
REPORT

UPON THE

COLORADO RIVER OF THE WEST,

EXPLORED IN 1857 AND 1858 BY
LIEUTENANT JOSEPH C. IVES,
CORPS OF TOPOGRAPHICAL ENGINEERS,

UNDER THE DIRECTION OF THE OFFICE OF EXPLORATIONS AND SURVEYS,

A. A. HUMPHREYS, CAPTAIN TOPOGRAPHICAL ENGINEERS, IN CHARGE.

BY ORDER OF THE
SECRETARY OF WAR.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1861.

EXPLORATIONS AND SURVEYS. WAR DEPARTMENT.

COLORADO EXPLORING EXPEDITION, LIEUTENANT J. C. IVES, TOPOGRAPHICAL ENGINEERS, 1857-'58.

HYDROGRAPHIC REPORT.

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[NOTE.—Throughout this report, in stating facts bearing upon the navigability of the Colorado, the river is described as it appeared at its lowest and worst stage. It is probable, however, that not once in twenty years would the navigation be attended with so many obstructions as during the season of unprecedentedly low water when the survey was made.]

GULF OF CALIFORNIA AND MOUTH OF THE COLORADO.

The Gulf of California, into which the Colorado river empties, is six hundred miles long, and averages about eighty miles in width. The navigation is good, particularly along the western or Lower California shore, where the coast is bold and rock-bound, and the water deep. Along the northern half of the eastern side the country is generally low, and the adjacent soundings shallow.

The surface of the Gulf is dotted with islands, some of which are twenty or thirty miles in extent. The faces of these islands are usually precipitous, and there are many, in the lower part of the Gulf, where, to the very base of the cliffs, there are no soundings. As the lead would not give notice of their proximity, during dark nights, unless caution was observed, their neighborhood might be attended with hazard. There are no currents that prove a hindrance to navigation. Between the islands and along the shore, particularly near the head of the Gulf, the tides are sometimes strongly felt.

The prevailing winds blow either up or down the Gulf. During the autumn and winter they are generally from the northwest. In summer southeast breezes are more frequent. The worst gales come from this quarter. Calms are liable to be encountered at all seasons. In the vicinity of Cape St. Lucas, which is at the southern extremity of Lower California, they occur oftenest and are of longest duration. It is in the same neighborhood that the most furious storms and tempests are experienced. The length of the voyages of sailing vessels from San Francisco to the mouth of the Colorado is from fifteen to thirty-five days.

The greater portion of the harbors is upon the coast of Lower California. They are at Cape St. Lucas, San José, La Paz, Port Escondido, Loreto, Molega, Angeles bay, San Louis, and the bay of San Felipe. At Cape St. Lucas harbor there is sufficient depth for vessels of the heaviest draught. The harbor is protected from southeast winds, but is exposed towards the north and west. It is a dangerous anchorage, for there is a high surf, and no bottom at a hundred fathoms, till within a short distance of the beach. The locality can be distinguished a long distance off by the white cliffs that border the coast. At San José the harbor is exposed from east northeast to southwest, and would be unsafe during the summer and early autumn. The holding ground is good. The harbor of La Paz is land-locked, but vessels of large size cannot approach within three miles of the town. At Loreto, Port Escondido, Molega, a little beyond Point Conception, and at Angeles bay vessels of moderate draught can find a good anchorage. Angeles bay has been seldom resorted to. It is towards the head of the Gulf, and not far from the southwestern extremity of Angeles island. It is four miles wide and opens towards the east. There are springs of slightly brackish water near the southern end, at the base of a high mountain. An excellent bed of oysters exists in the vicinity. There are said to be lead mines in a valley at no great distance. At San Louis and San Felipe there is anchorage for small vessels. The latter place is only fifty miles from the mouth of the Colorado.

On the eastern coast, twenty-five miles from the head of the Gulf, is a small bay. The harbor of Guaymas is entirely land-locked, and is secure and spacious. The depth of water is from four to six fathoms, permitting the ingress of ships of the heaviest draught.

Upon some of the islands in the Gulf there is guano, and several are known to contain valuable metals. Upon Carmen island are valuable deposits of salt. The waters of the Gulf abound in whales, seals, turtles, &c.

Below the harbor of San Felipe is a low black cape, and at this place the lofty and barren mountains, which border the shore as far as Cape St. Lucas, leave the coast and trend towards the northwest. Ten or fifteen miles northeast of Black cape, and a little east of south from the mouth of the river, is a rock one or two hundred feet high, white with guano, the sides rising abruptly from the water. Approaching from the south it bears a strong resemblance to a vessel sailing before the wind. A reef runs from the base in a northwest direction for at least one or two miles, and not being laid down upon the charts might hazard the safety of any craft passing near at night. Abreast of Ship Rock I found between seventeen and eighteen fathoms. Lieutenant Derby states that in 1850 he found the depth in the same locality twenty fathoms. The bottom being remarkably flat and uniform, it would appear from this that the Gulf towards its head is rapidly filling up.

Beyond the rock the shores on both sides come in sight, and the Gulf narrows till it is only four or five miles in breadth. The water gradually shoals to two and a half or three fathoms, and becomes red and turbid. The bottom is a soft ooze, feeling like grease to the fingers. Two islands, Montague and Goree islands, and a bar twelve or fifteen miles wide, obstruct the mouth of the river. In the channels across the bar there are only ten feet of water. In the channel of the river, above the bar, as far as the head of tide water, the depth varies from twelve or fifteen to thirty-five feet.

The country on both sides is a flat expanse, entirely overflowed by the spring tides, which render it, during much of the time, a sheet of soft mud. The lines of the shore and the channels upon and beyond the bar are shifting and changeable, and shoals and islands are in constant progress of formation and removal. For twenty miles above the mouth the navigation is rendered periodically dangerous by the strength and magnitude of the spring tides. These have a rise and fall of from twenty-five to thirty feet, and a flow of extraordinary velocity, varying from five to seven or eight miles an hour. The flood is preceded by a "bore" or huge tide wave, from four to seven feet high. In the bends around Point Invincible and Howard's Point it is very powerful and violent, but loses its force as it ascends, and at a distance of thirty miles is scarcely felt. There are curves of the shore, as at Robinson's Landing, where the rush of water is broken, and vessels may lie at anchor in comparative safety. Upon the shoals are formed what are called "tide rips," where the sudden check to the surging mass causes it to bound along in high successive waves. The neap tides have a rise and fall of only ten feet, and a velocity of two and a half or three miles an hour.

No opportunity has ever been afforded of making continuous observations upon these tides. At some seasons of the year the full moon, and at others the new moon tides are greatest and most violent. Similar alternations take place in regard to the day and night tides. There is no slack water. The ebb running out encounters the flood and is turned back, the current instantly setting in the opposite direction.

The draught of vessels plying to the mouth of the river should not exceed eight or ten feet. If they carry freight that is to be discharged upon the decks of the river boats, they usually anchor near the west bank, in the vicinity of Robinson's Landing. The best approach across the bar can be determined by experiment only. On several occasions vessels have crossed along the western shore. Lieutenant Derby followed the California coast. At the time I passed the deepest channel appeared to be between Montague and Goree islands. The most sheltered spot should always be selected for an anchorage, and where there is sufficient depth

to insure the vessel from grounding at the lowest tide. In this part of the river, owing to the formation of the steep shelving banks and the rapid rise and fall of the water, it would be difficult and dangerous to land freight from the vessel directly upon the shore. The best course would be to ascend the river for twenty or thirty miles. It would be impossible to sail up. The vessel should take advantage of the tides, and, an hour or two after the passage of the "bore," or the setting in of the flood, drift along the channel, keeping near the highest bank, and constantly sounding; care being taken to select a secure place for an anchorage before the approach of the ebb. The time of high water at "full and change" is, at the mouth of the Colorado, 3h. 15m., p. m.

When a steamboat is to be built for service upon the river the materials should be carried at least twenty-five miles above the mouth, in order to secure a place not overflowed at the highest tides, to be beyond the effects of the bore, and to be near fresh water.

Enough drift-wood can be found strewed over the flats to afford a supply of fuel, and some miles higher up there is a growth of cottonwood, willow, and mesquite along the banks, but the country furnishes no timber suitable to be used in building a boat, or even material of which the ways could be constructed.*

MOUTH OF THE COLORADO TO FORT YUMA.

It is about one hundred and fifty miles by the river from the head of the Gulf to Fort Yuma, though only half that distance in a direct line. Concerning no particular locality can any special information be given that would be of value to the navigator. The shifting of the channel, the banks, the islands, and the bars is so continual and so rapid that a detailed description, derived from the experiences of one trip, would be found incorrect, not only during the subsequent year, but perhaps in the course of a week, or even a day. A few facts of a general character can alone be stated.

The width of this portion of the river varies from one-eighth to half a mile. The course is exceedingly tortuous. The depth in the channel is from eight to twenty feet, but bars are frequently encountered where there are not more than two feet of water. The current, during the low stage of the river, which is from October till the early part of May, has an average velocity of two and a half miles an hour. In some of the bends it is perhaps a mile an hour swifter. The period of highest water is in the early part of July, when this velocity is increased to five or six miles. The average height is then ten feet greater than during the summer months, but the depth is not in all places proportionally increased. New bars at once form when the river begins to rise, and the obstructions to navigation, though not as numerous, are still encountered.

No rocks are met with below Fort Yuma. The bed of the river is composed of quicksand and soft clay. The bars are yielding, and any agitation upon their surface causes them speedily to wash away. A boat may frequently be forced over places where there was, at the time of its striking, six or eight inches too little water.

For several years the Colorado has been regularly navigated by steamboats between its mouth and Fort Yuma. At low water trips are rarely made without the boat grounding many times a day. A sounding pole is constantly employed. Different points upon the bar are tried till the least difficult is found. The steamer is then worked backwards and forwards to loosen the sand. Lines are attached to a tree, snag, or to an anchor taken out ahead, and are heaved upon with the windlass or capstan. As a last resource the boat is lightened of a portion of the cargo, and by these expedients the bars may always be passed, with more or less difficulty and

*The above information has been gathered from my own observations, from the report of Lieutenant Derby, Topographical Engineers, from Captain C. P. Stone, of the Sonora survey, from Captains Johnson and Wilcox of the Colorado steamboat company, and from Captains Naghel, Jayne, and Walsh, who have commanded vessels running from San Francisco to the mouth of the Colorado.

delay, depending in a great measure upon the address shown in the employment of the different modes of extrication resorted to. The snags are numerous, but being flexible or brittle are seldom dangerous.

Experience alone can impart the knowledge required to enable one to navigate successfully. Memory assists but little in selecting the channel, for it has been known to change from one bank to the other in a single night. Generally, along a steep bank and a concave bend the deepest water is to be found, but the rule is not invariable. The water being turbid and perfectly opaque, it is impossible to determine the depth as in the case of a clear stream. From the formation and relative positions of the islands and banks, from the eddies, the direction of the currents, from the pieces of drift-wood and other floating substances, the experienced navigator can generally determine the proper course to be selected.

During the months of May and June, while the Colorado is rising, and before new bars have had time to form, the navigation is most easy. At the worst stages of the river the round trip from Fort Yuma to the Gulf, allowing a day or two for taking in the cargo, can be accomplished in two weeks. During high water it is frequently made in three days.

FORT YUMA TO MOUTH OF BILL WILLIAMS'S FORK.

This section of the river is one hundred and ninety miles in extent. The Yuma flats reach from the fort to the first chain of hills that crosses the river. At very low water the navigation at this place will doubtless always be found difficult and tedious. There is nothing to confine the channel, and the water is spread over a wide surface filled with bars and snags. The bed is quicksand, and does not afford good holding ground for an anchor. There are no trees to which lines can be attached, and the snags are not strong enough to render much assistance. The least depth of water encountered was twenty-two inches.

A low range is now entered, and for forty-four miles—from Explorer's Pass, at the entrance of the Purple Hills, to Hazard Pass, at the foot of the Great Colorado valley—the river flows generally between hills and rocky bluffs. The average depth of the channel is less than below Fort Yuma, being not more than eight or ten feet. The velocity of the current is about the same. The bed of the stream is still composed of sand, but for the first time rocks are encountered. The banks are more permanent, as might be expected, than in the flat country below, and the position of the channel more fixed. The bed of the river, however, being composed of the same shifting material, bars are met with that present the same difficulties that characterized the previous navigation. They are not so numerous as in the open country. The more precipitous the banks the deeper, as a general rule, is the channel. In the Purple Hill Pass and through the Cane-brake cañon the navigation is pretty good, though at the lower end of the latter pass there are one or two bars with but twenty inches of water, and at the upper end a cluster of rocks near the left bank that project slightly above the surface. At a higher stage they would be dangerous were their position not known. A mile above the first rapid occurs. The river, at its foot, impinges against the face of a vertical wall and then bends sharply to the left. Some caution should be exercised in making the turn. The channel over the rapid is good, and the current not swift enough to occasion trouble.

A short distance above are the Barrier islands. Several high rocks, arranged in a circle, occupy the middle of the stream, leaving a narrow channel on either side. That near the left bank is the more favorable, but the current is swift, and two or three isolated rocks just above add to the difficulty of the passage. A single rock, two and a half feet below low water mark, stands in the channel at the head of the narrowest place. Below Red Rock Gate is a difficult bar and then a stretch of good river. The velocity of the current in this portion is about three and a half miles an hour.

At Three Points Bend two sharp rocks project from one bank, and a third juts out midway from the other side. The channel glances by all three, and the passage requires care. Im-

mediately above is a lone rock, fifty feet from the left bank, the top visible a little way above the surface. A difficult shoal occurs beyond. A few miles further the centre of the river is again occupied. A rock shaped like a light-house stands midway between the banks. The channel on the east side is the proper one to be followed. It is but thirty feet wide, but presents no obstructions. Some sharp turns around rocky corners make the next pass a little hazardous, and then, through a narrow porphyry gate, the Great Colorado valley is entered.

The head of this valley is one hundred and ten miles from Porphyry Gate, and the navigation throughout its whole extent is similar to that below Fort Yuma. The current has the same velocity. The average depth of the channel is seven or eight feet. The best water is usually found close to the concave banks. In several places flats are encountered similar to those above Fort Yuma. They are generally filled with snags; the water divided into numerous channels, and the navigation troublesome. In the vicinity of the Half-way and Riverside mountains the river is better than in any other portion of the valley, excepting at one place, the Sand island shoals, where two channels are formed by an island, and these subdivided, occasioning a succession of difficult bars that require much time and labor to pass. There are few places in this valley where the condition of the river is at all permanent, and it is therefore impossible to describe in detail the different localities.

Beaver island is at the commencement of the foot hills of the Monument mountains—a range intervening between the head of the valley and the mouth of Bill Williams's Fork, twenty miles above. At the foot of the island is a little cove, which affords a good place for a steamboat to lay by. In the cañon formed by the foot hills and mountains the river is narrow and the water generally deep. The navigation could be pronounced better than at any place above the mouth were it not for the occasional appearance of sharp, jagged rocks, projecting a foot or two above the surface, and indicating danger when the water is two or three feet higher. Four miles from the mouth of the fork there is a sunken rock near the right bank. All of the rocks observed were quite close to the shore. During the high stage of the river, unless the current should be very swift through the confined passage, the navigation of this cañon would be attended with no trouble.

Throughout the section just described the character of the Colorado differs little from the portion below Fort Yuma. Though isolated rocks are met with, the bed is composed of sand, and the bars have about the same depth upon them. The obstructions are, however, much more numerous than they are below the fort, and the navigation attended with more delay.

BILL WILLIAMS'S FORK TO PYRAMID CAÑON.

This section, one hundred miles in extent, comprises the Chemehuevis and Mojave valleys and the cañon through the range which separates them. The navigation in this cañon is somewhat like, though much better, than in the cañon through the Monument mountains. The river is narrow and deep, and free from bars. There are neither sunken rocks nor any that are visible above the surface. There are indications that during the freshet the water rises to a prodigious height in some of the narrowest portions, and at that time the ascent or descent should not be made without great caution. At other seasons no obstacle will be encountered.

In the lower part of the Chemehuevis valley are many shoals, where the bottom is composed of coarse gravel, and it is hard to force a boat over the unyielding surface. A slight difference in draught would be a matter of great importance in this part of the river. The least depth found was twenty-two inches. Upon all of these bars there is a swift current, which enhances the difficulty of crossing. Through much of the valley the river flows between gravel bluffs, one or two hundred feet high, and here the navigation is good. Where the banks are bold

and rocky there is nearly always a good channel and a sandy bed. If the land on either side is low, pebbles are washed down into the stream and overspread the bottom.

At the mouth of the Mojave cañon the Colorado is divided by a pebbly island, on both sides of which are sharp rapids. The eastern channel is preferable to the other. The water has a depth of three feet, but the bottom is gravelly, and some scattered pebbles of large size come within two or two and a half feet of the surface. The rapid is one or two hundred yards in length. In ascending, a line should be taken from the bow to an anchor ahead, to prevent the boat, in case she should catch upon a rock, from being swung around. If the bow were to be whirled back it would be with such violence that an encounter with a rock would occasion serious damage.

In the Mojave valley the river generally is good. At the entrance from the Needles is a broad, difficult shoal, covered with pebbles. Four miles above Camp 41, abreast of Camp 45, and at the very head of the valley, are also rocky bars, attended with slight rapids. The bed generally is less gravelly than in the Chemehuevis valley. The channel is little obstructed by sand bars. One only was found near Camp 44, where for fifteen or twenty yards there were but eighteen inches of water. The average depth of the channel continues to decrease. In the Mojave valley it is about six feet.

This section of the Colorado, it will be seen, differs from the two preceding, principally in the character of the river bed, which, as high as the mouth of Bill Williams's Fork, is composed entirely of sand, but is afterwards found to be partially covered with gravel. At all of the gravelly bars the current is swift, and frequently assumes the character of a rapid. Such places present, of course, more difficulty than the sand bars; but though, from this reason, the bad places are worse, the channel generally is freer from obstructions than it is below. When the water rises the gravel bars do not experience any change, and during a higher stage they would occasion no trouble. At such times the navigation of this section would doubtless be easier and better than that of any other portion of the Colorado.

PYRAMID CAÑON TO BLACK CAÑON.

This section comprises the remainder of the navigable portion of the Colorado. It is sixty miles in length. In the Pyramid cañon, which is five or six miles long, the navigation is good. Above, the bed of the stream is composed generally of coarse gravel and rocks. Rapids occur at short intervals throughout the whole distance. The first, at the head of the cañon, has a depth of two and a half feet. Two or three small rapids which follow present no great difficulty. At Deep rapid the channel is narrow, and the rush of water stronger than at any place below the Black cañon, but in the centre of the channel there is a depth of six feet, and there are no rocks to obstruct the passage. There is good holding ground above for an anchor, to which a line may be attached to keep the bow steady. The rapid above occurs at a sharp turn of the river, but is not difficult to pass.

At Shallow rapid there are only twenty-two inches of water. An island divides the river into two channels. The current is rather stronger on the west side, but the river is narrower, and the abrupt bank, covered with trees, offers better places to which to attach a line. The two rapids above Camp 50 are easy. At the first there is plenty of water, and at the second nearly two and a half feet. The other rapids below the head of Cottonwood valley have at least three feet of water and a moderate current. Through the Painted cañon the navigation is good. Near Mount Davis the edges of the channel are obstructed by rocks, but a sufficiently wide space in the middle is left clear.

Round island should be passed on the eastern side. There is a pair of rapids abreast of the island. At the first there is plenty of water, but at the second, for several yards, a depth of only eighteen inches. At the rapids between Camps 53 and 54 there is sufficient depth. At

the last a line should be taken ahead to prevent the possibility of the boat swinging against some rocks that project near the channel.

The rapids between Camps 54 and 55 are neither shoal nor very swift; but abreast of the latter camp is a long rapid, where there are only two feet of water. No others are now encountered till the Black cañon is reached. At the mouth of the cañon there is a short deep rapid, above which, in the centre of the channel, is a sharp conical rock, the top of which is about four inches below the surface.

During the season when the river is high the current in this part of it would be swifter than below, but excepting for this, the navigation of this section of the Colorado would present little difficulty or hazard after the position of the sunken rocks should become known. A boat drawing not more than eighteen or twenty inches could at all times ascend and descend, without being lightened of its cargo, and perhaps experience less trouble from the rapids than from the sand bars in the lower part of the river.

BLACK CAÑON.

The black cañon is twenty-five miles long. It contains twenty-five or thirty rapids. The presence of large rocks in the centre and along the edges of the channel renders many of these rapids dangerous. At two or three, and at Roaring rapid in particular, the fall is considerable, and the rush of water violent. Over any one of them, however, a steamboat of proper construction, partially or entirely lightened of the cargo, could be taken with the assistance of lines, but the passage of the cañon, at low water, would be tedious, and attended with much labor, hazard, and expense.

In some of the narrowest portions of this gigantic defile, drift-wood was seen lodged in crevices fifty feet above the surface of the river, an evidence of the astonishing height to which the water has banked up during the summer freshets. The attempt to go through the cañon at any season when a sudden rise might be apprehended would be accompanied with grave peril. At the beginning of the warm weather, when the water has risen only one or two feet, the cañon might be navigated without serious trouble or danger; but the uncertainty and risk attending the passage, for the greater portion of the year, are such that the mouth of the cañon should be considered, for all practical purposes, the head of navigation of the Colorado.

Above the Black cañon the river soon becomes a continuous rapid, utterly impracticable to be ascended in boats.

DESCRIPTION OF BOAT TO BE USED UPON THE COLORADO.

With a boat of proper construction the Colorado can be navigated without trouble, at all seasons of the year, between the head of the Gulf of California, and the mouth of the Black cañon. The most essential conditions in regard to the boat are as follows:

- 1st. That she should not draw more than twelve inches when light.
- 2d. That the boiler should be of large capacity and the engines of great power.
- 3d. That she should have a large stern-wheel.
- 4th. That the bottom should be perfectly flat and smooth.
- 5th. That the hull should be divided by water-tight bulkheads.

For service upon the river I would recommend iron boats in preference to wooden ones. In the hot climate of New Mexico the former would be more durable; they can be built of lighter draught for the same capacity; are cheaper, and more easily and rapidly put together. A good description of boat would be an iron stern-wheel steamer, with the hull one hundred feet long, and the greatest breadth of beam twenty-two feet; built sufficiently full to insure a draught, when light, not exceeding twelve inches; if in sections, the flanges, where the sections meet, to be turned inwards, in order that the bottom may be perfectly smooth and flat; to have a large boiler and a powerful high-pressure engine, with two fourteen-inch cylinders of five

feet stroke; a stern-wheel eighteen feet in diameter; the hull to be separated into four water-tight compartments, one at the bow, one enclosing the boiler, a third behind the space set apart for stowing the cargo, and the fourth near the stern; to be steered by three wooden rudders; the bottom to have such a sheer aft that the lower edge of the transom may be, when the boat is loaded, about two inches above the surface of the water, so that the pilot can see by looking over the rail if any of the rudders are bent or foul; to be provided with a capstan; with two anchors of one hundred and twenty-five pounds weight, and a small kedge anchor; with plenty of extra rudders, wheel buckets, and stout lines.

The water of the Colorado holds in suspension a large amount of fine silicious sand, sharp as emery, that cuts away the valves almost as rapidly as it could be done with a file. Unless the boiler is made large it would require but a week's service to disable the engine so as to render it impossible to run the boat.

A steamboat, built as above described, and run by an experienced pilot, would occupy, in making a round trip from the mouth of the river to the head of navigation, from twelve days to five weeks; depending upon the season of the year and the stage of the water.

FUEL.

Wood of excellent quality for the purpose of fuel can be obtained in abundance, alongside of the bank, at short intervals, between the mouth of the river and the Painted cañon. It is principally mesquite, willow, and cottonwood. There are large groves of sun-dried trees, ready for instant use. The mezquite wood makes the hottest fire, but, if much used, injures the boiler. Between the Painted and Black cañons, wood is less frequently met with, and were this part of the river to be constantly navigated, it would be necessary to establish depots, which would derive their supply from below.

ESTIMATE OF COST OF TRANSPORTATION.

A suitable boat, capable of carrying sixty tons, should be able to make fifty trips between tide water and the head of navigation before becoming unserviceable. Such a number ought certainly to be accomplished within six years, which would enable 3,000 tons of freight to be carried to the highest navigable point during that period. A boat of the character described could be built and put together at the mouth of the river for \$20,000 00

The annual expenses of running her would be—

For pay of captain	\$2,000 00	
For pay of pilot	2,000 00	
For pay of two engineers, at \$1,500 each	3,000 00	
For pay of eight hands, at \$450 each	3,600 00	
For rations of twelve men, at 30 cents per day, about	1,300 00	
For repairs	1,100 00	
Annual expenses	13,000 00	
Expenses for six years		78,000 00
Total expense of transportation of 3,000 tons of freight		98,000 00
Or about \$30 per ton.		

No estimate is made for expense of fuel. The boats are unable to run at night. As has been stated, there is abundance of wood along the banks, and eight men, while at camp, would be able to lay in a sufficient amount for a day's consumption.

It is believed that the above estimate is a liberal one, and rather exceeds than falls below the expenditure that would be actually involved were a sufficient amount of transportation business done upon the river to keep the boats in service constantly employed.