

The obstacles to navigation on the route explored were found to be numerous, extensive, and not unfrequently quite dangerous. They consist chiefly of rocky ledges running across the channels, isolated boulders of varying sizes, and shoals of gravel. The aggregate length of shoals is nearly 35 miles out of a length of river of 154 miles.

The river is subject to considerable freshets. The average rise on such occasions is about 16 feet; but it has reached much greater heights. At Petersburg, in 1852, the river rose 44 feet above the common stage within 48 hours, and 38 feet within 36 hours in 1875. In the latter year the streets of Augusta were 4 feet under water, although they are 35 feet above the river at ordinary stage.

These great differences of water-level show the practical impossibility of improving the river by locks, dams, and side-cuts for canals.

The height of a number of points on the river above the city of Augusta, which is 148 feet above the sea, was ascertained by barometric observations. An aneroid was employed for this purpose, using the corresponding records of the signal office at Augusta to compute differences of altitude. The observations were corrected for instrumental error, reduced to 32° Fahr., and computed by Col. R. S. Williamson's tables.

The head of pole-boat navigation was thus determined to be about 374 feet above the water-level at Augusta. At Andersonville, S. C., 107½ miles above Augusta, the river was 270 feet above the water-level of the latter place. The greatest local fall of any of the reaches of the river was observed at Hatton Shoal, 110 miles above Augusta, amounting to 39 feet in 1½ miles. At Gregg's Shoal, 85 miles above Augusta, it was 20 feet in one mile, and at Cherokee Shoal 9 feet in half a mile.

To what degree of accuracy these slopes were ascertained with the means available for the purpose, it is impossible to say. It is believed that they cannot be safely relied upon in preparing a project of improvement, and that a careful instrumental survey of some parts of the line will be necessary.

The country on both sides of the river from Augusta to Knox's Bridge, a distance of 124 miles, is devoted to the raising of cotton. It is also well adapted to the production of tobacco, grain, and indigo, as well as to vine and silk culture. The country adjoining both banks of the upper 30 miles above Knox's Bridge is generally used for raising corn. It is well timbered. Gold-mining is carried on to some extent, and there are also, in places, extensive beds of good iron ore, with abundance of fuel and limestone.

The area of the cotton-land, estimated to depend to some extent on the river for the transportation of its products and needed supplies, is about 1,900 square miles, with a population of 82,000, according to the census of 1870. The total annual production of cotton in these districts is estimated at 70,000 bales.

In 1876 and 1877 the freight from Augusta upstream averaged from 2,000 to 2,500 tons per annum; from the head of navigation down to Augusta about 12,000 bales of cotton. The average annual receipts of cotton from all sources at Augusta is stated to be 180,000 bales. The amount of cotton shipped on the route examined forms, therefore, only a rather small proportion of the whole.

There can be little doubt that an improvement of the river would aid the further development of its trade. There is an abundance of water which, if properly regulated, would deprive navigation of most of its present inconveniences, dangers, and delays, allow the introduction upon the lower portion of the route, at least of vessels propelled by steam, and thus greatly cheapen the cost of transportation.

Two estimates are submitted by Mr. Carson, as follows:

The first estimate is for opening a channel for pole-boat navigation, 3 feet deep and 30 feet wide, from Augusta to Andersonville, at the mouth of the Tugaloo River, 107½ miles, and from Andersonville up the Tugaloo River 43¼ miles to Brown's, a total distance by river from Augusta of 150¾ miles.

The estimated cost of the improvement for the entire distance is .....	\$171,705
Add 10 per cent. for contingent expenses .....	17,170
Total .....	188,875

The second estimate is for a steamboat channel, 3 feet deep and 90 feet wide, from Augusta to Trotter's Shoal, a distance of 64 miles .....	80,910
Pole-boat navigation as before from Trotter's Shoal on the Savannah to Guest's Shoal on the Tugaloo, 50½ miles .....	125,977
Steamboat navigation on the Tugaloo from Guest's Shoal to Brown's, 36¼ miles .....	43,286

Add 10 per cent. for contingent expenses .....	259,173
Total .....	285,090

These estimates can be regarded at best as only rough approximations to the probable cost of the work. The error will doubtless be found in having put them too low rather than too high, as they are based upon the supposition that rock can be excavated from the bed of the stream for \$2.50 per cubic yard, sand and gravel for 25 cents per cubic yard, and that the riprap dams can be built for \$1.25 to \$1.50 per cubic yard—prices derived from the present exceptionally low cost of all grades of labor. In addition to this there are considerable errors in quantities, which always accompany estimates based upon rapid and partial examinations of this kind.

Before a project for the improvement of the Upper Savannah River can be intelligently prepared, more detailed information must be collected from trustworthy sources, private and corporate, interested directly or indirectly in raising and transporting the productions of that portion of the country naturally tributary to the contemplated route; and a careful instrumental survey of a large part of the stream, more especially above Trotter's Shoal, will be required.

Below Trotter's Shoal the slope of the stream is comparatively gentle, and a suitable and appropriate method of improvement more simple and apparent. Any appropriation which may be made should, in my judgment, be expended upon this portion of the river, until a thorough examination from Trotter's Shoal to Andersonville, and perhaps as far as Brown's on the Tugaloo, can be made. The ledges of rock, in particular, that have to be removed ought to be surveyed with considerable minuteness of detail.

It will also be necessary to ascertain the slope of the stream with precision at numerous places.

The following estimates for the improvement of the lower reach of the river are respectfully submitted:

Cost of improvement for pole-boat channel 3 feet by 30 feet, from Augusta to Trotter's Shoal, 64 miles .....	\$45,000
Cost of steamboat channel 3 feet by 90 feet over the same route .....	124,000

Mr. Carson's detailed report is appended hereto. The cost of the examination has been \$750.

Very respectfully, your obedient servant,

Q. A. GILLMORE,

Lieutenant-Colonel Engineers, Brevet Major-General, U. S. A.

Brig. Gen. A. A. HUMPHREYS,

Chief of Engineers U. S. A.

REPORT OF MR. J. P. CARSON, ASSISTANT ENGINEER.

NEW YORK, January 7, 1879.

GENERAL: I have the honor to submit the following report of the examination of the Savannah River above Augusta, Ga., made according to your instructions, dated 2d November, 1878.

I arrived in Augusta on night of 4th November, where, by the advice and assistance of several prominent citizens, I was enabled to procure one of the most experienced pilots on the river, with a boat and crew of four negroes, and started from the Canal Basin 9th November, and returned 17th December.

The instruments used during the examination were an aneroid barometer, thermometer, prismatic compass, and tape. The boat was what is called a Petersburg or fall boat, such as are employed in the trade of the river. They are usually 70 to 80 feet long, of uniform cross-section for 50 feet; 6 feet wide on bottom, which is flat, and 7½ feet wide at gunwale; the bow and stern are rounded and pointed for about 10 or 12 feet, like a cigar, and decked over. They are steered by a large oar at the stern, and propelled up stream by six boatmen, with heavy iron-pointed poles, 18 feet long, who walk backward and forward along the foot-planks on the bottom, with their shoulders pressed against the point of the pole. In the rapids they bend over, clutch the gunwale, foot-planks and timbers, gradually pulling themselves along, inch by inch, until the boat is through. Considerable skill is required to properly plant the poles so as to assist the steersman. Coming down stream a pair of oars is used in the slack water, and in the rapids light poles at the bow to fend off from the rocks at the given signal from the pilot; they descend with great velocity; every one is on the alert; any mistake will cause a "hang" for several hours, and very frequently a smash up. They travel up stream about 1½ miles per hour, and down stream at the rate of 4½ miles per hour, varying with the condition of the river. Empty, they draw 4 inches of water, and loaded, 18 to 20 inches. The load up stream varies, according to the stage of water, from 6,000 to 20,000 pounds. The load down stream is from 30 to 50 bales of cotton, placed breaking joints, piled three tiers high, and projecting about 2 feet beyond the gunwale. The men cook and live on the boats.

The river was exceptionally low, said to have been lower than at any time during the last fifteen years, thus affording an excellent opportunity for seeing all the rocks, and my observations are based upon this stage of water.

It commenced to rise about 1st December, on my return, and about the 15th it reached its average stage of winter river, when only the largest rocks remain visible.

We were towed by horse through the canal from the basin to the lock, which is 100 feet long by 15 feet wide. A masonry dam across the river diverts the water into the canal. For a quarter of a mile above the lock there is slackwater with average depth of 4 feet; there commence the "Ninety-nine Islands." These are apparently made from an old cut-off on the Georgia side; are of small extent; the average depth of water between them is from 1 to 2 feet, and from the deposit of mud and trash new islands are forming wherever there is earth enough for willows to grow, with which they are covered.

*Stevens Creek Fall* (8 miles).—This is the widest part of the river, about 1 mile. The islands extend a half mile above scattered diagonally toward Georgia. The first ledge extends 200 yards across from an island to the South Carolina bank, and is 100 yards long (measured in the course of the river); the fall is about 2 feet. The channel is on the South Carolina side, but the falls are so much obstructed by fish-traps and bowlders that boats pass through circuitously among the islands and avoid it. Four hundred yards above the first ledge is another known as *Reach Shoal*; it extends across the river and is 10 yards long; water about 8 inches. The water above and below these ledges is 4 to 8 feet deep. By removing the rock and constructing a small wing-dam between the islands and the Georgia shore, about 600 yards long, the obstruction can be obviated.

(10 m.)—We then enter what is called the "Reach," a clear stretch of water for 2 miles; width of river, 450 yards; depth, 5 feet; velocity, 0.8 foot per second; channel on South Carolina side. We meet *Bush Rock*, a large bowlder, about 5 cubic yards, and 2 ledges, 15 yards each, 150 yards apart; below these, a sand bar 400 yards long by 150 yards wide is deposited. The channel is deflected to the Georgia side, and then returns to the South Carolina side. About 50 yards of ledge will have to be removed to straighten the channel. Depth of water in channel, 1 foot.

The Reach continues N. 50° W. for 2 miles to—

*Pine Log Shoal* (12 m.).—The fall is 1½ feet in 100 yards; depth of water, 1 foot. Here, on the Georgia side, is a channel known as the "Whirligig," used by boats descending during very low stages of water, they being obliged, on account of the sharp bend, to turn completely round on their course, forming a loop, and then go on. Twenty-five yards of ledge will have to be removed. Depth of water above shoal, 15 to 20 feet; the channel is 20 to 30 feet wide, and winds with easy curves among a

number of bowlders and ledges presenting no special difficulty. Course of river west for 1 mile.

*Fury's Ferry* (13 m.).—River 350 yards wide; course S. 60° W.

*Germain's Island* (14 m.) commences; 3 miles long; 300 yards wide; channel South Carolina side; clear river for 2½ miles above ferry.

*Harvey's Falls* (15½ m.).—Half mile long, fall about 3 feet; formed of two granite ledges about 600 yards apart, and some bowlders above. Lower ledge, 40 yards; upper ledge, 30 yards; depth of water, 20 inches; velocity of water between ledges, 0.8 foot per second; depth, 4 feet. Course of river, N. 30° W. Above the shoal, course N. 60° W. Channel flows down diagonally through the upper ledge on Georgia side, and through the lower ledge on South Carolina side.

*Big Kiokee Creek, Georgia* (18 m.).—Fifty feet wide. The banks are 10 feet high. The water in its bed was 12 feet wide by 6 inches deep. Clear river for 3 miles above fall, until we reach—

*Blue Jacket Shoal* (19 m.).—Fall about 10 inches; length, 200 yards; channel, 70 feet wide, 3 feet deep. Two submerged rocks, about 5 cubic feet each, in the middle of the channel, are the chief obstructions. Velocity in channel, 3.3 feet per second. Course of river N. 30° W. 1 mile.

Course of river N., 1 mile.

In these 2 miles above the shoal the river is 200 yards wide, and average depth 15 to 20 feet. The bottom is mud. The banks on either side, 12 feet high.

*Scott's Shoal* (21 m.).—One and a half miles long. First ledge requires nothing, then 600 yards of clear river, and then a series of sunken rocks and bowlders (aggregate length, 100 yards); depth of water, 2 feet; channel very tortuous, and boats frequently ground or "hang." For 400 yards above, the river is 3 feet deep; average width, 500 yards. Then for ¼ mile the depth is 18 inches over submerged ledges and gravel. Here we reach *Scott's Ferry*. The next mile and a half clear river, 5 feet deep.

*Little River, Georgia* (24½ m.).—Fifty yards wide; average depth for 3 miles above, 2 feet; banks, 12 feet high.

*Little River Falls* (24½ m.).—Two hundred yards long; fall, 3 feet. One of the most dangerous points on the river. There are 3 ledges of 10 yards each, equidistant; channel on South Carolina side about 15 feet wide and very serpentine.

Clear river for 1½ miles and we reach *Crow Hill Island*, 1½ miles long, and next to a cluster of islands known as *Kilcrease Islands*; channel on Georgia side.

*Garden Shoal* (26½ m.).—Four hundred yards, fall 3 feet; 2 ledges 30 yards each, 350 yards apart. The lower one extends from upper point of *Kilcrease Island* to the Georgia side. The channel divided; one portion, known as "Charleston Big Road," goes behind the island on the Carolina side; the other on the Georgia side, and is 200 yards wide just below the shoal. On the shoal the river is 500 yards wide; just above it contracts to 350 yards, and is very deep. Velocity on the shoal, 10 feet per second. Two hundred yards above is *Kilcrease's Ferry*, and the end of *Price's Island*, which is 3 miles long and 1 mile wide in the widest place.

*Pannel's Ledge* (27½ m.).—River 300 yards wide. There are two ledges across; 200 yards apart; aggregate length, 45 yards; fall, 2 feet; channel on Carolina side, about 2 feet deep, and very crooked. Going up, the boats zigzag among the rocks on the Georgia side.

*Spring Ledge* (28½ m.).

*Morgan's Ledge* (28½ m.).—These are made up of a series of small ledges; the aggregate length is 15 yards; depth, 2 feet; fall, 30 inches in 400 yards. Crooked channel through them all.

*Long Shoal* (29½ m.).—At the head of *Price's Island*. This shoal is 5 miles long, and the fall about 35 feet; the average width of the river is 600 yards.

For the first 2½ miles the channel twists among a series of ledges and bowlders along the Carolina bank; velocity, 10 feet a second; depth from about 2 feet to 8 feet; course of river, N. 50° W. Then *Dordon's Creek*, Edgefield County, South Carolina, is reached.

Half a mile further, as before, and *Stuman's Eddy* is reached; 1 mile long; 400 yards wide; 2 to 8 feet deep; velocity, 3 feet a second. Here there is a narrow low island, 1½ miles long, on the Georgia side. The next ¼ mile is called "Straight Tucker." The channel runs diagonally from Georgia (at the head of the island) to South Carolina, and is very swift; containing several sunken rocks.

Going up, the boats follow the Carolina shore. The next ¼ of a mile is through a more moderate rapid. The last quarter of a mile is through what is called the "Ring Jaw," and is the dread of the boatmen.

The channel is deep (velocity 12 feet a second) and very serpentine, with many detached rocks, both exposed and sunken.

Of the whole 5 miles 4 are rapids, and about ¼ of a mile of rock and bowlders would have to be removed to make it passable without danger. The banks on both sides of the river are about 15 feet high.

Above the shoal for ¼ a mile the river is 250 yards wide and 30 feet deep; course, N.

30° W. It then widens out and a lot of small islands occur. It continues clear river for 1½ miles, 650 yards wide, until we reach

*Point Lookout Shoal* (36½ m.).—There are three small ledges about 10 yards each, 150 yards apart; fall, 2 feet in a quarter of mile. The islands continued. The channel is tortuous, but not difficult.

Just above the shoal, on the South Carolina side, is *Benningfield Creek* (36½ m.), 10 yards wide. Opposite the creek, 300 yards across the river, is Ferguson's Island, 1 mile long and 300 yards wide; river beyond is 300 yards wide, but shallow. Quarter of a mile above the island is Ferguson's or Searle's Ferry.

*Little River, South Carolina* (40½ m.).—This is the dividing line between Edgefield and Abbeville Counties. Width, 50 yards; depth, 2 feet; velocity, 0.7 foot in 1 second; banks 12 feet high.

*Soap Creek, Lincoln County, Georgia* (40½ m.).—Width, 5 yards; depth, 1 foot; banks 12 feet high.

*Smith's Gravel* (42 m.).—Length, 200 yards; depth, 2 feet. There are also two small ledges, 150 yards apart, with 14 inches of water; length about 5 yards each. The bottom is covered with gravel, which is considered as anything in size, from a buckshot to a hen's egg.

The river beyond is 350 yards wide, with 5 feet depth and 5 feet velocity in channel on South Carolina side, and 1 foot depth on Georgia side.

*Red Horse Gravel* (43 m.).—Two hundred yards long; channel, 4 feet deep, 15 yards wide; velocity, 4 feet per second on the South Carolina side; in the middle, at lower end, there is a very dangerous rock. Clear river to

*Barksdale Ferry* (47 m.).—For the next 12 miles the river is practically clear; width, 300 yards; depth, 5 to 20 feet, with the exception of *Crawl-Round Shoal* and another without a name, the two being about 300 yards long. Six miles above the ferry is Fishing Creek, Georgia.

*Petersburg, Elbert County, Georgia* (59 m.).—The Broad River enters at this point and divides Lincoln from Elbert County. Width, 100 yards; depth, 2 feet; velocity, 3 feet per second.

Pole-boats go up 5 miles to foot of Anthony's Shoal, which has a fall of 17 feet in 2 miles. Thompson's Cotton Factory was located here, but has been burned down.

Opposite Petersburg, in Lincoln County, is Lisbon, and in Abbeville, Vienna. Only a few cellars remain to mark the site of what were, forty years ago, quite prosperous towns. The center of a large tobacco trade, they are now cotton-fields. Petersburg is a planter's house; Lisbon has a shop, and Vienna a few negro cabins. Here there is a ferry, and the Savannah River is 350 yards wide; 2 to 4 feet deep; velocity, 3 feet a second. After a freshet it is, at the ferry, said to silt up to 2 feet depth, but during low-water it scours out according to its duration until the bed-rock is reached.

One mile above is *Petersburg Gravel* (60 m.); this extends ¼ mile. A series of rocks is scattered through it on which boats are frequently wrecked, but it is not considered a serious obstacle. Channel on South Carolina side 30 feet wide, 2 feet deep.

*Bell's Gravel* (61 m.).—One mile; 2 feet deep; velocity, 2 feet per second. During high-water it is very difficult to ascend on account of the velocity of the current and the poles slipping or sinking into the bottom, which is the chief difficulty where gravel occurs.

The river (62½ m.) makes a very sharp bend from N. 30° E. to N. 50° W.; this is called by boatmen the "Hominy Pot." In South Carolina there is a large excavation in the hill supposed to have been made by the Indians for constructing a mound, which is on the other side of the river, about 40 feet high.

*Rembert's Ferry* (63 m.).—Not kept up.

*Foot of Trotter's Shoal* (64 m.).—The river is 250 yards wide; velocity, 1½ feet per second; depth, 4 feet.

These shoals are 7 miles long; the fall is 74.88 feet as determined by spirit-level. They are the longest on the river, but no more difficult than many of the others. The river widens out to about 800 yards, and from its bends the channel forces its way diagonally from shore to shore through the rocks and islands, of which there are a great many.

Of the 7 miles 2½ are eddy, or comparatively smooth water. Those are known as "Tate's Mill-dam Eddy," "Shuck-pen Eddy," and "Blacksmith's Eddy." The shoals and rapids are known as "Rembert's Big Ledge," "Posey's Dam," "Bear Garden Ledge," "Bowman's Dam," "Bank Sluice," "Little" and "Big Cunningham Sluices," "Brook Sluice," and "Little Hell Sluice." The aggregate distance is 4½ miles, about 1 mile of which may be considered solid rock. The channel is from 10 to 40 feet wide, with an average depth of 2 feet; the velocity varies from 3 to 5 feet a second; its course is exceedingly sinuous, and it contains both exposed and sunken rocks everywhere. Between the ledges are spaces 50 to 100 yards long where a pole cannot touch, which causes the boats ascending to lose ground in crossing from side to side "looking for bottom."

Above the head of Trotter's Shoal is *Paris Island* (71½ m.), 1½ miles long, 1 mile

wide; the largest on the river. The stream between the island and South Carolina shore is called "Cracker's Neck"; 40 yards wide and very shallow. Rocky River from South Carolina enters at the lower end of the island. It is about 30 yards wide and 2 feet deep. The channel above the shoal continues west of the island 120 yards wide, 20 to 30 feet deep, smooth and clear.

*Beaver Dam Creek, Georgia* (72½ m.).—Twelve yards wide; 1 foot of water; banks 10 feet high. The river for the next 2½ miles is winding, but has very sharp curves; 200 to 250 yards wide; 5 to 6 feet deep. In this distance the following ledges occur:

*Gloucester Shoal* (73½ m.).—One hundred yards; depth water, 2 feet; velocity, 4 feet.

*Allston's Ledge* (73½ m.).—One hundred and fifty yards; depth water, 2 feet; velocity, 4 feet.

*Brickyard Ledge* (74½ m.).—Thirty yards; depth water, 2 feet; velocity, 4 feet.

*Chambers Ledge* (74½ m.).—Two hundred and fifty yards; depth water, 2 feet; velocity, 4 feet.

On the Carolina side of the river are Buzzard's Island, Hunt's Island, and Spier's Island, each separated by 40 yards of water from main shore. Clear and deep river to *Cherokee Shoal* (75½ m.).—One-half mile long; fall, 9 feet by level. The river is 600 yards wide. The channel is very winding; it passes over four ledges about 30 yards each; depth, 15 inches; velocity of water, 6½ feet per second.

*Moseley's Ferry* (76½ m.).—Mattox's Mill at the foot of the shoal; 100 yards above ferry is *Tucker's Ledge*. Velocity, 5 feet; depth, 18 inches; length, 100 yards. Heard's Island commences; 2 miles long; a dam at lower end to Georgia, and canal 1 mile long conveys water to mill; fall, 16 feet. River, 300 yards wide; clear; 2 to 12 feet deep for 3½ miles.

*Sand-bar submerged* (80 m.).—Four hundred yards long.

*Van's Creek, Georgia* (80½ m.).

*Bank's Ledge* (80½ m.).

Two ledges, 20 yards; many submerged rocks; channel, 3 feet deep; 4 feet velocity; 200 yards of slight rapid above, at mouth of *Ross Creek, South Carolina* (80½ m.).

*Harper's Ferry* (81 m.).—Clear river, 2 miles; 200 yards wide; 6 feet deep.

*Bowman's Ledge* (83 m.).—This is opposite the old town of Edenborough. There now remains only an old dilapidated mill, with undershot water-wheel. To supply this an artificial dam was made on the Georgia side, above and below which the channel is 15 feet deep. Its present course is over the ledge on the South Carolina side; crooked and 2 feet deep; ledge, 40 yards of solid granite. Clear river, 2½ miles; 6 feet deep.

*Oliver's Creek, South Carolina* (84 m.).

*Picken's Creek, Georgia* (85½ m.).

*Gregg's Shoal* (85½ m.).—One mile long; fall, 20 feet. For the first quarter of a mile two small ledges are passed about 15 yards each; the remaining ¾ of a mile is the shoal proper; the current is very swift; the channel winds among the rocks, and the difficulty is greatly increased by the poles slipping. At the head of these shoals (86½ m.) is the dividing line between Anderson and Abbeville Counties. Came down in 13 minutes. Clear river for 2 miles with exception of *Strickland's Ledge* (87½ m.). This is small; about 10 yards long.

*Bond's Ferry* (88 m.).

*Middleton Shoal* (88½ m.).—One mile; fall, 18 feet. For the first ¼ of a mile we pass through rapids on Georgia side. The river then widens to 700 yards. Above the rapids we pass behind a small island into smooth water; channel, 50 yards wide; 15 feet deep for 500 yards; the remaining 700 yards most difficult rapids. It took an hour and a half to go up and only 16 minutes to come down.

*Little Generostee Creek, South Carolina* (89½ m.).—This creek is 10 yards wide; 1 foot deep.

*Craftsville, Elbert County, Georgia* (89½ m.).

*Ferrill's Ledge* (89½ m.).—Channel on South Carolina side; fall, 3 feet; 120 yards long; a great many fish-traps are built along it.

*A ledge* (90 m.).—Channel good; running diagonally down the river; rocks scattered about for 600 yards. The river is about 800 yards wide. Here commence

*Craft's Islands* (90½ m.).—They are each a quarter of a mile long and 300 yards wide, separated from Georgia by a stretch of water 40 to 80 yards wide and 10 to 12 feet deep. The space between them is 100 yards. Through this space boats pass during low-water; there is a ledge 10 yards long. Clear river for half a mile.

*Watt's Ledge* (91½ m.).—This extends about 300 yards; there are two ledges of 10 yards, between which there is just space enough for the boats to pass; then there are rapids 150 yards; velocity of water, 5 feet per second; fall, 2½ feet. For 500 yards above the river is smooth, and from 15 to 20 feet deep.

*McCue's Shoal* (92 m.).—One mile long, with spaces of smooth and deep water 150 yards between the ledges; velocity of water on ledges 4 feet a second, and depth of water 2½ feet.

*Brown's Ferry* (93 m.).—This is at the dividing line between Elbert and Hart Counties, Georgia.

For the next  $2\frac{1}{2}$  miles the river is clear, and from 6 to 12 feet deep; 200 to 300 yards wide; velocity, 3 feet per second, with these exceptions, viz:

*Saddler's Ledge* (93 $\frac{1}{2}$  m.).—One hundred yards.

*Cedar Creek, Georgia* (93 $\frac{1}{2}$  m.).

*Green's Island Ledge* (94 $\frac{1}{2}$  m.).—Seventy-five yards; the fall is about 1 foot. *Green's Island* is 400 yards long; 60 yards wide; main channel on the Georgia side is 50 yards wide; the river on the Carolina side is 80 yards wide.

*Stephenson's Ferry* is 200 yards farther, and we reach

*McDaniel's Shoals* (95 $\frac{1}{2}$  m.).—These are 5 miles long; fall, 30 feet. The first ledge is about 250 yards long, then comes an eddy for  $1\frac{1}{2}$  miles. The remaining  $3\frac{1}{2}$  miles is a series of rapids and short ledges, with spaces of deep water between from 50 to 200 yards long. In this distance there are two sluices; the first is 40 yards wide, 40 yards long, and 30 feet deep; velocity, 10 feet per second; fall, 3 feet; boats frequently have to be pulled up with ropes.

The second sluice is 30 yards wide, 30 feet deep, velocity 7 feet per second, and through this it seems as if the entire river poured.

At the head of the shoal is a very sharp and difficult turn caused by some projecting rocks; the river is 100 yards wide and 15 feet deep. It took three hours to ascend and only 57 minutes to descend. About 1,200 yards of solid rock will have to be removed along the length of the shoal.

Two and a half miles above the foot of these shoals *Big Generostee Creek*, South Carolina (98 m.), enters.

*Head of Shoals* (100 $\frac{1}{2}$  m.).—Then clear river to *Dooley's Ferry* (101 m.), and clear river to *Brown's Ferry* (102 $\frac{1}{2}$  m.).

For the next  $4\frac{1}{2}$  miles there are  $3\frac{3}{4}$  miles of clear river 250 yards wide; 3 to 5 feet deep, and  $\frac{1}{4}$  of a mile of shoals, which occur in the following order, viz: 250 yards wide, 3 to 5 feet deep:

*Light Wood, Log Creek, and Shoal* (104 m.).

*Creek in Georgia* 30 feet wide, 3 feet deep; a pole-boat can go up for half a mile. The water rises in it very suddenly. The ledge is 20 yards long and extends across the river; fall, 1 foot; channel on Georgia side obstructed by fish-traps.

*Scott's Shoal* (105 m.).—Half a mile long; depth, 2 feet to 10 inches; channel straight in middle of river. There are four ledges 8 yards each, equal to 32 yards.

*Jenny's Ledge* (106 $\frac{1}{2}$  m.).—Extends across the river and is covered with fish-traps; water 1 foot deep; length of gravel and ledge quarter of a mile.

*Buckhead Ledge* (106 $\frac{3}{4}$  m.).—One hundred and fifty yards long.

*Fork Shoal* (107 $\frac{1}{4}$  m.).—Fall, 3 feet; length, quarter of a mile. This is at the junction of the Seneca and Tugaloo Rivers, and the head of the Savannah River.

*Andersonville, South Carolina*, (107 $\frac{1}{2}$  m.).—In the fork of the river and at the mouth of *Little Beaver Dam Creek* several good houses, a church, a store, and a cotton factory, working 20 hands. The cotton is spun into yarn directly from the seed. It is quite a thriving settlement. There is a ferry to Georgia, and a large quantity of cotton passes through from Hart County to Anderson Court-House, 13 miles distant, where it is sold and shipped by railroad.

The Seneca River is 80 yards wide; boats can go up for 4 miles.

*Tugaloo River*, at Andersonville, is 310 yards wide and 3 to 5 feet deep.

#### TUGALOO RIVER.

After leaving Andersonville the river is clear for  $2\frac{1}{2}$  miles, and the depth is from 3 to 5 feet, with the following exceptions, viz:

*Bobo's Ledge*.—Three hundred yards long, of which 50 yards are rock and 250 yards are gravel.

*Reed's Ledge*.—Two hundred yards of rock; fall,  $2\frac{1}{2}$  feet; channel filled with fish-traps.

*Morris Island* (109 $\frac{1}{2}$  m.).—Three-quarters of a mile long; channel on the Georgia side is 40 yards wide and 3 feet deep.

*Foot of Hatton Shoal* (110 m.).—One and a half miles long; fall, 39 feet; river 50 yards wide, and in the course of a quarter of a mile it widens to 480 yards. Here is *Hatton's Ford*. For half a mile the water is very shallow, being spread out over the entire bed of the river.

*Malden's Ledge* is reached, and beyond is *Holland's Sluice*; the fall was 2 feet perpendicular, and the boat was forced through a channel 7 feet wide, between the rocks, for 40 feet, scraping on all sides, and by pushing and handspiking finally passed through 50 yards in 30 minutes. This was the worst point on the whole river.

*Big Beaver Dam Creek* (111 $\frac{1}{2}$  m.).—Fifteen yards wide and 2 feet deep. Two miles above the mouth there is a fall of 80 feet in 300 yards.

(111 $\frac{1}{2}$  m.).—Shoals and rapids continued to the end of the shoal, which is full of fish-traps its entire length.

Above *Hatton Shoal* the river is clear for half a mile; 100 yards wide, 8 to 10 feet deep; velocity,  $2\frac{1}{2}$  feet per second.

*Six-Hundred-Yards Shoal* (113 m.).—Four feet fall.

*Guests' Shoal* (113 $\frac{1}{2}$  m.).—One mile long; fall, 17 feet.

There are five equidistant ledges, and the aggregate length of rock is 400 yards; depth of water,  $2\frac{1}{2}$  to 5 feet, and from 10 to 15 feet depth in the spaces between the ledges.

Above this shoal the river is 10 feet deep, and is clear for  $10\frac{1}{2}$  miles, to *Knox's Bridge*, average width being 50 yards, and depth from 4 to 10 feet. In this distance there are 6 small ledges, amounting to about 100 yards of rock.

Then are passed *Chambers' Ferry*, *Avery's Ferry*, *Wolf Creek*, and *Cane Creek*, at the dividing line between Anderson and Oconee Counties, S. C.

*Shoal Creek, Georgia*, (123 m.).—Cotton factory of 20 hands, 1 mile up the creek.

*Knox's Bridge* (124 m.).

*Gum-Log Creek* (126 m.).—Five yards wide; the dividing line between Hart and Franklin Counties, Georgia.

*Wright's Shoal* (127 $\frac{1}{2}$  m.).—Rapid water, 4 feet deep, and *Reed's Ledge*, 200 yards, filled with fish-traps; 2 feet of water.

*Ralston's Ledge* (128 m.).—Four hundred yards of rapids, with ledge of rock 5 yards long; water,  $2\frac{1}{2}$  feet deep.

*Warren Shelah's Ferry* (130 m.).—Two hundred yards above which, on the South Carolina side, *Choestoe Creek* enters; 5 yards wide.

*Stribling Shoal* (130 $\frac{1}{2}$  m.).—There are two ledges of rock—first, 50 yards; second, 150 yards—with a stretch of 400 yards of smooth water between them 8 feet deep. Length of shoal,  $\frac{1}{2}$  mile; water on ledges, 2 feet deep.

*Old Stribling Ferry* (131 m.), and the foot of *Eastronolly Shoal*. The river is 150 yards wide, and the banks are low. Shoal one-half a mile long. One ledge 100 yards; water, 2 feet deep; is obstructed by two lines of fish-traps; fall, 2 feet. Then we have a space, 250 yards long, of smooth water 15 feet deep. The next ledge is 50 yards long, with a fall of 18 inches. Above this there are 250 yards of gravel to the mouth of *Eastronolly Creek, Georgia*, (131 $\frac{1}{2}$  m.). The river continues clear from this point for  $12\frac{1}{2}$  miles, with the following exceptions; the depth is from 6 to 15 feet; width, 40 to 100 yards; velocity,  $3\frac{1}{2}$  feet per second:

(134 m.).—Gravel, 40 yards.

(135 m.).—Ledge of rock; 30 yards; fall, 1 foot.

(136 m.).—Gravel, 60 yards.

(136 $\frac{1}{2}$  m.).—*Jenkin's Ferry*; river 120 yards wide; gravel, 700 yards.

(137 m.).—Gravel, 50 yards.

(138 m.).—*Fishery Shoal*; 200 yards; water very rapid; 100 yards above is *Barton's Ferry*.

(138 $\frac{1}{2}$  m.).—Gravel, 800 yards; 2 feet of water.

(140 m.).—Gravel, 200 yards; 2 feet of water.

*Chauga Creek, South Carolina* (141 $\frac{1}{2}$  m.).

*Town of Fort Madison, South Carolina* (142 $\frac{1}{2}$  m.).

*Piedmont Air Line Railroad Bridge* (144 m.), crosses the river, 100 miles east of Atlanta. This is at the dividing line between Franklin and Habersham Counties, Georgia. The river is 40 yards wide, 5 feet deep, velocity,  $2\frac{1}{2}$  feet per second. It becomes very winding, the reaches varying from 50 to 300 yards in length. It continues clear to *Panther Creek*,  $9\frac{1}{2}$  miles, with the following exceptions, viz:

*Jarratt's Old Bridge* (145 $\frac{1}{2}$  m.).—Gravel, 30 yards; water, 2 feet deep.

(147 m.).—Gravel, 500 yards; water, 2 feet deep; river 60 yards wide.

(148 m.).—Gravel, 20 yards; rock, 5 yards.

*Smith's Ferry* (148 $\frac{1}{2}$  m.).

(148 $\frac{3}{4}$  m.).—Shoal, 40 yards; fall, 6 inches.

(149 $\frac{1}{2}$  m.).—Gravel, 20 yards; fall, 1 foot.

(150 $\frac{1}{2}$  m.).—Shoal, 75 yards; fall, 2 feet. Eighteen inches of water; channel filled with fish-traps; 6 feet deep above.

(151 $\frac{1}{2}$  m.).—Two ledges and a dam; 30 yards. Gravel, 200 yards; 2 feet of water.

(152 m.).—Shoal, 150 yards; 1 foot of water. River 150 yards wide.

The next  $1\frac{1}{2}$  miles continuous shoal water, 1 to 2 feet deep.

*Brasstown Creek, South Carolina* (153 m.).

*Panther Creek, Georgia* (153 $\frac{1}{2}$  m.).—This is 15 yards wide, 18 inches deep; velocity, 0.8 foot per second.

(154 m.).—This is as far as it is possible to carry a pole-boat; the remaining distance to the junction of the *Tallulah* and *Chatooga* Rivers (156 $\frac{1}{2}$  m.) was a succession of rapids, the fall being 30 feet to the mile.

The *Tallula River* was 40 yards, bearing west. The *Chatooga* was 150 yards wide, bearing N. 35° W.: the banks very precipitous, and the surrounding hills were from 800 to 1,000 feet high.

