

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS.

The following table shows the danger point at each river station; the highest and lowest stages for the month of March, 1894, with the dates of occurrence, and the monthly range:

Heights of rivers above low-water mark, March, 1894.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>						
Shreveport, La.	29.2	33.5	31	15.8	12, 13	17.7
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	17.6	8, 9	3.9	4	13.7
Little Rock, Ark.	23.0	22.6	22	7.0	5	15.6
<i>Missouri River.</i>						
Pierre, S. Dak.	13.0					
Sioux City, Iowa*	18.7	10.9	22	6.0	29	4.9
Omaha, Nebr.	18.0					
Kansas City, Mo.	21.0	13.0	7, 26	7.2	1	5.8
<i>Mississippi River.</i>						
St. Paul, Minn.†	14.0	4.5	9	2.0	28	2.5
La Crosse, Wis.‡	10.0	7.4	27, 28	5.6	12	1.8
Dubuque, Iowa§	16.0	8.0	31	5.6	8	2.4
Davenport, Iowa*	15.0	6.5	7, 8	4.4	5	2.9
Keokuk, Iowa	14.0	8.1	9	5.2	4	2.9
Hannibal, Mo.	17.0	9.3	10	2.0	1	7.3
St. Louis, Mo.	30.0	20.1	11	5.3	2, 3	14.8
Cairo, Ill.	40.0	32.3	12	22.4	5, 6	9.9
Memphis, Tenn.	33.0	24.5	15	16.8	7, 8	7.7
Vicksburg, Miss.	41.0	40.8	31	32.8	12	8.0
New Orleans, La.	13.0	13.7	31	12.0	16-18	1.7
<i>Ohio River.</i>						
Parkersburg, W. Va.	38.0	18.7	10	9.5	1	9.2
Cincinnati, Ohio	45.0	27.5	12, 13	17.8	19, 22	9.7
Louisville, Ky.	24.0	10.3	13, 14	7.9	22	2.4
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	19.2	5	10.0	16	9.2
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	9.7	4	5.2	31	4.5
Knoxville, Tenn.	29.0	5.0	2	2.0	31	3.0
<i>Monongahela River.</i>						
Pittsburg, Pa.	22.0	14.0	8	4.8	1	9.2
<i>Savannah River.</i>						
Augusta, Ga.	32.6	20.8	2	8.0	31	12.8
<i>Willamette River.</i>						
Portland, Oregon.	15.0	18.0	19	5.6	5	12.4
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	12.2	9	3.2	1	9.0
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	19.9	23, 24	6.5	12, 13	13.4
<i>James River.</i>						
Lynchburg, Va.	18.0	4.7	3	1.1	31	3.6
<i>Sacramento River.</i>						
Red Bluff, Cal.	22.0	9.5	31	5.2	25	4.3
Sacramento, Cal.	25.0	21.8	1, 2	19.5	13-17	2.3
<i>Des Moines River.</i>						
Des Moines, Iowa	19.0	4.5	5-7	3.3	31	1.2

\* For 28 days. † For 24 days. ‡ For 21 days. § For 23 days. || For 26 days.

FLOODS.

The above table shows that in the rivers here recorded the water has risen above the danger line at Portland, Oreg., New Orleans and Shreveport, La., and very closely approached the danger line at Vicksburg, Miss., and Little Rock, Ark. The following special reports have also been received:

**Arkansas and Ouachita Rivers.**—The greatest flood in the history of south-central Arkansas occurred on the 18th-21st, and the whole State approached the condition of an overflowed region; it rained almost incessantly for five days, and the rainfall averaged approximately 6 inches, reaching about 7½ at Hot Springs and Memphis. The Arkansas River rose rapidly, and the Ouachita reached its highest point for fifty years; traffic was generally suspended on the railroads between Memphis, Little Rock, Hot Springs, and the surrounding country.

**Powder River.**—Baker City, Oreg., 15th, the river was the highest known in years, low lands flooded; 28th, river rising rapidly; 29th, two foot bridges washed away. A levee at Wilovale, a suburb of Baker City, broke and flooded that portion of the city.

**Red River.**—Shreveport, La., 28th, river has passed the danger line and rising rapidly; 29th, a crevasse at the Pruitt, about 15 miles south of Shreveport; 30th, river continues to rise; 31st, levee broke on Hendersons place.

**Susquehanna River.**—Wilkesbarre, 9th, river overflowed its west bank this morning.

NAVIGATION OF RIVERS AND HARBORS.

The weekly "bulletin of depth of snow lying on the ground" gives reports of ice in rivers and harbors, and shows that on Monday, March 5, the ice in the Mississippi River was,

at La Crosse, Wis., 15 inches thick; the Platte, at Kearney, Nebr., 12; Missouri, at Williston, N. Dak., 40; Bismarck, N. Dak., 27.5; Pierre, S. Dak., 26. On the Lakes the ice was, at Duluth, Minn., 29.5; Marquette, Mich., 10.5; Sault Ste. Marie, Mich., 30; Grand Haven, Mich., 6; Erie, Pa., 0.5; Oswego, N. Y., 8.

On Monday, 12th, Williston, N. Dak., 36; Bismarck, N. Dak., 26th; Pierre, S. Dak., 24; Duluth, Minn., 24; Sault Ste. Marie, Mich., 14.

On Monday, 19th, Williston, N. Dak., 32; Duluth, Minn., 12; Sault Ste. Marie, Mich., 11.5.

Monday, 26th, Williston, N. Dak., 36; Bismarck, N. Dak., 4; Pierre, S. Dak., 1; Duluth, Minn., 13; Sault Ste. Marie, Mich., 14.

The following special reports have also been received:

**Black River.**—Port Huron, Mich., 5th, ice in river broke during the early morning and it was about clear in the evening.

**Connecticut River.**—Hartford, Conn., 4th, river opened for navigation. Middletown, Conn., 8th, navigation opened to Long Island Sound.

**Des Moines River.**—Des Moines, Iowa, 5th, ice all melted in river.

**Detroit River.**—Detroit, Mich., 6th, the high temperature and winds of the last few days have cleared the river of ice; 11th, ferryboat made first trip and a tug from Port Huron reports Detroit River and lakes St. Clair and Huron free from ice; first steamer left on the 19th.

**East River.**—New York, N. Y., 1st, small amount of ice floating in East River and New York harbor.

**Hudson River.**—Albany, N. Y., 9th, navigation resumed between Newburg and New York; 17th, the first boat of the season passed up the river to-day; Albany and Newburg line of steamers began making regular trips, opening navigation. Wappingers Falls, N. Y., 8th, ice broke up in the river and navigation opened on the 9th.

**Kennebec River.**—Gardiner, Me., 23d, river opened.

**Straits of Mackinac.**—Cheboygan, Mich., 12th, the ice bridge broken up and the opening of the straits for the present season must date from the 11th, as against April 17 last season; 12th, the straits are clear as far as Point Au Sable, but the St. Ignace is stuck in the ice off McGulpin Point. A day or two will open the straits clear through. St. Ignace, Mich., 17th, north passage of straits opened; 19th, the ferry between St. Ignace and Mackinac Island commenced running; 23d, south passage of straits clear of ice. The ice floe, pushed up on the shore at "Old Mackinaw" near the fort, was piled up from 18 to 30 feet high, and large boulders were shoved along with it.

**Mississippi River.**—St. Paul, Minn., 7th, river partly opened; 8th, river observations resumed; 9th, floating ice. Winona, Wis., 8th, river opened. La Crosse, Wis., 10th, ice moving out of river; 25-26th, river full of floating ice. Davenport, Iowa, 4th, ice began moving out to-day and channel opened some distance below city; 5th, large quantities of floating ice in river near shore; 6th, river nearly clear; 7th, considerable floating ice; 8th, river nearly clear; 9th, river clear; 13th, first steamer of the season arrived to-day, opening navigation. Keokuk, Iowa, 9th, a steamer passed up the river to-day, opening navigation for the season. Le Claire, Iowa, 5th, ice broke up in river, 8 a. m.; 6th, river full of floating ice. Muscatine, Iowa, 3d, ice moved out of river. North McGregor, Iowa, 5th, ice broke up; 26th, river frozen; 28th, river full of floating ice; 30th, river clear.

**Missouri River.**—Fort Buford, N. Dak., 16th, ice in river broke up and moved out during the afternoon, leaving channel below bridge clear. Santee Agency, Mo., 9th, ice broke up in river. Niobrara City, Nebr., 12th, navigation on the river opened. Omaha, Nebr., 4th, ice in river broken up and river full of floating ice; 8th, river clear. Cumberland, S. Dak., 14th, ice broke up in river. Greenwood, S. Dak., 10th, the ice passed out of river. Sioux City, Iowa, 4th, ice passed out of the river during the day, doing some damage to boats and sinking one steamer; navigation opened 25th, river full of floating ice. Hermann, Mo., 24th, navigation on the river opened.

**Penobscot River.**—Orono, Me., 30th, river opened.

**St. Lawrence River.**—North Hammond, N. Y., 12th, river clear of ice.

**St. Clair River.**—Port Huron, Mich., 5th, no ice in the St. Clair River; 11th, a schooner left for Alpena, Mich., thus opening navigation for the season on Lake Huron; 16th, a steamer arrived from Detroit, opening navigation on the St. Clair River.

**Lake Champlain.**—Burlington, Vt., 15th, ice passed out of lake; 26th, navigation resumed.

**Lake Erie.**—Cleveland, Ohio, 10th, a tug left here for Port Huron to-day, being the first boat of the season to leave; 12th, a small steamer arrived to-day, being the first of the season; 14th, a dozen of the heaviest carriers on the great chain of lakes will leave here to-morrow. The lake navigation season will be opened six weeks earlier than for years. Erie, Pa., 13th, navigation opened. Toledo, Ohio, 22d, navigation opened.

**Lake Huron.**—Alpena, Mich., 13th, a steamer arrived to-day, opening navigation.

**Lake Michigan.**—Grand Haven, Mich., 11th, ice in lake off harbor dis-

appeared and navigation opened. Harbor Springs, Mich., 20th, ice passed out of bay; 24th, harbor clear of ice; 25th, harbor and bay frozen over. Milwaukee, Wis., 12th, navigation opened. Green Bay, Wis., 8th, river clear of ice; 11th, the bay is clear of ice; 31st, first boat arrived, opening navigation.

*Lake Ontario.*—Oswego, N. Y., 30th, the schooner *Julia*, from Kingston, Ont., arrived to-day and opened navigation for the season.  
*Lake Superior.*—Two Harbors, Minn., 16th, the harbor of the lake practically clear of ice at this point.

OBSERVATIONS ON THE GREAT LAKES.

Owing to the close of navigation on the Great Lakes during the winter season the Weather Bureau has received no reports from vessels for the month of March, and from only one U. S. Life-Saving station.

SUNSHINE AND CLOUDINESS.

SUNSHINE.

During the month an instrumental record of the amount of sunshine has been kept at 15 stations by means of the photographic sunshine recorder and at 21 stations by means of the thermometric sunshine recorder; the results of these observations are given in Table IV, which shows the actual percentage of sunshine received on the average of the month for any hour of local mean time (not seventy-fifth mean time).

The stations recording the largest percentage of sunshine between the hours of 11 a. m. and 1 p. m., are: Colorado Springs, Colo., 86.0; Denver, Colo., 82.5; Detroit, Mich., 81.5; Dodge City, Kans., 81.0; Key West, Fla., 86.5; Saint Louis, Mo., 86.5; Santa Fe, N. Mex., 81.5; Vicksburg, Miss., 86.0.

The stations having the least percentage during these hours, are: Portland, Oreg., 23; Cleveland, Ohio, 54; Cincinnati, Ohio, 55.

The general average sunshine for the whole month is given in the next to the last column of Table IV. The highest percentages are: Key West, Fla., 82; Santa Fe, N. Mex., 77; St. Louis, Mo., 75; Dodge City, Kans., Denver, Colo., and Tucson, Ariz., 74; Kansas City, Mo., 70. The lowest percentages are: Portland, Oreg., 24; Salt Lake City, Utah, 53; Chicago, Ill., 52; Buffalo, N. Y., 53; Galveston, Tex., 54; New Orleans, La., 55.

CLOUDINESS.

The number of clear and cloudy days and the average cloudiness between sunrise and sunset, as based on numerous personal observations, are given for each Weather Bureau station in Table I. The complement of this average cloudiness gives the observer's estimated percentage of clear sky, and these latter numbers are given in the last column of Table IV. On the average these personal estimates of clear sky are lower by about 8 per cent than the sunshine as recorded by the thermometric registers and lower by 11 per cent than the sunshine recorded by photographic registers.

GENERAL REMARKS.

The quantity of direct sunshine received at any station is approximately shown by the self-recording sunshine registers

which work either by photography or by thermometry. The quantity of direct sunshine, or blue sky light, received at the same station is approximately shown by the estimated cloudiness, and the complement of this number is an approximate value of the average amount of sunshine received by the surrounding country, as distinguished from the station itself. As has been explained in previous WEATHER REVIEWS there is no necessary agreement between the local sunshine register and the observer's estimate of the cloudiness of the sky. In the following table there are brought together, side by side, the instrumental records of the percentage of duration of sunshine and the observer's personal estimate of the percentage of area of the sky covered by clouds, and, in accord with the results of previous months, it is seen that the differences are rather larger for comparatively clear skies but smaller for cloudy skies:

Difference between instrumental and personal observations of sunshine.

Station.	Photographic register.			Station.	Thermometric register.		
	Instrumental.	Personal.	Difference.		Instrumental.	Personal.	Difference.
Santa Fe, N. Mex.	77	63	14	Key West, Fla.	82	62	20
Dodge City, Kans.	74	62	12	St. Louis, Mo.	75	64	11
Tucson, Ariz.	74	59	15	Colorado Springs, Colo.	68	50	18
Denver, Colo.	74	49	25	Philadelphia, Pa.	68	47	21
Kansas City, Mo.	70	65	5	Vicksburg, Miss.	66	65	1
Savannah, Ga.	69	60	9	Baltimore, Md.	66	57	9
Washington, D. C.	63	60	3	Detroit, Mich.	66	45	21
Memphis, Tenn.	61	58	3	Columbus, Ohio.	64	45	19
Cleveland, Ohio.	59	45	14	Wilmington, N. C.	62	64	- 2
San Francisco, Cal.	57	53	4	Des Moines, Iowa.	62	51	11
Cincinnati, Ohio.	56	51	5	Portland, Me.	62	45	17
Galveston, Tex.	54	54	0	New Haven, Conn.	61	40	21
Portland, Oreg.	24	25	- 1	Louisville, Ky.	60	47	13
Eastport, Me.	35	.....	.....	New York, N. Y.	60	46	14
San Diego, Cal.	62	.....	.....	Little Rock, Ark.	60	45	15
				Boston, Mass.	60	41	19
				New Orleans, La.	55	54	1
				Salt Lake City, Utah.	53	40	13
				Buffalo, N. Y.	53	39	14
				Chicago, Ill.	52	51	1
				Rochester, N. Y.	.....	41	.....

NOTES BY THE EDITOR.

OLD RECORDS OF COLD WEATHER IN MARCH IN MARYLAND.

In connection with the disastrous cold weather of the latter part of March, the voluntary observer, Mr. A. E. Acworth, of Mardela Springs (formerly Barren Creek Springs), Wicomico Co., Md., communicates the following extracts from old records kept by the late Dr. Ker, at Princess Anne, Somerset Co., Md., from 1823 to 1849, which show the dates in March of each successive year on which temperature fell to 32°, or below, also the recorded temperature itself in degrees; the dates on which frost, ice, or snow occurred are also given:

- 1823.—Temperature, 1st, 24; 4th, 28. Frost, 9th, 26th. Snow, 2d.
- 1827.—Temperature, none. Frost, 31st.
- 1830.—Temperature, 10th, 32. Frost, 5th, 10th, 20th.
- 1831.—Temperature, 18th, 32; 21st, 32. Frost, 2d, 8th, 9th, 11th, 22d. Snow, 17th.
- 1832.—Temperature, 15th, 30; 16th, 32; 18th, 23-24; 19th, 26. Frost, 2d, 16th, 28th, 29th, 31st.
- 1834.—Temperature, 23d, 32. Frost, 14th, 17th, 31st. Ice, 31st. Snow, 3d.
- 1836.—Temperature, 3d, 29-30; 12th, 30-31; 13th, 28-29; 16th, 32; 26th, 32. Frost, 4th, 9th, 13th, 16th, 25th, 27th. Snow, 22d.
- 1837.—Temperature, 1st, 31; 4th, 22; 5th, 27-28; 6th, 31. Frost, 12th, 17th, 21st. Snow, 3d, 24th.
- 1838.—Temperature, 1st, 26; 3d, 30; 4th, 31. Frost, 13th, 24th. Snow, 2d.