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Article Summary: The great Missouri River steamboats facilitated the settlement of the northern plains. Sinkings, fires, and groundings were common, however. A submerged wooden structure, an unidentified wreck from the nineteenth century, was discovered near Yankton in 1981.

Cataloging Information:

Names: Pierre Chouteau, Sanford Coulson, T C Power, E H Durfee, C K Peck, Hiram Chittenden

Place Names: Yankton, South Dakota; Sioux City, Iowa; Bismarck, North Dakota

Steamboats: *Yellowstone*, *Chippewa*, *Far West*, *Bertrand*, *Senator*, *Fontenelle*, *Western*, *Yankton*, *Lizzie Warden*, *Belle of Lexington*, *Josie L K*, *Katie*

Transportation Companies: Northwest Transportation Company, Kountz Line, Missouri River Transportation Company, Fort Benton Transportation Company, Montana and Idaho Transportation Company

Photographs / Images: the *Western* at the Yankton levee near where it sank in the 1870s (with the *E H Durfee* alongside); the *Western* submerged; the forward section of the *Western's* hull, April 1881; salvage marks on hull planking; broken ribbing over what appears to be the vessel's central keelson; wrought iron spikes used to secure the planks; section of the trapezoidal "cocked hat" from the chine or rib connection in the hull; wreckage visible above the sandbar

Missouri Riverboat Wreckage Downstream from Yankton, South Dakota

By Paul M. Putz

In November of 1981 two fishermen, Robert Winter and Jerry Melick, discovered and reported to the US Army Corps of Engineers the presence of a submerged wooden structure in a sandback downstream from Yankton, South Dakota. The following report outlines the nature of that find to the extent possible at the time of preparation. Because research is acknowledged to be incomplete and given the difficulties in working with sites underwater, this must be recognized as an interim report on research progress.

Following is a summary of the history of riverboat use on the Missouri River, particularly in the Yankton area, a description and analysis of the site discovered, and a presentation of certain evidence which may lead to an identification of the wreckage. Conclusions regarding future work at the site are also provided.

Riverboats on the Upper Missouri River—Travel on the Missouri River above Council Bluffs began with an experiment conducted by the American Fur Company in 1831. The steamer *Yellowstone* was dispatched from St. Louis in April of that year in an unsuccessful attempt to reach Fort Union at the mouth of the Yellowstone River. Based on this experience the company tried again in 1832 and delivered its cargo to the fort that June. Pierre Chouteau, an active partner in the firm, continued the practice of an annual delivery to posts along the Missouri for many years.¹ These early trips instructed boat owners and operators on the river's nature and allowed them to plan schedules and boat designs accordingly. Such knowledge served to significantly expand steamboat operations on the river as the Missouri basin grew in population.

It was known that the Missouri was a difficult river to

navigate. Separated into two regions, the sandy and rocky rivers (identified by the materials comprising their respective beds), the Missouri was shallow but fast. Its waters were replete with snags, sandbars, and, in the upriver portion, boulders. Spring floods created unpredictable channel alterations, and each winter the surface froze solid, making the material for lethal ice flows and ice dams.

Adding to the danger of the river itself was the remoteness of the land through which it flowed. For almost 3,000 miles the Missouri twisted through areas barely settled in the 1830s to the yet uncharted Rocky Mountains. There were vast stretches between outposts, themselves in peril of western dangers. Woodcutters, whose service was necessary in an industry in which one boat could burn a cord each hour of operation, were not conveniently positioned as in more developed regions. Thus the crews of early steamboats landed frequently to cut fuel on the hostile shore.²

Inconvenience, however, gave way to profits. Lucrative government contracts to carry supplies to the military and the Indian tribes upriver in addition to trading furs made riverboat trips into the wilderness profitable indeed. Pierre Chouteau pioneered the former with contracts to take goods north from St. Louis to Fort Pierre and beyond. In 1860 Chouteau reached Fort Benton, upstream from the mouth of the Missouri using two boats specially designed for the trip.³ By this time, however, his were not the only steamers on the upper river.

The opening of Dakota Territory in 1859 brought European culture farther up the Missouri Valley. In anticipation of controlling commerce within the developing area, a group of entrepreneurs founded Sioux City, Iowa, immediately across the border. By the time new lands to the west were ready, Sioux City was an incorporated town of several hundred people. It became the terminus of steamboat lines based in St. Louis. As Dakota Territory developed, Sioux City was joined by the settlements of Vermillion, Yankton, and Bon Homme upstream. All were steamboat stops. So were a profusion of military forts and Indian agencies created by the treaties establishing several new reservations. More reservations were established following the 1862 Sioux Uprising in southwest Minnesota.⁴

A rapidly growing population in the territory and a tremen-

dous demand for goods suddenly created by gold discoveries in Montana attracted competition to the Missouri River steamboat trade. Between 1860 and 1867 the number of boats struggling yearly upstream increased from 9 to 71. Annual tonnage swelled from a few thousand to over 15,000 tons of freight yearly on the upper river during that time.⁵

These numbers seem small but virtually all such trips were made by boats once a year between May and mid-June when the river was highest. Further downstream more frequent steamboat landings were possible; but for the upper river, steamboating was a seasonal business.

Until 1868 government contracts were issued for departure from St. Louis levies, but that year saw the beginnings of a pattern which focused steamboat operations further up the river, a pattern in which was woven the end of steamboating on the Missouri. Military and commercial interests depended on river transportation as an alternative to slow and expensive land freighting. The arrival of the Chicago and North Western Railroad at Sioux City in 1868 not only opened up a faster land route to the upper Missouri region but directly connected Chicago and Dakota Territory.

Consequently, shipping practices were altered. Goods soon arrived in Sioux City by rail to be warehoused for subsequent river transport, as both the Army and civilian agents took advantage of accelerated deliveries offered by the railroad. St. Louis was replaced by Sioux City as the headquarters for steamboat interests. Later, Yankton and then Bismarck were favored steamboat centers, but they too lost out to the railroads.

A year before the Chicago and North Western arrived there, the first Sioux City riverboat line was formed. Known as the Northwest Transportation Company, it owned five steamers hauling to points as far north as Fort Benton. Although freight to Benton fell off as overland routes from the south and west of Montana took over, steamboat men found new markets in the expanding territory. More boats plied the river, and companies entered into intense competition for military and annuity contracts. This was particularly true of the Northwest Transportation Company and the Kountz line, which located in Sioux City in 1871.

In 1873 one of the partners in the Northwest line, Sanford



The Western at the Yankton levee, 1870s, near where it sank, with the E. H. Durfee alongside. Coulson's warehouse (left) was later used as a barn and may still be standing on a farm outside Yankton. . . . (Below) the Western submerged.



Coulson, and several associates created the Missouri River Transportation Company. This new line was headquartered in Yankton, Dakota Territory, where the Dakota Southern Railroad had just arrived. Again rail transportation into the West squeezed steamboat traffic to a shorter stretch of the Missouri, and Coulson found his boats operating out of Yankton and Bismarck, the latter now being a terminus for the Northern Pacific. It was in Bismarck that Kountz established his base after aligning himself with the railroad. He would soon be in competition with the Fort Benton Transportation Company owned by T. C. Power. Coulson's old partners, E. H. Durfee and C. K. Peck, who ran the remaining fur and trading business in the upper Missouri Region, continued to operate from Sioux City. Thus, by 1874 steamboat companies were located in each major community along the river.

A swiftly changing frontier dramatically affected the steamline industry, whose nature was volatile anyway, but few steamboat men probably knew in 1874 that in 10 years their business would be a thing of the past. After a profitable period influenced by accelerated immigration, the Black Hills gold rush and its related Indian wars, and a delay in railroad construction caused by the panic of 1873, steamboating witnessed a precipitous decline. The Army reduced its presence in the early 1880s, and the railroads met the Missouri at Pierre, Chamberlain, and Running Water. In 1881 Coulson sold half his fleet and based the remainder in Bismarck. He and the other operators found hauls reduced to trips north out of that port or short runs between railheads downriver. By 1884 Kountz left the river, and Coulson followed a year later. Durfee and Peck were already out of business along with other, smaller firms who abandoned the trade. Practically all of the steamboat hauling business on the upper Missouri was left to the Fort Benton Transportation Company, which continued operations in one form or another until 1936.

The era of the great Missouri steamboats lasted little more than a half century, but they were essential to the settlement of the northern plains. A lesser means of river transportation would have slowed progress into the new territories and greatly increased the cost of that progress. At their best, however, upper Missouri steamers were cumbersome adaptations of their more elegant and efficient predecessors operating on-

southern and eastern streams. A litany of sinkings, fires, groundings, and undelivered cargoes portrays steamboat piloting as a frustrating experience. There were stories of frequent sandbar crossings, near snaggings, storms, and a dozen other hardships that interrupted travel. The railroad's year-round schedule was a welcome relief for those relying on the timely delivery of goods, but for as long as it could, the steamboat offered the next best service. The history of that service includes an evolution of boats working the western rivers.

River Boat Construction—Missouri River steamboats were indeed adaptations of steamers from other times and places. Certainly they were different from early boats using steam engines as a means of auxiliary power. Such vessels were conventional sailing ships carrying huge boilers and pistons within their hulls. They were suited for eastern bays and the deep water of the Ohio and Mississippi, but as traffic on lesser tributaries became commercially important, it became evident that changes in boat design were necessary. Oddly enough, Robert Fulton's first hull anticipated the requirements of what was to be known as the western steamer. Fulton's *Clairmont*, built in 1807, had a long, relatively shallow, hull with straight sides. It was a boat designed for shallow, calm, river water, for Fulton expected an inland market for his invention.⁶

For many years afterward, however, steam-powered boats were built with deep-keeled hulls, but this tradition of naval construction was gradually adjusted to more practical designs. As the industry struggled with navigating farther into the country, steamboat hulls became less boat-like. They widened and drew fewer feet of draft. Meanwhile, cargo and passenger areas required a new type of superstructure. Shallower hulls made piling cargo on the deck more of a necessity so cabin space was constructed above decks. The pilot house for the purpose of improved visibility was placed on the boat's very top.

By the 1860s steamboat design was an entity apart from that involving open-water vessels. Steamboats had wide, flat, keel-less hulls with straight sides to lend stability.⁷ As much bulk in hull construction as possible was removed and replaced with a light but strong framework of white oak. Decks were made of

pine and grew thinner and less soundly ribbed the higher they were placed. Upper decks were covered with canvas painted and coated with sand for waterproofing.⁸

Long hulls, it was discovered, improved speed and increased the tonnage of steamers, but as boats grew longer their hulls became too flexible. Unloaded, the center of extended hulls would ride higher in the water than the bow and stern. This upward warping, referred to as "hogging," was corrected by the installation of truss systems running the length of the hull. Working much like the trusses of a bridge, these "hogframes" held boats flat in the water regardless of loading variances.⁹

Advances in machinery design were also important to the evolution of the Missouri steamer. The power plants of early steamboats were conventional steam engines of the time, constructed of cast iron and operating within relatively low pressure limits. Located in the center of the boat, their bulk competed with available cargo capacities. By the 1840s a search for lighter, more convenient engines resulted in stern-mounted cylinders driving the paddle wheels directly. These engines were smaller and more powerful by virtue of their ability to operate under high pressure. Boat builders solved the cargo space problem by separating the engines and mounting one on each side of the upper hull, clearing the decks for freight. An increase in the efficiency of boilers also contributed to more cargo space as the number of required boilers on boats was reduced.¹⁰

So as national trends in steamboat design changed, they cleared the way for developing craft suitable for Missouri River travel. These changes did not evolve quickly, nor did modifications in favor of Missouri River steamboating develop in logical order, but years of trial and error experienced by the fur traders finally brought about a formula for Missouri navigation.

Pierre Chouteau's *Yellowstone*, built in 1831, was the first steamer designed for the upper Missouri. Like all prototypes, this deep-drafted side-wheeler had its faults, but in general the *Yellowstone* accurately met its challenge. In terms of tonnage, it was smaller than average and the long, narrow, flat-bottomed hull carried it up the river easily.¹¹ The boat's success in reaching Fort Union in 1832 prompted other voyages, but not until 1859 was there an attempt to markedly improve on the design of the Missouri River steamer.



The forward section of the Western's hull, with the ice center at left, April, 1881. Much of the superstructure has been cut away except the pilothouse, leaving the twisted hull for salvage. Somewhere to the right of and over 10 feet below the pilothouse is the inverted stern.

The *Chippewa*, Chouteau's light draft stern-wheeler that landed near Fort Benton, possessed the classic features of the Missouri breed. Measuring 165 x 30 feet, the *Chippewa* drew less than 3 feet of water under a heavy load. Its flat-sided, flat-bottomed hull was powered by a high pressure engine which could drag the boat over shallow bars and through rapid chutes. Small by conventional steamboat standards, the *Chippewa* acknowledged its special mission of hauling freight and a few passengers up a treacherous stream. It was not a fancy boat in the tradition of its Mississippi cousins but it worked.¹²

Chouteau left the river after the Civil War. His trade was replaced by the Montana and Idaho Transportation Company, which constructed boats of light draft for the Fort Benton run. They were joined by other St. Louis firms, one in particular engaged in the operation of packets to Omaha. The latter may have found its small boats adaptable to the upper river.

When Coulson and Kountz assumed dominance, they too built boats, most of which were contracted through Pennsylvania shipwrights who had the necessary experience and access to foundaries providing boilers and engines. During the 1870s these men constructed many specialized steamboats for their area of operations. Among the first was the *Far West*. Measuring 189 feet long, 33 feet 5 inches wide, and 5 feet deep in the center of the hold, the *Far West* was capable of transporting over 397 tons of cargo.¹³ It had but one upper deck—the cabin deck—and a pilot house above that. Its two smokestacks rose about 35 feet over the water, and it was stripped of the "gingerbread" adornment usually associated with steamboats. Between 1871 and 1879 construction of boats similar to the *Far West* continued, ending abruptly when the railroad threatened the trade.

Other than descriptions available from the Steamboat Inspection Service, which licensed boats and later licensed pilots, little evidence regarding the actual construction of these Missouri River boats existed until the discovery of one of the Montana and Idaho Transportation Company steamers in the late 1960s. The excavation and recording of this vessel, the *Bertrand*, revealed much about hull construction and led to some conclusions regarding superstructures of the so-called mountain boats.¹⁴ Based on these sources and period

photographs, it is clear that considerable experimentation took place throughout the period of upper river steamboat building, particularly in superstructure design, for few boats were made exactly the same. However, the basic elements present in boats like the *Far West* did prevail and this relative consistency provides a basis for the comparison of documentation, existing physical evidence, and the discovered material.

The Wreck—During periods of low water there were numerous instances in which a submerged object was struck at or near the location of the wreckage. A barge traveling upriver in the 1960s hit what was then supposed to be a wooden structure, and there are now reports of motor boats striking something there over the years.¹⁵ In 1980 during the dramatic lowering of water resulting from an annual inspection of the face of Gavins Point Dam undertaken by the Corps of Engineers, local residents visited the wreckage and salvaged what may be a piece of paddle wheel associated with the site.¹⁶

The November, 1981, discovery was reported to the Corps of Engineers, who subsequently advised the State Historical Preservation Center of a possible historical site in the Missouri River. On November 17 representatives of the corps and the state, accompanied by Robert Winter and other residents of the Yankton area, examined the material about one mile downstream from the Yankton. Covered in 6 inches to 1½ feet of water, the material protruded from a large sandbar, one of a network of shallow bars north of the main channel. A precise location of the wreckage is not yet determined, but it appears to be near the extreme southern boundary of the center of Section 6, Township 33 north, Range 55 west, 1 1/12 miles due east of the southern end of the Meridian Bridge in Nebraska.

The wreckage was again examined in December of 1981. Rough measurements were taken and limited probing was carried out to determine the extent of the material. Finally, in March of the following year, an attempt was made to produce accurate measurements for mapping the site. None of these examinations were successful in determining the extent of wreckage present. Probing with steel rods seemed to indicate material lying below the surface of the sand from depths of a few inches to several feet, but ice lenses within the sandbar

proved to hamper probing, and excavation in the watery sand was not possible. Examination of the area with a magnetometer was inconclusive. Although incidents of high readings were recorded, there was not sufficient data for comparison with other portions of the river bottom. Thus, information on material below the surface must be considered subject to further verification through other means.

A large segment of the material is visible when the water is low, however, and is at times completely exposed. It is from this portion of the wreckage that most of the conclusions regarding its possible identity are based.

The surface material is in two pieces. The uppermost portion consists of seven long planks, ranging from 2 1/2 inches to 3 inches thick and from 12 1/2 inches to 18 inches wide. These run in length from only a splintered few feet to 18 feet and longer, one end being buried in the sand. These planks are laid flat and run parallel to one another forming a width of 8 1/2 feet. They are joined at 24-inch intervals by a series of perpendicular ribs, 4 inches wide and 6 inches high. The ribs and planks are broken on one side of the structure but along the opposite sides parallel with the planks is a narrow board edging the last plank and turned up at angle toward the ribbed side. This board is joined to the ribbing by a series of trapezoidal wooden plates nailed to the board and secured to the rib by means of a wooden dowel driven through 1 1/2 inch holes in both members. At the upper end of the plates are similar holes for fastening upright ribs to the joining system. The existing ribs are shaped to meet the face of an upright piece and accommodate the doweled hole.

Spiked to the top of the ribs and running with the length of the planking are two 2 by 4 inch planks which border, in part, a large pillow block, also of wood. This feature is approximately (there are no measurements recorded) 18 feet long by 20 inches high and 12 inches wide. It is notched at the top to take another object. As indicated, the whole of the feature, with the exception of the doweling, is fastened together with large wrought-iron spikes 7 inches in length coated with tar or pitch and fitted with a small metal washer.

The second piece of surface material is located immediately to the south and west of the construction described above. In fact, the two sections slightly overlap. This portion of

wreckage appears to be built identically to its partner, both probably being parts of the same hull area. It is exposed for a length of about 50 feet dipping to the southeast and consists of eight planks rising out of the sand to form a low wooden mound. In places at the eastern end of the section the planks terminate, exposing ribs beneath. Along their length the planks are linked together in a manner referred to as scarf jointing. This method is not consistently applied, however, for occasionally the planks are simply butted together and nailed into a rib below.

The cause of the slight rise which brings the wreckage out of the sand at this point seems to be a large timber extending along the assumed center of the hull. Where this member is prominent, the attached ribs are broken as if through upward movement or resistance to further settlement. The two 6 x 6 timbers of which this feature is made are secured one above the other and at intervals along its length tapered 2 x 2s are fastened perpendicular to it. These continue down into the sand for an undetermined distance. The ribs at this juncture are notched on the planking side at a depth of about an inch and for a foot in width. No reason for these notches was determined.

The whole of the section measures 35 feet wide and may extend as far as 120 feet based on probing with steel rods of varying lengths. This means of estimating the extent of wreckage was subject to certain disadvantages including the presence of ice lenses beneath the surface of the bar which could be misinterpreted for wood when encountered by the probes. Neither was it possible to determine whether subsurface features were connected to those which were visible. In response to the ice problem, probes were driven through the sand with hammers until a feature stopped their progress completely. The manner in which the rods resisted was compared to probes driven into visible planks. In this way more confidence in the type of material being encountered below was provided. Measurements of width, therefore, owing to the relative shallow depth of the feature and the apparent consistency of the feature as revealed by the contour of the probes, is considered to be fairly accurate. Also, the continuance of material below the horizontal at the outer edges of the hull's length may indicate the remains of the hull's sides still

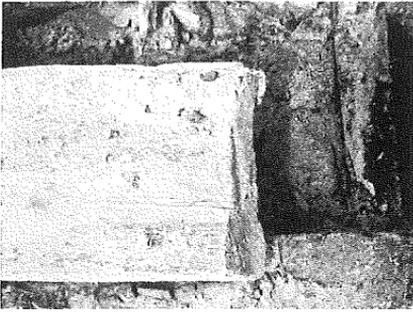
attached, at least in places, to the bottom of that section.

A few additional details regarding this section of the wreckage are worth noting. The section terminates to the east above the sand in a ragged manner, obviously not at a normal stopping place. Some of the timbers and planks extend farther than the others, but several exhibit marks attributable to those of an axe or similar round-edged cutting tool. One plank ends in a v-shape and may have been sawed. Cuts in these members are stepped back toward the remaining wood on the exposed side, indicating the blows were delivered when the section was in its present position. Another feature showing signs of being cut away is a 4 x 4 protruding from the hull at a point where the planking dips into the sand to the west. This post seems to have been forced through the wreckage at a joint.

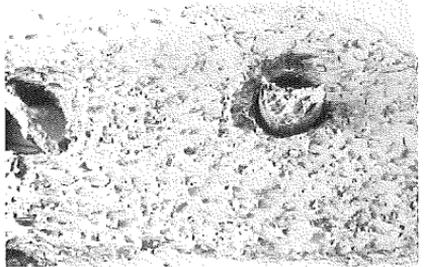
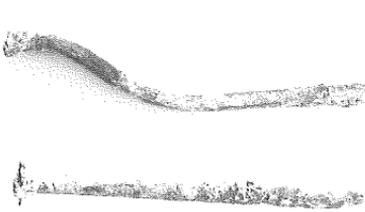
These two large pieces of material are not the only signs of wreckage in the area. To the east-southeast of the original discovery lies another section of apparently similar marine construction. This piece, some 150 feet away, appears to be a corner of an old hull. There was not sufficient time to inspect this wreckage closely, however.

Identification of the Wreck—Based on information available from drawings made of the *Bertrand*, there are significant similarities in the construction of that vessel and the wreckage found near Yankton. The means by which the *Bertrand's* hull was fastened together coincides almost exactly with the peculiar rib connections found at Yankton. The terminations present on the section first described above are referred to as the "chine" in the *Bertrand* report. The chine system held the bottom and side ribs of the steamer together and allowed the plankings to make a gradual turn upward with the use of a diagonally situated board called a knuckle. The planking of the *Bertrand* was irregular but within the same width and thickness measurements as described. This is also true of ribs, crossmembers, and fasteners.¹⁷

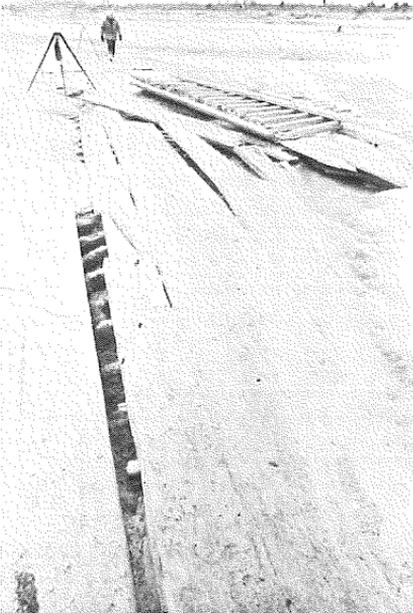
Further identification of features in the Yankton wreck are also possible. The large wooden pillow is similar to those found attached to the bottoms of steamboat hulls. Called footlines, these supports carried the stantions, or upright posts, of the hogframe.¹⁸ They were aligned with the crossmembers giving lateral strength to the hull and referred to as keelsons. The



Salvage marks on hull planking. Rib to which the plank was spiked is visible below. . . . (Right) Broken ribbing over what appears to be the vessel's central keelson.



Wrought iron spikes used to secure the planks. These show evidence of being coated with pitch or tar and are fitted with washers. . . . (Right) Section of the trapezoidal "cocked hat" from the chine or rib connection in the hull.



Wreckage is visible above the sandbar. In foreground is the inverted hull, the assumed centerline of which extends along the separation between the planks. A "scarf joint" appears in the central plank. Behind is the upright hull section with chines and footline.

central keelson often served as the foundation for a bulkhead running the length of the hull. The large 6 x 12 member in the center of the Yankton wreck is possibly such a feature.

Two analyses of samples of wood from the wreck were made to determine its state of preservation and the wood type present. The first, of a piece of the trapezoidal "chine" connector, was determined to be cottonwood (*Populus deltoides*) or a similar "soft" hardwood.¹⁹

The second of two pieces of planking was found to be of oak (*Quercus*) of the white oak group, the material employed in the construction of steamboats on the Ohio River. These pieces were considered to be well preserved.²⁰ The tests were carried out by the University of South Dakota biology laboratory and the USDA Forest Products Laboratory in Madison, Wisconsin, respectively.

The possibility of the wreckage being a steamboat is enhanced by these findings. But determining the identity of the type of craft there actually requires seeing more of the remains.

As to the identity of the boat itself there are a limited set of possibilities. Research into the matter of sinkings in the Missouri near Yankton, particularly of larger vessels, was conducted by Captain Hiram Chittenden, secretary of the Missouri River Commission and a historian of the region. Drawing his material largely from Steamboat Inspection Service records, Chittenden was able to describe and locate the loss of three boats in the area. These included the *Senator*, a large ferryboat which was reported to have sunk near the mouth of the James River in 1888, and the *Fontenelle*, a Kountz boat that was crushed by the ice upstream from Yankton in the spring of 1881.²¹ Newspaper reports of the flooding which took place in that year included this description of the loss of the latter:

The steamer *Fontenelle*, of the Peck line, which lies several miles above Yankton at an island near which she was caught by the freeze-up last fall, was so severely damaged by the gorging ice last evening that she filled and sunk.²²

The *Western*, a steamboat belonging to Sanford B. Coulson, was also destroyed by ice at Yankton. Chittenden's report explains the incident. The *Western*

was cut down by the ice and crushed against the bank and sunk during the great gorge of ice at Yankton. After the boat sank a large field of ice ran against her with such force as to flatten her port boilers.²³

The latter two larger boats, ones which could be called steamboats in the sense of big freighters, were wrecked at or near Yankton. The *Fontenelle* measured 205 feet in length and had a beam of 33 feet. The hull was 4.3 feet deep through the center. It was rated for 297.09 tons and carried her wheel at the stern. The boat had burned at New Orleans in 1873 and was rebuilt with a longer hull. The *Western* was somewhat larger, being rated 208 feet long and 35 feet wide, with a hold of 5.5 feet and a tonnage of 475.69. It too was a stern-wheeler. Both were Pennsylvania boats, the *Fontenelle* built there in 1870 and the *Western* in 1872.²⁴

The River Room Museum in Hermann, Missouri, lists several smaller craft downed in the Yankton vicinity. Other than the *Senator* (120 x 26 feet), these included the *Belle of Lexington*, a sizable 120 x 30-foot ferryboat of 124 tons. She was sunk by ice in the winter of 1875-1876. In 1873 the *Lizzie Warden* suffered a similar fate, and three years earlier a snag punctured the *Yankton*, which was a center-wheel ferry of 32 tons. The *Yankton's* machinery was installed in another ferry, the *Katie* (71 x 14 feet), which apparently sank in a spring flood in 1877. As late as 1920 the river continued to claim ferries when the *Josie L. K.* succumbed to the ice and went down.²⁵

These smaller craft were built at various places around the country. The *Yankton* was constructed at St. Louis, the *Lizzie Warden* at Independence, Missouri, and the *Belle of Lexington* at New Albany, Indiana. Because the machinery was available it may be that the *Katie* was locally built. The *Josie L. K.*, a local boat, was constructed at Chamberlain in 1884.

Given the nature of the visible remains on the sandbar, the wreckage could be any of the vessels named above with the possible exception of the *Josie L. K.*, whose local origin would preclude the use of non-native white oak in its construction. It is quite likely that the hull design of all riverboats with enclosed hulls were similarly built, particularly boats required to haul loads of any weight. It is also possible that this wreckage is from a sinking farther upriver. Many steamboats were lost in the vicinity of Bon Homme Island, and given the

tremendous power of the river and the considerable time that has passed since the steamboat era, it is not inconceivable that semi-bouyant material could have been washed a great distance downstream.²⁶

To begin an attempt to identify the wreck, certain assumptions must be made. One of these is to accept the measurement of width determined by probing through the sand. If the wrecked hull is indeed 35 feet through the beam, then it extends beyond the widths of several of the reported casualties. None of the ferries with the exception of the *Belle of Lexington* and the *Senator* were rated at more than 32 tons, leaving the certainty that their beams were less than half that of the wreck. The *Belle of Lexington*, at 30 feet, was nearest to the wreck's measurement while the *Senator* ran 9 feet narrower. This leaves the *Western*, whose beam conformed to the assumed width of the wreckage.

The length of the material, estimated as it is on the basis of probing beyond the exposed remains to some distance and at greater depth than the width, cannot be confirmed. It is not likely that an entire hull has survived, given the shattered condition of the wreckage above the sand. Thus the nature and extent of subsurface features are unknown, and little can be assumed from the evidence.

The position of the wreckage, being directly downstream from the old levee at Yankton, allows the possibility of the hull's migration from a point at or near that landing. Again the *Western* and the *Belle of Lexington* are the only boats of size to have gone down at Yankton itself. Both victims of crushing ice, they would be severely damaged, as the material on the bar appears to have been. The latter vessel, however, was sold for lumber and cordwood soon after it sank, leaving the question of whether any of it survived intact.²⁷

Finally, there is the presence of salvage marks of the planking of the hull. If it is assumed that salvage operations were carried out on the wrecked boat immediately after its sinking, then these would be most relevant to confirming the identity of the discovery. It is evident that these marks were made from above the hull as it now lies, which is consistent with the experience of the *Western* after the ice and water that engulfed her had receded and attempts at recovering parts of her were made. At that time it was reported:

The Steamer *Western*. . . lies where she was cast by the flood, a crushed and disintegrated mass of wood and iron. Through the melting mass of ice can be seen enough of the wreck to convince the explorer that the *Western* was completely chewed up in the jaws of the gorge. The forward part of her hull lies upon the bank right side up and the stern projects over and against the bank, apparently in an inverted position. The ice has not yet melted away sufficiently to establish the fact that the hull of the *Western* broke in the center and the stern half turned bottom side up, but this appears to be her condition. The fragments of the upper works have all been removed with the exception of the pilot house, and the boilers and machinery are yet under ten feet of ice. A squad of men are at work, under the direction of N. Morgan clearing away the debris. Their first effort is to secure the uninjured planks from her hull, which will be used in repairing the other boats. After this is accomplished the machinery will be taken out and the ribs and timbers will make good fuel.²⁸

The fact that the *Western* was twisted in two by the ice demonstrates the enormous force of the flood which sank her. The stern, which sank first, was somehow overturned by that force, leaving the bow to be smashed against the bank. When salvage operations were undertaken, it would have been necessary to cut at the stern section from above the inverted hull. Marks left by such operations would be similar to those found at the site. Over the century the wreckage lay on the river bottom; however, it may have been the source of lumber or firewood for others who may have encountered it there.

There is also a possible reason for the existence of large, unsalvaged portions of the *Western* to remain. The paper indicates the "boilers and machinery" were to be salvaged and, indeed, on April 24, 1881, the *Press and Dakotian* printed the news that the builders of the *Western* had been sold to the Excelsior Mill, a Yankton flour mill. There was no mention of the engines or other portions of the wreck, which might be accounted for by the development of a large sandbar at the steamboat levy as the flood waters receded. This bar, first mentioned in the *Press and Dakotian* on April 27, was sufficient to lead the reporter to speculate that the summer landing would have to be moved downstream and that no launchings of the boats on the ways would be undertaken until the June rise. Anything along the bank, therefore, would be buried in this sandbar, as the submerged stern portion of the *Western* probably was. Because this was a very busy time for Coulson's crews, it may not have been considered worth their while to excavate along as much as 100 feet of broken hull and down

through the sand to recover engines buried below the boat. Insurance on the boat would have partially offset their loss. In any event, the priority for the company was the repair and launching of those boats which survived. Thus, the stern section of the *Western* may have been left buried in the river with or without its steam engines.

What is clear from the evidence accumulated to date is that not enough is known at this time to make a positive identification of the wreckage. It appears certain, however, that sections of a river craft of significant dimension were found and that those sections could be from the steamer *Western* should certain assumptions be proved true. More research is required to test those speculations. Particularly, more of the wreckage must be exposed.

Conclusions Regarding Future Work—The resources of the state of South Dakota available for underwater salvage have become exhausted. To further explore the discovery, however, some salvage will be required. The recommendation of this report is that an experienced professional in underwater archeology conduct more accurate mapping and subsurface testing of the site. The configuration of the remains being determined, and it will be possible to make a reasoned decision regarding the question of recovery of all or part of the wreckage. In addition, wood samples should be examined to estimate curatorial requirements.

The costs of mapping the site are estimated between \$5,000 and \$6,000. This would include information on the size and disposition of the wreck and the means by which recovery would be possible. Information on the presence of artifacts at the site may also be supplied through mapping.

From this data salvage approach plans and cost estimates may be determined. These may be less than originally estimated, particularly due to preliminary assessments of the state of preservation of wood samples. Samples kept by the Historical Preservation Center for several months in the open air did not exhibit massive deterioration. Although some surface checking and flaking took place, the samples retained a high degree of their structural integrity. Such favorable indications may mean that preserving material from the wreck will not involve the most expensive curatorial techniques.

Given the level of public interest in the discovery of the wreck, it would seem inappropriate to discontinue the study of it without some effort to make a final determination of its origin. There is another reason for continuing, that being the significance of the steamboat to the development of Dakota Territory and of South Dakota. The material in the Missouri near Yankton represents the only available vestige of those boats which provided transportation on the Missouri River in the 19th century. Perhaps a search for information on riverboat construction, the usual motive for undertaking salvage, will not be rewarding in this instance, but to the people of Yankton and of South Dakota these remains may be significant artifacts. For now, the question of whether there is machinery associated with the wreck is one which should be explored for scientific purposes. That find would be worthy of broad historical and archeological attention.

NOTES

1. William E. Lass, *A History of Steamboating on the Upper Missouri River* (Lincoln: University of Nebraska Press, 1962), 8-11. Most of the material for this section is taken from Lass, who provides a well-documented review of the regional steamboat trade including technical developments, business practices, and historical trends of significance.

2. *Ibid.*, 13.

3. *Ibid.*, 19.

4. The Indians killed 644 white settlers in the area of the Minnesota River Valley. Ninety-three soldiers died in engagements which subdued the Indians. *Out-of-Old Nebraska* (December 4, 1974), a collection of historical articles written by the staff members of the Nebraska State Historical Society.

6. Louis C. Hunter, *Steamboats on the Western Rivers: An Economic and Technological History* (Cambridge: Harvard University Press, 1949), 66. This is the most definitive work on steamboats to date.

7. *Ibid.*, 78, *passim*.

8. Hunter, 80-81; Lass, 109.

9. Hunter, 96-100. A good series of illustrations showing the mechanics of steamboat design can be found in Alan L. Bates, *The Western Rivers Steamboat Cyclopoedium* (Leonia, New Jersey: Hustle Press, 1968).

10. See discussions in Hunter regarding mechanical development beginning on p. 121.

11. Lass, 9-10.

12. *Ibid.*, 16-17.

13. *Ibid.*, 109.

14. See Jerome E. Petsche, *The Steamboat Bertrand: History, Excavation, and Architecture* (Washington, DC: National Park Service, US Department of the Interior, 1974).

15. Max Brown and Robert Winter, conversation with author, Yankton, South Dakota, December 9, 1981.

16. Kenneth Westergaard, conversation with author, Yankton, South Dakota, March 15, 1982.
17. Petsche, 76.
18. Petsche, 78; Alan L. Bates, Louisville, Kentucky, correspondence with author, December 26, 1981.
19. Dr. Theodore Van Bruggen, University of South Dakota, Vermillion, South Dakota, correspondence with author, January 6, 1981.
20. Donna Christensen, Center for Wood Anatomy Research, US Forest Products Laboratory, Madison, Wisconsin, telephone conversation with the author, August 5, 1982.
21. Hiram M. Chittenden, "Appendix W. W., Report of the Missouri River Commission," *Annual Reports of the War Department for the Fiscal Year Ended June 30, 1897* (Washington, DC), 3881.
22. *Yankton Daily Press and Dakotian*, March 30, 1881.
23. Chittenden, 3891.
24. *Records of the Bureau of Marine Inspection and Navigation*, Record Group 41, National Archives, Washington, DC; Notes of Mrs. Shirley Walpole, Yankton, South Dakota, grandniece of Samuel Coulson.
25. Captain Kermit J. Baecker, Hermann, Missouri, correspondence with author, March 4, 1982.
26. Carl Jones, Nebraska State Historical Society, Museum of Missouri River History, Brownville, Nebraska, telephone conversation with author, December 8, 1981.
27. Robert F. Karolevitz, *Yankton: A Pioneer Past* (Aberdeen, South Dakota: North Plains Press, 1972), 77.
28. *Yankton Daily Press and Dakotian*, April 19, 1886.