

WILLAMETTE RIVER IN OREGON

Tangible property totally or partially destroyed.....	\$80, 300
Matured crops.....	7, 000
Prospective crops.....	12, 000
Livestock and other movable farm property.....	3, 075
Suspension of business, including wages of employees.....	35, 000
Total.....	9, 245, 275
Total, exclusive of Ohio-Mississippi flood.....	23, 053, 972
Total loss in Ohio River Basin, January-February.....	411, 200, 000
Total loss in lower Mississippi Basin, January-February.....	6, 485, 557
Grand total.....	440, 739, 529

Estimated savings from flood warnings during 1937

ATLANTIC SLOPE DRAINAGE

Tioughnioga River in New York.....	\$1, 500
Chenango River in New York.....	3, 620
Susquehanna River.....	1, 500
Roanoke River.....	255, 000
Tar River in North Carolina.....	8, 000
Neuse River in North Carolina.....	26, 500
Cape Fear River in North Carolina.....	22, 500
Pee dee River in South Carolina.....	36, 000
Saluda River in South Carolina.....	1, 500
Broad River in South Carolina.....	7, 000
Congaree River in South Carolina.....	3, 000
Catawba-Wateree River.....	20, 000
Santee River.....	26, 000
Savannah and Ogeechee Rivers.....	75, 000
Altamaha River.....	86, 000
Total.....	573, 120

EAST GULF OF MEXICO DRAINAGE

Apalachicola River.....	4, 000
Conecuh River.....	2, 000
Alabama River.....	8, 000
Black Warrior-Tombigbee River.....	79, 000
Pascagoula River.....	15, 300
Pearl River.....	22, 500
Total.....	130, 800

MISSISSIPPI SYSTEM

UPPER MISSISSIPPI BASIN

Rock River in Illinois and Wisconsin.....	30, 000
Maquoketa and Wapsipinnicon Rivers in Iowa.....	5, 000
Iowa and Cedar Rivers in Iowa.....	2, 500
Des Moines River.....	117, 000
Total.....	154, 500

MISSOURI BASIN

Big Sioux River.....	10, 000
Grand River in Missouri.....	27, 500
Osage River.....	10, 000
Missouri River.....	24, 000
Total.....	71, 500

OHIO BASIN

Allegheny River.....	\$230, 000
Monongahela River.....	235, 000
Muskingum River.....	100, 000
West Fork of White River.....	64, 000
East Fork of White River.....	55, 000
White River in Indiana.....	558, 000
Wabash River.....	526, 000
Cumberland River.....	128, 600
French Broad River.....	1, 000
Tennessee River.....	53, 000
Ohio River and minor tributaries.....	55, 532, 850
Total.....	57, 483, 450

WHITE BASIN

Black River in Missouri.....	6, 000
Black River in Arkansas.....	15, 000
White River in Arkansas.....	642, 000
Total.....	663, 000

ARKANSAS BASIN

Cimarron River.....	12, 000
Ninnescah River in Kansas.....	5, 500
Neosho River.....	15, 000
North Canadian River.....	6, 000
Canadian River.....	105, 500
Petit Jean River.....	500
Arkansas River.....	10, 000
Total.....	154, 500

RED BASIN

Ouachita River.....	135, 000
Sulphur River.....	7, 100
Red River.....	7, 500
Total.....	149, 600

LOWER MISSISSIPPI BASIN

Mississippi River and minor tributaries.....	3, 021, 500
Total for Mississippi system.....	61, 698, 050

WEST GULF OF MEXICO DRAINAGE

Trinity River.....	15, 000
Pecos River in New Mexico.....	155, 000
Rio Grande in New Mexico.....	165, 000
Total.....	335, 000

PACIFIC SLOPE DRAINAGE

SACRAMENTO BASIN

Sacramento River.....	2, 283, 550
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COLUMBIA BASIN

Willamette River.....	35, 150
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Total Pacific Slope Drainage.....	2, 318, 700
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Grand Total.....	65, 055, 670
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Flood losses and savings for 1938 will be published in an early issue.

WEATHER ON THE ATLANTIC AND PACIFIC OCEANS

[The Marine Division, WILLIS E. HURD, acting in charge]

NORTH ATLANTIC OCEAN, DECEMBER 1938

By H. C. HUNTER

Atmospheric pressure.—The pressure averages of December were below normal over more than half of the North Atlantic, though slightly above over some southeastern areas and from the vicinity of the Azores to waters near Newfoundland and eastern Canada. The northeastern portion of the ocean showed the largest deficiencies of pressure, but none of the selected stations had an

unusually large departure for a winter month, —0.16 inch being the greatest, at Julianehaab, Greenland, and Valencia, Ireland.

During the first 17 days pressure was for the most part below normal, and often much below, over northeastern and north-central regions. Thereafter for a few days, centering about the 20th, low pressure prevailed over a belt in lower latitudes from Bermuda to southwestern Europe.

The pressure extremes noted in the available vessel reports were 30.66 and 28.42 inches. The higher reading was recorded during the forenoon of the 17th by the Danish steamship *Svanhild*, a short distance to south-eastward of Cape Breton Island. The lower reading was noted early on the 12th, near 52° N., 42° W., by the German steamer *Bockenheim*.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, December 1938

Station	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Jullanebaab, Greenland.....	29.32	-0.16	30.04	29	28.76	17
Reykjavik, Iceland.....	29.35	-0.12	30.09	23	28.44	5
Lerwick, Shetland Islands.....	29.71	-0.11	30.59	19	28.79	1
Valencia, Ireland.....	29.78	-0.16	30.45	25	28.94	10
Lisbon, Portugal.....	30.02	-0.09	30.39	5	29.21	11
Madeira.....	30.09	.00	30.33	5	29.71	21
Horta, Azores.....	30.19	+0.05	30.50	16	29.74	20
Belle Isle, Newfoundland.....	29.79	+0.05	30.44	27	28.84	7
Halifax, Nova Scotia.....	29.97	+0.02	30.54	17	29.50	13
Nantucket.....	30.03	-0.02	30.59	3	29.26	6
Hatteras.....	30.10	-0.03	30.56	28	29.60	6
Bermuda.....	30.07	-0.05	30.36	4	29.66	22
Turks Island.....	30.00	-0.03	30.14	28	29.82	15, 16, 17
Key West.....	30.06	-0.02	30.26	10	29.84	15
New Orleans.....	30.15	+0.02	30.54	27	29.63	28

NOTE.—All data based on a. m. observations only, with departures compiled from best available normals related to time of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Cyclones and gales.—Though by no means so stormy as December 1934, yet the North Atlantic weather of December 1938 was stormier than during any of the three Decembers next preceding it. When different portions of the month are compared, it appears the final fortnight was the least disturbed part; the last week, particularly in central and eastern longitudes, included scarcely a gale of any consequence.

A storm centered near the Bay of Fundy when the month began traveled northeastward across Newfoundland, gaining in strength, and on the morning of the 3d was centered near 57° N., 37° W.; it continued thence north-eastward to the waters between Iceland and southern Greenland on the 4th. Thereafter for a few days it centered near Iceland, with no great change in intensity. Two German steamers, *Hedderheim* and *Bockenheim*, on the 3d and 4th respectively, noted winds of hurricane force within the far-northern area dominated by this cyclone.

A following LOW, which was well developed when central over Labrador on the 7th, moved first northeastward but later eastward till, on the 9th, the center was near 55° N., 20° W. Much shipping was affected by the storm that day, though it was now less intense than when over Labrador. The American steamship *Black Eagle* met force-11 winds on the 9th. For a few days the LOW center remained west of the British Isles, but a LOW trough developed to southward, and within this trough, between Madeira and southern Portugal, very early on the 11th, the Dutch steamship *Arundo* met intense shifting winds which at one time reached hurricane force. The trough soon drew away to northward, making the LOW system more compact.

Within the 6-day period starting the 11th, a series of well-developed LOWs, in rapid succession, advanced from waters near America to unite with the system which hovered over the area west of the British Isles. Several vessels reported force-11 winds encountered in the chief shipping lanes to northwestern Europe as the result of one or other of these cyclones, and two vessels met force-12 winds, the *Black Eagle*, early on the 12th, near 48° N., 42° W., and, considerably to southeastward of that position, the American steamer *H. D. Collier*, during the evening of the 14th. Finally about the 17th, the LOW system moved away to northward and eastward as high pressure advanced eastward and southeastward from the Canadian coastal waters.

A feeble LOW, noted on the north-central Caribbean Sea on the 14th, moved northward over Haiti and the Bahamas and gained sufficient force by the 16th to cause whole gales over the waters east and northeast of the Bahamas. The center passed northwest of Bermuda during the night of the 17-18th, and near the southeastern edge of the Grand Banks on the 19th, where it merged with a moderately strong LOW system in high latitudes.

There was one later occurrence of wind of hurricane force, the British steamer *Trentbank* meeting this early on the 24th. The location was in unusually low latitude for the winter season, as had been the *Arundo's* encounter on the 11th, but the *Trentbank* was in 34° N., 40° W., or farther west than the Azores. A LOW which was not then intense had crossed New Jersey on the 21st, but within 2 days the center had moved to a position not far east of Newfoundland and had grown much stronger, while a trough of low pressure had developed, reaching far to the southward. The *Trentbank's* encounter was within this trough.

One tragedy nearly resulted from this storm. The Norwegian steamer *Smaragd*, from Norfolk, December 15, for Scotland, was disabled near 38° N., 62° W., on the 22d; boats from the American steamer *Schodack* succeeded in removing all 20 persons on board. The LOW system soon moved away to northward, and the chief sea routes were left in comparatively quiet condition for the remainder of the month.

Fog.—In the general region of the Grand Banks, fog was nearly everywhere of somewhat more frequent occurrence than usual in December, the first and third weeks bringing more than the other portions of the month. Here the 5°-square, 40° to 45° N., 45° to 50° W., furnished reports of occurrence on 9 days, or more than any other portion of the North Atlantic. In waters near the North American continent fog was met less frequently than usual in December, especially to northward of the 40th parallel. Near the Carolina coast to southwestward of Hatteras fog was observed on 3 days, and in the northwestern Gulf of Mexico on 2 days.

Between the 30th meridian and the coast of Europe, to northward of the 45th parallel, there was more fog, as a rule, than December normally brings, most of it occurring soon after the month began or in the period 24th to 29th. Some few occurrences were noted to southward of the 45th parallel; on the 24th one vessel met fog only a short distance northeast of Fayal, where it is very seldom seen.