

the northerly winds of the approaching anticyclone, the temperature fell with great rapidity, reaching the zero mark at nearly all stations in the central and northern sections by the morning of the 23th. The cold wave was remarkable for its persistency, and the temperature continued to fall during the remaining days of the month, generally reaching the lowest point on the 30th. The rapidity with which the temperature fell on the approach of the cold wave was remarkable, as is indicated by the following twenty-four hour changes: At Boscobel the temperature fell 55°; Crandon, 61°; Waukesha, 52°; Gratoit, 61°, and Madison, 50°. The lowest temperature reported in the State was 18° below zero, at Hayward on the 22d.

The average precipitation for the entire State was 2.87 inches, which is 0.98 of an inch in excess of the November normal. The average amount and departure from the normal, by sections, is as follows: Northern section, 3.91, an excess of 1.79; middle section, 2.76, excess, 1.09; southern section, 1.92, excess, 0.05. It will be noted that the heaviest precipitation occurred in the northern section, and the amount gradually decreased toward the southern portion of the State. The

heaviest precipitation for the month was 6.74 inches, at Appollonia, 5.00 inches of which fell during the storm of the 25th and 26th. The recent floods in the Chippewa Valley were undoubtedly due largely to the excessive rains which accompanied this storm, and a careful examination of the records of those stations located about the headwaters of that stream would indicate that the average amount of precipitation over the districts drained by the Chippewa River was about 2.00 inches during the continuance of the storm. This amount of precipitation would of itself be sufficient to raise the river to a high stage, but not sufficient to produce a destructive flood, and had the river been free from ice there is every reason to believe that the channel is amply sufficient to have carried off the water without doing any damage to the lowlands along its border.

Wyoming.—The mean temperature was 23.7°, or 7.0° below normal; the highest was 72°, at Sheridan on the 15th, and the lowest, 31° below zero, at Lander on the 27th. The average precipitation was 1.06, or 0.50 above normal; the greatest monthly amount, 3.92, occurred at Fort Yellowstone, and the least, 0.09, at Laramie.

RIVER AND FLOOD SERVICE.

By PARK MORRILL, Forecast Official, in charge of River and Flood Service.

The *extreme and average stages of water* in the rivers for the current month are given in Table VIII. Flood waters have occurred only in the rivers of Oregon. Moderate rises took place in the California streams, and similar rises were caused by the heavy rains which fell in the Appalachian Mountain regions at intervals during the month. The northern Mississippi and Missouri and smaller tributary streams in the Dakotas, Minnesota, Wisconsin, and Iowa are frozen. The following résumé of river stages and conditions of navigation in the various streams is compiled from the reports of the various section directors of the River and Flood Service:

Hudson River.—The local storms on the upper Hudson watershed during the 6th, caused a 10-foot rise in the river at Troy, and an 8-foot rise at Albany. No damage was caused by high water during the month. The amount of water flowing into the Hudson was below the normal for the month of November, but the storm tides due to the passage of storms along the coast, together with the large percentage of southerly winds, which retarded the flow, kept the volume of water in the river from Coxsackie to Troy about normal.

Susquehanna River and Branches.—The general rains on the 4th and 5th caused a rise in all rivers of the watershed, the greatest rise noted on the West Branch being 5.5 feet at Williamsport, where the highest stage recorded was 7.5 feet on the 6th, and 6.0 feet at East Bloomsburg, on the North Branch, where the highest stage was 7.0 feet on the 6th; at Harrisburg the river rose 5.4 feet on the 6th and 2.9 on the 7th, the highest water reached being 10.1 feet on the 7th. Along the Juniata the rainfall on the 4th to 6th averaged between 2 and 3 inches, causing a rise of 2.4 feet at Huntingdon and 3.8 feet at Mifflin. After the 7th the streams fell gradually until near the end of the month, when they rose slowly in consequence of the showers that fell in the drainage basin of the Susquehanna. The water at no time during the month approached the danger line. The culm which came down with the rise on the 6th and 7th, as usual in such cases, discolored the Susquehanna and caused considerable annoyance to consumers of river water.

Rivers of the South Atlantic States.—These streams have been moderately low throughout the month, although a slight rise was occasioned by the rains of the 5th. On the 29th, rain, varying in amount from 0.50 to 1.50 inches, fell in the great valley and middle district of Virginia, and slightly less in eastern Virginia. A rapid, though moderate, rise in the James took place, but at no time caused any apprehension. The ground was very dry, owing to the previous lack of moisture, and a large portion of the precipitation was absorbed by the earth; hence the quantity reaching the river was materially lessened.

The Cape Fear River remained low during the month, except that a rise of 10 to 15 feet occurred on the 6th and 7th, but this did not bring the stage of the river more than half way to the danger line. For the remainder of the month the rivers in eastern North Carolina were quite low. In the mountainous western sections, owing to heavy rains, the streams maintained relatively high stages, except during the latter part of the month.

The logging interests in South Carolina have suffered during the month of November, owing to the unprecedentedly low stages of water in the streams. The Wateree was navigable from the 5th to the 14th only, when a number of rafts were successfully floated downstream. The rise also proved highly beneficial to the steamboat interests, much cotton, tar, rosin, turpentine, and general merchandise being carried

down. The Pedee was navigable from the 6th to the 10th between Georgetown and Cheraw. A large amount of merchandise is now awaiting transportation from Cheraw and points below for lack of a sufficient rise. The Santee was navigable from the 8th to the 22d. The Waccamaw and its branches were navigable from the 5th to the 13th from Georgetown to Effingham, Fair Bluff, and Conway, and, therefore, afforded steamboatmen and lumbermen a fair season for transportation. The Edisto was at a very low stage, and navigation thereon was suspended nearly the entire month, and no logging or steamboating was done at all, although millions of feet of lumber and much merchandise are awaiting transportation. A result of the deficient rainfall in the Piedmont region is the substitution by the owners of the cotton mills in those sections, of steam power for the hitherto unfailling water supply. This lack of water is the first occurrence of this sort in twenty-four years. Quite a number of mills have ceased operations entirely for the want of power.

No very noticeable change occurred in the condition of the Savannah River, excepting on two occasions, when a considerable rise took place. The first rise occurred on the 6th, bringing the river up to 20.9 feet at Augusta, and, while facilitating the running of boats between that point and Savannah, was also highly beneficial to the farming interests of the lowlands, by leaving a deposit or sediment over the soil at a time when the fields are not in cultivation. The next rise occurred on the 14th, when the river reached a stage of 13.4 feet at Augusta, and materially aided flat boat traffic in handling produce and cotton. The lowest stage during the month was recorded on the 1st (5.0 feet at Augusta), which at this season of the year is hardly sufficient for rapid navigation, as large shipments of cotton are scattered along the river course for at least 75 miles below Augusta to be conveyed by boat to that market.

Several heavy rains fell on the Georgia watersheds which drain into the Altamaha and Apalachicola rivers. Resultant rises of from 5 to 10 feet were experienced at the various river stations on these streams. The stages were far below the danger line throughout the month.

Mobile River and Branches.—The Tombigbee River and its tributaries have been unusually low, remaining, for the most part, below the zero of the gauges; at Demopolis, on the Tombigbee, the stage did not rise above zero throughout the month. The rain, which was light and scattered, did but little to improve the prevailing unfavorable conditions. The rivers fell generally during the latter part of the month, giving unusually low stages, almost suspending traffic. General rain on the last three days of the month was of vast benefit in relieving this condition, and the rivers rose rapidly, opening navigation to all points, and this has continued to the end of the month. River men report that since May 1 no boat has been above Demopolis, and for the past three months not above Gays Landing, 60 miles below Demopolis. The rivers have been lower this year than for the three seasons past.

The Alabama and tributaries were all low during the first half of the month, with slight increase of water to navigable stages during the latter portion. At Montgomery the extremes varied from 0.5 feet below zero on the 3d to 7.5 feet above on the 14th, the fluctuations being slightly greater at Selma and less at upper river stations. The water has been too low for regular steamer navigation above Selma since the latter part of July. The first boat to arrive at Montgomery since the low season was the steamer *Tinsie Moore* from Mobile on November 19, which carried down over 1,000 bales of cotton and general freight.

Ohio River and Branches.—At Pittsburg the month has been one of exceptional activity for the river interests. For the first time in four years the river has remained open for packet navigation during the entire month. There was a barge-water stage on the 7th and 8th, and

for the entire week beginning with the 24th, culminating in a coal-boat stage on the 30th, on which 35,000,000 bushels of coal were shipped to lower river ports.

At Cincinnati the month closed with a good rise, which made the fourth during the fall, when ordinarily there is but one rise looked for—at about Thanksgiving. River business has therefore been good, and the supply of coal in the market, still abundant, has been augmented by a run of 7,000,000 bushels on the last rise.

At Cairo the river rose slowly from the 2d to the 10th; then fell slowly until the morning of the 14th; rose quite rapidly during the 15th and 16th and continued rising until the morning of the 19th, after which it fell slowly until the 26th; and then rose rapidly until the close of the month. The highest stage was, 14.3 feet, on the 30th; the lowest, 7.6, on the 1st and 2d.

Heavy rains fell on the Tennessee and Cumberland watersheds at the middle of the month. The Tennessee was higher during the present month than it has been any November since 1889, and with more days of navigable water than any year since 1890. Navigation opened on the 7th, closed on the 22d, and opened again on the 29th. Light drift was reported at Chattanooga on the 13th, 14th, 15th, and 29th.

Mississippi River and Minor Branches.—The river stages for the section of river above Davenport were about normal throughout the month, and no marked changes occurred, except at some of the northern stations during the last two or three days of the month, and these were caused by ice gorges. Navigation is reported by the steamboatmen and pilots as very good for this season of the year, though during the month of November very few boats are running on the upper Mississippi River. During this month work generally ceases on the river; the United States Engineers, in charge of the upper Mississippi River improvement, suspended operations about the 15th this year. The river remained open as far north as Dubuque during the entire month, although navigation practically closed to this point on the 21st, and no boats, except ferries, were in operation after that date. Considerable running ice was present between Davenport and Dubuque during the last two or three days of the month. The river closed with ice at North McGregor on the 28th; it closed at La Crosse on the 21st, but opened again on the 26th, closing again on the 30th. It was frozen over at St. Paul on the 28th.

An ice gorge of great extent and doing a vast amount of damage, formed during Friday night, November 27, about 10 miles below Lake Pepin. The gorge formed very rapidly, and by 5 o'clock the next morning had extended as far north as the mouth of the Chippewa River. During Friday night the temperature fell very rapidly, and Saturday morning (28th) was below zero. This severe cold froze the gorge tight, and it continued to form up the Mississippi River into Lake Pepin and also up the Chippewa River; and by Saturday night it had extended 8 miles up the latter river.

The gorge caused a rapid rise in the rivers, the change at Reeds Landing between the 27th and 30th being 5 feet, and the water soon spread out over the bottom lands on the Wisconsin side of the Mississippi, doing great damage to property. As far as could be learned no human lives were lost, but the loss of property and stock is very large, although at present no definite estimate of the money value can be made.

The formation of the gorge is supposed to have been caused by the driving of piles in the Mississippi River at a point a few miles above Alma, Wis., to hold a "sheer boom" for the purpose of running the logs which had been loosened from the sandbars and shores of the Chippewa and Mississippi rivers by the recent heavy rains into the Zumbra River for safe harbor. The river being full of floating logs and ice, the sudden fall in temperature made a gorge of unusual strength. The gorges which created the trouble at Chippewa Falls and Eau Claire, Wis., concerning which the newspapers gave full information, formed further up the Chippewa River and were occasioned by similar causes. The one at Chippewa Falls was at one time 5 miles in length and from 30 to 50 feet in thickness.

The section of river from Davenport to St. Louis disclosed no features of special interest during the month of November. A good boating stage of water has been maintained below the mouth of the Missouri, allowing navigation to proceed uninterruptedly, an occurrence which of recent years has not been frequent at this season. Navigation above St. Louis has been practically suspended, but will continue below indefinitely. Running ice was reported at Warsaw, Ill., on the 28th, and by the 30th the river at that place was bank-full. On the latter date ice commenced to run past Quincy and Hannibal, but as yet none has come out of the Missouri, nor has any been seen at St. Louis except a little shore ice.

From St. Louis to Memphis the river remained at a nearly stationary low stage. During the first week of the month the river gauge at Memphis showed less than 3 feet, but after the 8th a steady rise occurred, advancing the river to a good stage, which was maintained till the close of the month. Navigation on the Mississippi continued through the month without interruption, large packets and coal barges making regular trips to all points. On the small tributaries navigation was suspended for a time on account of low water, but was re-

sumed towards the end of the month and boats now make regular trips up the St. Francis and Hatchie rivers. No ice has so far been seen in this section.

In the section of river from Memphis to Vicksburg the stages were about the average for this season of the year, there being no unusually high or low water to report. The Yazoo River was closed to navigation from the Mississippi the greater part of the month on account of the sandbar which forms at its mouth during low water, but was open at the close of the month owing to heavy rains and rising water in its tributaries and the Mississippi. The work of turning the course of the Yazoo southward to avoid the sandbar now at its mouth, and allowing it to pass in front of Vicksburg, which is cut off from the river during low water, is progressing rapidly, but will require some time for its completion.

The month opened with a moderately low stage in the Mississippi River, from Vicksburg southward, continuing nearly stationary until the middle of the month, when a general rise commenced below Vicksburg and continued until the close of the month, giving a maximum stage some 5.5 feet higher at the close than at the commencement. The stage from New Orleans south was but slightly affected, the river varying less than 2 feet during the entire month at New Orleans.

The usual low November stage was maintained in the Red River, the only rise worthy of mention occurring near the close of the month at Fulton, amounting to about 9 feet between the 26th and 30th. A low stage continued in the Ouachita River until the 27th, when a marked rise occurred, owing to general rains, the stage at Camden showing a rise of about 12 feet between the 27th and 30th, and that at Monroe a rise of over 10 feet. Navigation continued uninterruptedly in the lower Mississippi River, but the low stages in the Red and Ouachita permitted of only light traffic.

Missouri River.—The condition of the Missouri River was marked by few changes during the month. The stream was frozen over at Sioux City on the 28th, and navigation was closed, at and above that point, on that date. On and after the 13th running ice was noted at Omaha, Plattsburg, and St. Joseph. Shore ice formed on sandbars at Omaha on the 29th, and on the morning of the 30th the river was nearly frozen over, there being open water only in the channel. Navigation closed at Omaha on the 30th. At the close of the month the river was open from Crescent City, Iowa, 6 miles south of Omaha, southward.

Arkansas River.—During the greater part of the month the Arkansas River was too low for navigation, but a rise of about 2 feet on the 5th gave sufficient water for navigation up to the 13th; then it declined steadily until the 27th, when another slight rise caused by heavy rains in Oklahoma and the Indian Territory gave sufficient water from the 29th to the end of the month, but with a declining river at the close of the month. No ice or floods were reported during the month. The low stage of the river was favorable for the construction of a bridge that is in course of erection at Little Rock.

Rivers of the Pacific Coast.—On November 19, 1896, the Willamette River was higher at Portland than was ever known before during the month of November, the stage being 20.2 feet. The usual stage during the month of November is from 2 to 6 feet. From the 14th, when the river began to rise rapidly, to the 21st, when the fall began, merchants having goods on docks and in cellars moved their goods therefrom. The freshet in the Willamette was caused by the unprecedented rainfall which prevailed during the first sixteen days of the month. Snow had fallen in the foot hills of the Cascades, which was melted by the chinook which prevailed from the 11th to the 14th, and the melting snow added much to the volume of the flood. Then, too, the rainfall was heavy in the Columbia River Valley and caused the Columbia to rise materially, which prevented the Willamette discharging as much or as rapidly as it otherwise would have done. When it is considered that the average rainfall for November is less than that which fell during the seven days immediately preceding the great rise, the cause of the flood is easily understood. During the freshet the drift was so great as to cause navigation to cease. The river rose sufficiently high in the low places in the Willamette Valley to prevent the Southern Pacific Railroad from running trains. County bridges and a few small railroad bridges were washed out and some stock was drowned. A cool period began on the 16th which checked the river and it then began to fall. The temperature fell on the 29th lower than it had ever been known in November before, causing the Columbia to freeze above the Cascade Locks, and the Willamette also froze above its mouth so as to stop all navigation. Vancouver, Wash., was entirely cut off from November 29 to December 3 on account of the ice. Steamers and other vessels had difficulty in getting up the Columbia from Astoria from November 29 to December 4 on account of floating ice.

During the first decade of the month both the Sacramento and San Joaquin rivers were rather low, and navigation on the former river, while not interrupted, was conducted with reference to the tides. There was little rain in the river basins before November 9. During the second decade the stages were several feet above low water. The third decade was marked by heavy rains and rapid rises in the rivers. At Red Bluff, owing to a break in the levee and sudden change in the

course of the Sacramento, the hatchery of the United States Fish Commission was completely washed out. On the evening of the 25th the river reached its highest, but was still several feet below the danger line. The Yolo and other low basins along the Sacramento were generally under water.

ICE AT THE CLOSE OF THE MONTH.

The following reports from regular stations reporting to the Climate and Crop Service show the thickness of the ice at the close of the month in rivers and harbors:

Iowa.—Sioux City, 10 inches; Keokuk, 0.3. Minnesota.—Moorhead, 14. Missouri.—Kansas City, 3.8. Montana.—Miles City, 6.2. North Dakota.—Bismarck, 7.0. South Dakota.—Pierre, 11.5. Wisconsin.—La Crosse, 3.0.

The following additional reports are from the November Weather Map of the Meteorological Service of the Dominion of Canada:

Esquimaux, B. C., ice 2 inches thick, an unusual occurrence at such an early date; Swift Current, 14.0 inches; Port Arthur, 2.0.

TABLE VIII.—Heights of rivers above zero of gauge, November, 1896.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>Mississippi River.</i>	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
St. Paul, Minn. ^a	1,934	14	3.7	23	1.5	21	2.5	2.2
Reeds Landing, Minn.	1,864	12	6.5	30	1.1	1,25	2.4	5.4
La Crosse, Wis.	1,790	10	4.1	10	1.9	30	3.3	2.2
North McGregor, Iowa	1,739	18	4.0	13	1.8	1	2.9	2.2
Dubuque, Iowa	1,679	15	3.9	13	1.7	1	3.0	2.2
Leclaire, Iowa	1,589	10	2.2	13-16	0.8	3,4	1.5	1.4
Davenport, Iowa	1,573	15	3.5	17	2.0	3	2.8	1.5
Keokuk, Iowa	1,443	14	3.0	17-20	1.3	30	2.5	1.7
Hannibal, Mo.	1,382	17	3.8	4	2.3	1	3.0	1.5
Grafton, Ill.	1,284	23	7.5	20,21	2.8	1	5.8	4.7
St. Louis, Mo.	1,241	30	9.3	7	4.4	1	6.7	4.9
Chester, Ill.	1,170	30	5.8	8	2.0	1	4.0	3.8
Cairo, Ill.	1,073	40	14.3	30	7.6	1	10.7	6.7
Memphis, Tenn.	843	33	6.7	23	2.5	3-5	4.6	4.2
Helena, Ark.	767	37	10.4	23,24	4.7	5	7.5	5.7
Arkansas City, Ark.	695	42	10.4	26,27,29,30	4.2	1	7.2	6.2
Greenville, Miss.	595	40	8.3	29,30	3.7	1,2,7	5.8	6.6
Vicksburg, Miss.	474	41	7.5	30	1.7	3	4.0	5.8
New Orleans, La.	108	13	4.6	27	3.2	18	3.7	1.4
<i>Arkansas River.</i>								
Fort Smith, Ark.	345	22	8.8	30	1.8	23-25	3.7	7.0
Dardanelle, Ark.	250	21	5.7	5	1.2	25,26	2.6	4.5
Little Rock, Ark.	170	23	6.7	8	3.1	25,26	4.3	3.6
<i>White River.</i>								
Newport, Ark.	150	21	2.8	7	1.0	26	1.6	1.8
<i>Illinois River.</i>								
Peoria, Ill.	135	14	8.1	19,20	5.9	1-4	7.1	2.2
<i>Missouri River.</i>								
Bismarck, N. Dak. ^b	1,201	14						
Pierre, S. Dak. ^c	1,006	14	1.9	8	0.3	15	1.3	1.6
Sfoux City, Iowa ^d	676	19	5.3	1	4.8	7-8		0.5
Kansas City, Mo.	280	21	9.4	3	4.7	30	6.9	4.7
Boonville, Mo.	191	20	9.8	4	5.2	26,27	6.9	4.6
Hermann, Mo.	95	21	5.0	6	0.1	28	2.0	4.9
<i>Ohio River.</i>								
Pittsburg, Pa.	966	22	10.9	30	3.5	21,22	5.5	7.4
Davis Island Dam, Pa.	960	25	11.3	30	4.0	4	6.6	7.3
Wheeling, W. Va.	875	36	11.7	30	4.8	5,6	7.2	6.9
Marietta, Ohio	795	25	13.8	29	5.2	3	7.7	8.6
Parkersburg, W. Va.	785	38	15.2	29	6.0	4	8.5	9.2
Point Pleasant, W. Va.	703	36	20.5	30	4.2	5	8.2	16.3
Catlettsburg, Ky.	651	50	26.5	30	5.5	6	10.7	21.0
Portsmouth, Ohio	613	50	26.5	30	7.6	5-6	11.9	18.9
Cincinnati, Ohio	499	45	21.4	30	9.7	8	13.8	11.7
Louisville, Ky.	367	24	9.0	29,30	6.0	9,26,27	7.0	3.0
Evansville, Ind.	184	30	15.9	30	6.7	11	9.2	9.2
Paducah, Ky.	47	40	11.8	30	4.1	10	6.4	7.7
<i>Alleghany River.</i>								
Warren, Pa.	177	7	3.1	28,29	0.4	3-7	1.3	2.7
Oil City, Pa.	123	13	3.9	29	1.2	5,7-9,11	2.2	2.7
Parker, Pa.	73	20	4.7	30	0.7	4	2.3	4.0

TABLE VIII.—Heights of rivers above zero of gauge—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>Alleghany River—Cont'd.</i>	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Freeport, Pa.	26	20	8.4	30	2.6	4	4.8	5.8
<i>Conemaugh River.</i>								
Johnstown, Pa.	64	7	2.6	6	1.0	2-4	1.8	1.6
<i>Red Bank Creek.</i>								
Brookville, Pa.	35	8	1.7	28	0.2	2-4	0.9	1.5
<i>Beaver River.</i>								
Ellwood Junction, Pa.	10	14	3.0	29,30	1.8	1-5,9-11	2.0	1.2
<i>Big Sandy River.</i>								
Louisa, Ky.	26	20	18.5	29	3.4	3,4	5.4	15.1
<i>Cumberland River.</i>								
Burnside, Ky.	434	50	35.0	29	2.1	22	4.4	32.9
Nashville, Tenn.	175	40	28.8	30	0.7	7	3.7	28.1
<i>Great Kanawha River.</i>								
Charleston, W. Va.	61	30	13.8	7	4.8	{ 3,4,13, } { 22,23 }	6.0	9.0
<i>New River.</i>								
Hinton, W. Va.	95	14	8.5	6	1.2	1-3	2.4	7.3
<i>Licking River.</i>								
Falmouth, Ky.	30	25	8.0	29	1.0	1-3	2.4	7.0
<i>Miami River.</i>								
Dayton, Ohio	69	18	3.3	29	1.6	{ 4,9,10, } { 19-21 }	1.9	1.7
<i>Monongahela River.</i>								
Weston, W. Va.	161	18	6.0	29	-0.2	20,21	0.8	6.2
Fairmont, W. Va.	119	25	8.5	30	1.0	3,4	2.7	7.5
Morgantown, W. Va.	95	20	13.9	30	7.2	5	8.5	6.7
Greensboro, Pa.	81	18	13.0	30	7.5	4-5	8.8	5.5
Lock No. 4, Pa.	40	28	16.7	30	7.0	3-5	8.9	9.7
<i>Cheat River.</i>								
Rowlesburg, W. Va.	36	14	7.0	6	2.0	3,4	3.3	5.0
<i>Youghiogheny River.</i>								
Confluence, Pa.	59	10	6.0	6	1.3	3	2.5	4.7
West Newton, Pa.	15	23	6.7	6	0.5	27	1.9	6.2
<i>Tennessee River.</i>								
Chattanooga, Tenn.	430	33	9.4	30	1.2	1,2	3.5	8.2
Bridgeport, Ala.	390		6.1	30	0.2	2,3	1.9	5.9
Florence, Ala.	220	16	5.7	30	0.1	1,2,3	1.8	5.6
Johnsonville, Tenn.	94	21	8.8	30	0.3	1-7	2.8	8.5
<i>Wabash River.</i>								
Terre Haute, Ind.	165	16	4.9	15	0.8	3,4	2.9	4.1
Mt. Carmel, Ill.	50	15	8.8	30	2.4	4,5	4.5	6.4
<i>Red River.</i>								
Arthur City, Tex.	688	27	11.6	28	2.4	1-3	3.9	9.2
Fulton, Ark.	565	28	9.8	30	0.4	1	2.5	9.4
Shreveport, La.	449	29	-0.3	15,16	-2.7	1,3,4	-1.7	2.4
Alexandria, La.	139	33	0.6	8-17,30	-0.1	1	0.4	0.7
<i>Atchafalaya River.</i>								
Melville, La.	100*	31	8.0	28	5.5	12	6.4	2.5
<i>Ouachita River.</i>								
Camden, Ark.	340	39	15.9	30	3.8	25,26	5.2	12.1
Monroe, La.	100	40	12.7	30	1.7	21-26	3.3	11.0
<i>Yazoo River.</i>								
Yazoo City, Miss.	80	25	-1.0	29,30	-1.9	16-20	-1.6	0.9
<i>Cape Fear River.</i>								
Fayetteville, N. C.	100	38	19.0	7	2.5	1	5.2	16.5
<i>Congaree River.</i>								
Columbia, S. C.	37	15	11.2	7	0.9	20	2.8	10.3
<i>James River.</i>								
Lynchburg, Va.	257	18	7.4	6	0.2	1-4	17.7	7.2
<i>Alabama River.</i>								
Montgomery, Ala.	265	35	7.5	14	-0.5	3	2.1	8.0
<i>Coosa River.</i>								
Rome, Ga.	225	30	8.4	14	0.5	1-3	2.2	7.9
<i>Tombigbee River.</i>								
Columbus, Miss.	285	33	-0.2	29	-2.7	2	-1.9	2.5
Demopolis, Ala.	155	35	-0.4	30	-2.1	1	-1.4	1.7
<i>Black Warrior River.</i>								
Tuscaloosa, Ala.	90	38	1.0	30	-0.8	1,2	0.0	1.8
<i>Savannah River.</i>								
Augusta, Ga.	130	32	20.9	6	5.2	4	8.1	15.7
<i>Susquehanna River.</i>								
Harrisburg, Pa.	70	17	10.1	7	1.8	3-5	3.7	8.3
<i>W. Br. of Susquehanna.</i>								
Williamsport, Pa.	35	20	6.9	7	2.1	4	3.5	4.8
<i>Sacramento River.</i>								
Redbluff, Cal.	241	23	12.5	24	0.4	8	2.7	12.1
Sacramento, Cal.	70	28	19.0	24	8.8	8,9	11.6	10.2
<i>Willamette River.</i>								
Albany, Oreg.	99	20	29.0	17	2.5	1	10.6	26.5
Portland, Oreg.	10	15	20.2	19	2.0	1,2	9.1	18.2

* Distance to the Gulf of Mexico. ^a Frozen after the 28th. ^b Frozen after the 7th. ^c Frozen after the 19th. ^d Frozen after the 9th.