bilge pump draws water from the hull. Built-in ladders assist in negotiating the tortuous entries into the hull.

Superstructure

The superstructure of Lone Star consists of two decks: the main, on which the propelling machinery is located, and the boiler deck above the boilers, which supports the pilothouse and quarters for the crew. Lone Star was built with a superstructure capable of being opened for ventilation during hot weather and closed for warmth in cold weather. Removable wooden panels cover midships openings and horizontal wooden shutters cover engine room openings. The superstructure is lightly constructed, designed with a bare minimum of weight but considerable strength.
Four large sliding doors, on the port and starboard sides of the superstructure, give access to the interior. The main deck superstructure interior is one large compartment with spaces defined by the placement of large machinery. The coal bins are forward, the boilers next, and the engines aft.

Foredeck

The main deck at the bow extends beyond the hull to produce a squared-off front face. The deck is fitted with two heavily reinforced vertical stanchions, called towing knees. Lone Star has two wooden towing knees on her bow. They are supported by braces both above and

below the deck. A heavy wooden towing bitt is mounted between the knees. A steam-powered windlass is offset to port behind the towing bitts and a double manual capstan is aft of the windlass on the center line. The capstan cover has raised lettering; "American Ship Windlass Co. Makers, Providence, R.I. 1874 & 1878"

Boilers

The forward part of the superstructure supports the coal bins. The boiler room is aft of the coal bins. The two boilers are connected by a mud drum below and a steam drum above. The mud drum gathered sediments precipitated out of boiler water, from which they were periodically blown overboard. The cylindrical boilers were fired from the front with bituminous coal. Coal was fed from the coal bin overhead by gravity to the deck and shoveled into the boiler fireboxes. The fire passed beneath the water to the back of the boiler and returned through the water to the uptake by way of two large diameter flues per boiler. Exhaust gasses passed through uptakes above the fire box and exited the boat through smokestacks to port and starboard. Steam produced by the boilers was extracted from the steam drum and passed through the main steam line overhead to the engine room. [6]

The boiler assembly is covered by a sheet steel jacket that once supported the asbestos refractory material covering the boilers. All asbestos material was removed by state order for public safety reasons. The current boilers may be the original set fitted to Lone Star in 1868. They are return-flue boilers, 44 inches in diameter, and 24 feet long, rated for 240 PSI. They are of the type popular between 1850 and 1900.

Three types of instruments indicate the level of water in the boilers. They also indicate improvements in marine engineering applied over time to the boilers. The oldest form of instrument is a vertical row of three small spigots, called test cocks, set into the back of each boiler. The water level is found by opening each one briefly to see whether steam or water comes out. The next oldest type, called a Van Duzen gauge for the inventor, is a clock face gauge activated by a float inside the center boiler. The third, and most modern type of water level indicator, called a sight glass, is a pipe, open at the top and bottom to the rear of the boiler. The sight glass is a heavy glass window set into the pipe through which the water level can be viewed. The redundancy of water level indicators assures that the water will not be allowed to drop low enough to damage the boilers. [7]

A small crew's "john" is located on the starboard side of the superstructure behind the boilers. It contains a shower, toilet and sink. The passageways on deck outboard of the superstructure are narrow and have no rails. Crew members could walk from the bow aft to the engine room by way of the passageways to port and starboard.

Engine Room

The engine room occupies the entire width of the stern and contains the engines, rudders, auxiliary machinery, and engine controls. The engines are mounted to port and starboard in the engine room on massive structural members, called cylinder timbers. The cylinder timbers support the cylinders and crossheads at their inboard ends and the paddlewheel shaft at the after end. The cylinder timbers both showed evidence of dry rot and are slated for renewal.

Western Rivers steamboat engines showed a great deal of variety in design from one builder to another. The most popular types of engine used variable cut-off steam valves. They are high-pressure, non-condensing engines equipped with an adjustable or variable cut-off. Two eccentrics controlled the admission and cut-off of steam to the valves on the cylinders.

Steam was admitted into the cylinders by the steam valves and expanded in the cylinders to push the pistons. Each piston pushed a heavy crosshead along a slide attached atop the cylinder timbers. The crosshead pushed and pulled the pitman (an overgrown connecting rod) which turned the crank and thus the paddlewheel. The cylinder is 12 inches in diameter and has a five-foot stroke. [8]

The 15-foot wide paddlewheel propeller is mounted at the stern. Four flanges, holding fourteen arms each, are evenly spaced along the paddleshaft. The arms are held rigid by iron circles and wooden blocking. Each arm and flange assembly forms one segment of the entire paddlewheel. The ends of the arms on each segment are attached to the paddle bucket planks which push the boat. The wheel is painted dark red with the iron circles painted white. [9]

A number of auxiliary steam engines powered various pumps and generators. Lone Star did not use gas or Diesel motors while in service. A steam reciprocating doctor pump is mounted between the engines. It supplied water to the boilers, provided fire protection, and pumped out the bilge. A large sand pump is mounted forward of the doctor, was used after 1890 to dredge sand and gravel from the river

bed for construction. A Moon steam turbine electrical generator, mounted aft of the doctor, provided power for lighting.

All engine room controls are located just aft of the boilers. A system of three bells, connected to the pilothouse, guided the engineer on duty as to what speed and direction (forward or reverse) was desired. The port bell called for astern and slow speeds, the center bell for dead slow and full stroke, and the starboard bell for full ahead and stop.

Steering was controlled from the pilothouse, but much of the multiple rudder system was located in the engine room. Cables led down from the pilothouse wheel moved the central tiller arm at the rear of the boat. This central tiller arm is yoked to two other rudders for additional control in maneuvering. Lone Star is unusual for her tillers and rudders built entirely of wood. The rudders are made up of heavy vertical planks bound by a steel strap around the edges. Each operates in a box cut through the hull called a dollar hole, because that is where "valuable" kitchen scraps were thrown overboard. Sometime in the 1950s, two steel monkey rudders were installed on a frame aft of the paddlewheel for extra control in steering.

Boiler Deck

The deck over the boilers in towboats supported cabins for the officers and crew. Access is by way of a single stairway set into the front of the superstructure on the centerline forward. The boiler deck holds the pilothouse, the captain's cabin, and three crew cabins. The crew were housed in double and single cabins, with doors opening to each side. The cabins are cooled by opening small ventilating windows just under the ceiling, and heated by steam radiators, and the heat radiated by the boilers and engine room. The cabin house is wider than the pilothouse
and is connected by angled walls to the rear of it. The rear of the cabin house and the eaves are gracefully curved.

Pilothouse

The pilothouse is built of wood, with large sliding windows all around. It is raised above the level of the boiler deck house to allow the steersman 360 degree visibility. The roof is flat with a very slight crown and curved outer eaves.

The main feature of the pilothouse interior is the large ship's wheel at the forward side, half hidden by the floor. This wheel steers the

boat by means of cables which run down to the stern. A foot brake in the pilothouse floor uses leather pads to stop and hold the wheel at the desired rudder angle. Lone Star is one of very few surviving steamboats equipped with this method of steering, which Mark Twain would have found familiar.
The pilothouse is surrounded by sliding windows which can be moved out of the way for clearer visibility. The front face is also fitted with chest boards which protect the person at the wheel from some of the rain and wind.

Rig

Like most other towboats, which must pass under low bridges, Lone Star does not step any masts. She does possess a flagstaff at the stern bulkhead, called a verge, which can be unstepped if needed.

Boiler exhaust travels up from the boilers on two sides and out of the boat through two narrow smokestacks. Western Rivers style high-pressure engines exhausted steam to the atmosphere rather than condensing it for reuse. The steam left the boat through 'scape pipes through the roof to port and starboard amidships. [10]

Notes

1
United States Treasury Department, Bureau of Customs, Merchant Vessels of the United States 1952 (Washington, D.C.: U.S. Government Printing Office, 1952) p. 321.

2
Frederick Way, Jr., Way's Packet Directory; 1848-1983 (Athens, Ohio: Ohio University, 1983) p. 292.

3
United States Treasury Department, Bureau of Navigation, Merchant Vessels of the United States 1898 (Washington, D.C.: U.S. Government Printing Office, 1898) p. 261.

4
Merchant Vessels...,1952, Op cit. p. 321.

5
Alan L. Bates, The Western Rivers Steamboat Cyclopoedium (Leonia, New Jersey: Hustle Press, 1968) pp. 22-26.

6
Bates, Steamboat Cyclopoedium, pp. 41-44.

7
Reports and Documents upon the subject of The Explosions of Steamboat Boilers (Washington, D.C.: Duff Green, 1833) passim.

8
James H. Rees, James Rees & Sons Company, Illustrated Catalog (Pittsburgh: N.P., 1913) pp. 30-31, and "No Picture This Week of a Steamboat of the Past" The Waterways Journal (ND, 1957, St. Louis, Missouri) p.11.

9
Bates, Steamboat Cyclopoedium, pp. 92-97.

10
Frederick Way, Jr., Pilotin' Comes Natural (New York: Rinehart and Company, 1943) pp. 265-266.

by taking the well-formed hull shape of the pirogue and replacing the hewn multiple-log construction with European plank-on-frame construction. [3]

Plank-on-frame construction was also used for another boat type called the bateau. Bateaus were adapted for frontier use on the eastern seaboard in the early 1700s and were later built for use on the Western Rivers. When more traditional European construction practice was followed with these vessels, they resembled ship's boats, but with more substantial timbers. When the best features of pirogues and bateaus were combined, they were given a hull shape that provided little resistance to the water, an external keel to help in steering, and sufficient cargo capacity to pay their way. This new type was called a keelboat. [4]

Keelboats were the most developed form of watercraft on the river and were used for rapid transportation of passengers and high value freight. Keelboats were usually 40 to 80 feet long and 7 to 10 feet wide. They possessed a well-modelled form, and could be propelled about 15 miles a day, either by oars at the bow or by poles pushed by the crew walking along a footway at each side. A single steersman stood atop a block at the stern to guide the keelboat using a long steering oar. Some keelboats sailing an advertised route on a regular schedule, came to be known as packets, the deep-water term for vessels in such service. [5]

Cheaper transportation was afforded by barges and flatboats. Flatboats were box-shaped variants of the scow hull form used as ferries on shallow Eastern rivers. Flatboats were the cheapest form of transportation on the rivers. Intended to travel only one way and then be broken up for lumber, flatboats were built, loaded with household goods, and sailed by the settlers themselves. [6]

Barges occupied the middle range of watercraft between keelboats and flatboats. Though similar in construction to keelboats, early barges were built wider, more robustly, and drew more water. Barges, with their deeper draft, transported heavy freight on the deeper rivers. [7]

Development of the Western Rivers Steamboat

Robert Fulton built the steamboat New Orleans at Pittsburgh, Pennsylvania, in 1811, and started a revolution which changed the pattern of commerce on the rivers. New Orleans proceeded down the Ohio and Mississippi rivers to her namesake city, attracting publicity and

attention along the way. Steamboats would provide convenient, inexpensive transportation and greatly facilitate the opening of the continent to settlement.

New Orleans, and the boats which were built on her pattern, were powered versions of canal boats. Their long, narrow, deep hulls were better suited to deep eastern rivers than the shallow Mississippi, but were needed to support heavy steam machinery. Another form of boat and engine was required for Western Rivers operation, following a different line of development from Fulton's. A number of unique design problems had to be overcome before steamboats could be a success on the Western Rivers. [8]

To navigate on the shallow rivers of the West, steamboat hulls and machinery had to be made as light as possible. Machinery weight problems were solved first. A lightweight, high-pressure engine was employed to propel the small boat Comet in 1813. The power plant was further refined in 1816 by Henry Shreve, who put the boilers on deck and designed a new type of engine to distribute machinery weight over a large area of the hull. Shreve's new engine design used a direct-acting, horizontal, high-pressure engine to drive the paddlewheel propeller. The second design problem was overcome through the years. Eventually, lightweight hull construction gradually replaced earlier robust "canal boat" construction as a broad, shallow-draft, hull form, using a truss-rod system rather than heavy wooden beams, developed over time.

To succeed in business, these lightly built boats had to carry a large amount of freight and many passengers. In answer to this requirement, sponsons were built over each side of the hull to extend the deck area. Superstructures were also extended several decks above the boiler deck to support passenger cabins.

All of the essential elements of the Western Rivers steamboat were present by 1825. Broad, shallow-draft vessels with boilers and engines on deck, sidewheels or sternwheels for propulsion, and cabins built on lightweight decks above the freight and machinery-laden main deck soon appeared on every tributary of the Mississippi. The ease and economy of this service caused the value of goods reaching New Orleans to double every ten years from 1820 to 1860. [9]

One feature of cardinal concern in the development of Western Rivers steamboats was safety. Early boats were particularly susceptible to boiler explosions, fires, and sinkings caused by hitting snags. Extraordinary dangers included being damaged in floods, tornadoes, and

ice gorges. The lifetime of a steamboat in the 1840s and 1850s was estimated to be below five years. This situation changed very slowly.

Government intervention forced builders and operators of steamboats to become more conscious of safety considerations in a way that commercial motivations could not. In 1838, Congress responded to the need for increased safety aboard steamboats by passing an act requiring the inspection of steamboats. In 1851, after six steamboat disasters took more than 700 lives Congress tightened these safety regulations. The Steamboat Inspection Act of 1852 set standards for both boats and operators, and created a system of Federal inspection to oversee them. [10]

As time progressed, steamboat designs diversified to meet the needs of various trades and routes. Various features advantageous to particular trades or routes were accentuated in vessels built for them. Passenger vessels required high speed and high-class accommodations. Ferries called for wide stable hulls. Package freighters required dependable engines and robust construction because of carrying heavy cargo on deck and in barges alongside. In some services speed became paramount, even surpassing safety concerns. Faster vessels required fine lines, powerful engines, and multiple boilers to supply plenty of steam. [11]

Shallow tributary rivers such as the Missouri and the upper regions of other rivers required boats with exceptionally shoal draft. Bertrand, sunk in 1865 on the Missouri River, drew only 18 inches when light. To travel such shallow waters steamboat operators had to sacrifice all unnecessary weight and be satisfied with minimal superstructures. [12]

By 1880, riverboat technology had advanced considerably. Several distinct types of steamboats had been developed for work on the Western Rivers. Passengers were carried on riverboats of any kind from time to time but several types were particularly adapted for passenger service. The most elaborate of these were saloon or palace steamers providing luxury passenger transportation in elegant cabins. Such boats usually ran on schedule, and often carried mail to designated ports. These services duplicated those of ocean-going packet companies; the boats performing the service were aptly termed packets. [13]

Other passenger vessels were adapted for short day excursions carrying groups and charters to nearby scenic areas and for cruises to nowhere. These excursion boats were usually large sidewheelers operating from large port towns. The principal requirements of excursion boats were

large open decks, dance floors, and orchestra or band stands. Smaller boats without these features also made occasional trips on the rivers "tramping" for charters. [14]

The Development of Towboats

More mundane sisters to the packets operated carrying passengers and cargo, wherever it could be found. Such non-scheduled steamboats often pushed one or more barges to increase cargo capacity or to decrease draft in periods of low water. Coal was carried in barges alongside packets from the 1840s and later salt, hay, iron ore, and grain were carried. A few boats specialized in pushing huge log rafts downstream to lumber mills. By 1850, a system of moving barges and log rafts lashed alongside and ahead of the towboat was developed which allowed greater control than towing on a hawser. This type of service favored sternwheel propelled boats over sidewheelers and promoted other improvements as well. Towboats became a distinct type by 1860. [15]

Most towboats moved only materials produced ashore. One extractive industry, however, developed along with towboats. Sand and gravel for construction was dredged up from river bottoms, and pumped aboard cargo barges. Simple hydraulic dredging rigs on small barges did the work. Towboats moved the dredge and sand barges around as needed. Later, small towboats were modified by installing sand dredges aboard, and used to dredge and tow the full sand barges to company terminals.

Barges also developed in size, construction, and soon were built in standard sizes. Early barges were of two general types. The more common type was a long narrow scow hull, built of planks and used on one-way trips downriver carrying coal. This type was generally developed from the flatboat, and like it, was broken up and sold for lumber when the cargo was disposed of. The other type of barge was used for voyages both up- and downstream. These vessels, called model barges for their finely modeled ends, were usually greatly enlarged versions of the barges of the 1820s. Barges of all kinds were carrying more than 19 million tons of freight per year by 1889.

Towboats were designed as floating engines to propel barges. Only the barge need be detained while loading or unloading cargo, and not the expensive towboat. Barges towed on a hawser are hard to control in narrow river channels. Barges lashed alongside and ahead of a towboat are easier to control. To ease tying off to a string of barges, nearly all towboats have straight sides and ends with large towing bitts and cavils. On the Lower Mississippi, strings of up to 60 barges were pushed on occasion. Today 15 barges is the more usual number on the

upper rivers, because the limited size of river locks requires breaking tows into several pieces. On smaller rivers towboats could only handle one or two barges. [16]

New propulsion methods and new engines were introduced on the rivers as they were in other parts of the country. Compression ignition or diesel engines were first used about 1910 for smaller sternwheel towboats, but did not gain ascendancy until the late 1930s, when diesel-powered propeller boats appeared. The introduction of screw propellers to the rivers came late because of their vulnerability to damage and the greater depth of water required for efficient operation. Competition from newer diesel-powered, screw-propelled towboats, with lower crew requirements, made continued operation of steam towboats uneconomical during the late 1940s. Some steam-powered, screw-propeller towboats were built but were either later converted to diesel-power or retired. Sternwheel boats were considered to be more efficient for smaller horsepower engines and shallow water than screw propeller boats, and a few diesel sternwheelers stayed on the rivers after steam sternwheelers disappeared. [17]

Advances in technology have been met by advances in operating methods. Powerful modern towboats push large tows of barges bound for different destinations. Tows are kept underway while various services are performed to make operation as efficient as possible. Fuel, groceries, and other boat stores are carried out to towboats by fast launches. Small "shifting service" towboats meet large tows underway, bringing barges to add to the tow and removing barges bound for separate destinations. The "shifting" service often is performed in conjunction with "fleeting" services. Barges are kept in holding areas, similar to railroad yards or parking lots, called fleets. Another towboat will tow the dropped barges on to their destination. Underway services substantially reduce the costly in-port time of large towboats. Other advances in operating techniques include radio dispatching and communications, computerized records, and "fully integrated tows" of matched barges to reduce water resistance. [18]

Lone Star

The Upper Mississippi River was a scene of considerable maritime activity up until the Civil War. Thereafter trade gradually diminished, fewer of the elaborate packets were built, and passenger and high value freight usually moved by railroad. Riverboats had to be versatile to survive. [19]

In 1868, Captain Sam Mitchell of Lyons, Iowa, built a small sternwheel packet at Lyons, Iowa, designed to provide the versatility needed in the post-war business slump. He called the boat Lone Star and ran her as a short-trade packet between Davenport and Buffalo, Iowa. After her second season on the river she was taken out of the packet business and probably put to work towing log rafts, and general river passenger and towing duties. [20]

Log rafting was the other major Upper Mississippi River trade at that time. Large, first growth trees were cut high up the Mississippi and towed downriver to sawmills by small steamboats. These steamboats were mostly smaller versions of the packet pattern equipped with a minimum of towing fittings. [21]

As built, Lone Star was 68.4 feet long, 19.3 feet broad and 3.2 feet deep in the hold. Her engines had 14-inch diameter cylinders with a three foot stroke. After serving as a towboat for six years, Captain Mitchell sold the boat in 1876 to Goss and Company of Davenport, Iowa. Goss and Company converted her into a regular towboat. This involved adding stronger towing fittings and more substantial guards. Goss and Company operated the boat in their business, dredging sand from the river bottom. Lone Star towed a digger and a sand barge between sand deposits and the company yard at Davenport. [22]

In 1890, Goss and Company had the boat enlarged and rebuilt at Rock Island, Illinois to better serve the company's purposes. She was lengthened to 84 feet long, and given more freeboard with a 5 foot depth of hold. The original machinery was apparently kept with some new machinery added. The American Ship Company capstan forward was probably fitted at this time. The large steam-powered, reciprocating sand pump, in the engine room, was also probably installed at this time. The sand pump required more room in the engine room and the added length was needed for it to be mounted. Rebuilding of this nature provides owners with the chance to have a vessel redocumented, allowing less expensive insurance rates, and longer periods between time-consuming safety inspections. Goss and Company took advantage of the rebuilding to obtain a new enrollment. Lone Star's new official number was 141082. [23]

Through a lucky twist of fate, Lone Star was honored to be the first through the Illinois and Mississippi Canal. The canal joined the Mississippi River at Rock Island with the Illinois River at Hennepin. On the afternoon of April 17, 1895, the newly renovated excursion boat, W.J. Young, Jr. was originally slated to take the first trip with passengers through the canal. Lone Star was to follow with several

barges laden with cargoes destined for exotic ports of the world. W.J. Young,Jr. was found too large to enter the lock and the honors went to Lone Star. [24]

The Goss Company became Builder's Sand and Gravel about 1900, and continued to operate Lone Star in the sand business. When the boat hull became worn out and required rebuilding, the company once more took advantage of the chance to enlarge the boat.

Kahlke Brothers marine ways in Rock Island, Illinois, rebuilt the hull for the boat in 1922. Lone Star emerged 90 feet long, 24.5-feet broad, and with a 4.1-foot depth of hold. The record of how the work was done does not survive but may be conjectured from the written record in combination with the surviving hull structure. The owners again re-enrolled Lone Star and received a new official number, 222089, and switched her home port to Chicago. [25]

The planking was removed, a few rotten structural timbers replaced, and new longer frames sitered to the old ones to widen the boat about two feet on each side. The hull was lengthened by adding additional frames to the forward end of the dead flat. The added space was used to enlarge the coal bins at the forward end of the superstructure to carry a full day's coal. The hull sides were lowered a plank and new engines with a longer stroke were fitted. The replacement engines have a 12-inch diameter and a five-foot stroke. The present engines appear considerably older than 1922 and so were probably transferred from another boat. [26]

The rebuilding allowed Lone Star to operate until 1956 without much repair work. The hull was replanked that year and the boat was reconditioned for continued work at the Kahlke Brothers marine ways, where she had been enlarged in 1922. The captain said then that the people of the company "hope to keep the Lone Star out of `steamboat heaven' for at least another five years, perhaps more." [27]

The 1956 boat yard visit kept Lone Star in operation until 1968, when the boat failed a Coast Guard safety inspection. The head of Builder's Sand and Gravel at that time was Mrs. Ethel Delarue. She wanted the boat to survive and sought a home that would preserve and display the boat. The town of LeClaire, Iowa, was successful in obtaining the steamboat in 1968. The LeClaire Businessmen's Association bought Lone Star, moved her to her new home under her own power, and placed her into a dry berth on the waterfront of the Mississippi at LeClaire. The maritime history of the region is interpreted at the Buffalo Bill Museum along with the story of LeClaire's most famous son. [28]

Lone Star, plays an important part in the cultural, technological, and historical heritage of the Upper Mississippi. Lone Star is also important as the sole remaining example of a wooden-hulled steam towboat, a vessel type which played an important part in the westward expansion of the United States, and was used on all the waters of the Western Rivers.

Notes

1
The other two steam towboats are Geo. M. Verity and W.P. Snyder, Jr., both also the subjects of National Historic Landmark studies. James P. Delgado et al., "Evaluative Inventory of Large Preserved Historic Vessels in the United States," (Washington, D.C.: National Park Service, 1988) entries for W.P.Snyder, Lone Star, Geo. M. Verity.

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