

NWS FORM E-5

U.S. DEPARTMENT OF COMMERCE
NOAA, NATIONAL WEATHER SERVICE

HSA OFFICE:
North Webster, IN

MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS

DATE:

REPORT FOR (MONTH & YEAR):
July 1998

August 5, 1998

TO: NATIONAL WEATHER SERVICE (W/OH12X1)
HYDROMETEOROLOGICAL INFO CENTER
1325 EAST-WEST HIGHWAY, RM 7116
SILVER SPRING, MD 20910

SIGNATURE:
Michael Sabones, MIC
Greg Lamberty, Service Hydrologist

When no flooding occurs, include miscellaneous river conditions, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (WSOM E-41).

An X inside this box indicates that no flooding occurred within this Hydrologic Service Area.



No flooding occurred in the Northern Indiana Hydrologic Service Area (HSA) during the month of July.

During the middle of the month of February the Grand River in the Grand Rapids HSA saw significant within bank rises but remained below flood stage. On February 21st the Grand River at Comstock Park crested a half a foot below flood stage.

February precipitation totals at first order and contract stations across our HSA were above normal. Monthly precipitation totals at Grand Rapids, Lansing, and Muskegon, were 1.51, 2.15, and 1.74 inches, respectively. Precipitation for the month at these three sites varied from 0.09 inches above normal at Grand Rapids, Michigan, 0.79 inches above normal at Lansing, to 0.25 inches above normal at Muskegon, Michigan. For the year, precipitation totals at Grand Rapids are 2.37 inches above normal, 2.64 inches above normal for Lansing, and 0.52 inches above normal for Muskegon.

Snowfall for the month at first order and contract stations was well below normal and ranged from only a half an inch at Grand Rapids, Michigan, two tenths of an inch at East Lansing, Michigan, to 1.0 inch at Muskegon, Michigan. For Grand Rapids, it was the second least snowfall total in February on record. By the end of the month, all the snow had melted.

The month of February was the warmest on record for Muskegon and the second warmest on record for Grand Rapids and Lansing. Average monthly temperatures were over 10 degrees above normal for these three sites. With above normal temperatures for most of the month of February, the frost depths at the end of the month were still zero and the rivers were ice free in our HSA.

Due to the above normal precipitation for the month, river levels were above normal across the HSA for this time of year. All rivers remained below flood stage during the

month of February.

cc:

Ken King - Regional Hydrologist W/CR2

Solomon G Sumner - Regional Hydrologist W/ER2

Kathy Patterson - NCRFC

Michael Sabones - NWSO IWX MIC

----- OHRFC

Al Shipe - NWFSO IND SH

NWS FORM E-5 U.S. DEPARTMENT OF COMMERCE
NOAA, NATIONAL WEATHER SERVICE

HSA OFFICE:
North Webster, IN

REPORT FOR (MONTH & YEAR):

July 1998

MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS

DATE:

August 5, 1998

TO: NATIONAL WEATHER SERVICE
HYDROMETEOROLOGICAL INFO CENTER
1325 EAST-WEST HIGHWAY
SILVER SPRING MD 20910

SIGNATURE:
Michael Sabones, MIC

When no flooding occurs, include miscellaneous river conditions, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (WSOM E-41).

An **X** inside this box indicates that no flooding occurred within this Hydrologic Service Area.



Precipitation

Rainfall for the month of July averaged near normal across northern Indiana, southern Michigan and northwest Ohio, but northwest Indiana and southwest Michigan had below normal rainfall while northeast Indiana, southeast Michigan and northwest Ohio had as much as 2 inches above normal rainfall amounts for July. There were two series of very heavy rainfall events in July. One on the 3rd and 4th and the second on the 21st through the 23rd of the month. Both of these effected parts of northern Indiana and northwest Ohio.

Temperature

Temperatures were, on average, cooler than normal across northern Indiana, southern Michigan and northwest Ohio. High temperatures averaged in the lower 80s, lows averaged near 60, giving an average temperature in the very low 70s which resulted in average temperatures being 1.5 degrees below normal. In Fort Wayne it was the 10th coolest July on record.

Weather

The boundary between the maritime tropical air mass and the continental polar air mass was located across northern Indiana, northwest Ohio and southern Michigan for much of July. This frontal boundary served as a focusing mechanism for a series of severe weather events. They occurred on July 3rd through the 4th, July 19th through 21st and July 22nd through the 23rd, with the final event triggering torrential rain to as much as 6.7 inches from midnight the 22nd to 6 am the same day across Adams, Wells, Huntington, Wabash, Miami, Fulton, Pulaski, White and Cass counties in northern Indiana..

This series of severe and flooding weather was caused by a procession of upper air weather disturbances which moved along the front as it waved north and south across the area. The activity on the 22nd was fed by a warm and very moist air mass centered over the southeast U.S. This air mass collided with that frontal system which was located across southern Michigan at the time. The front then sagged south over the night of the

21st. This slow moving front allowed storms to train over the Upper Wabash River Valley resulting in rapidly rising rivers across that area. The torrential rain sent the Wabash and tributaries Eel, Little, Mississinewa and Salamonie Rivers above flood stage that morning. The Tippecanoe River also flooded later that week. The Wabash reached its 2nd highest level since records have been kept at Linn Grove. The flooding along the Eel River near Adamsboro reached its highest level since May of 1943 which marked the record flood.

The flooding caused by the rain that fell on the 22nd and more on the 23rd resulted in flooding which lasted 6 days. The Tippecanoe River was the last to recede, doing so on the 28th of the month.

NWS FORM E-5 U.S. DEPARTMENT OF COMMERCE
NOAA, NATIONAL WEATHER SERVICE

HSA OFFICE:
North Webster, IN

REPORT FOR (MONTH & YEAR):

August 1998

MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS

DATE:

September 5, 1998

TO: NATIONAL WEATHER SERVICE
HYDROMETEOROLOGICAL INFO CENTER
1325 EAST-WEST HIGHWAY
SILVER SPRING MD 20910

SIGNATURE:
Michael Sabones, MIC

When no flooding occurs, include miscellaneous river conditions, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (WSOM E-41).

An **X** inside this box indicates that no flooding occurred within this Hydrologic Service Area.



Precipitation

Rainfall for the month of August averaged about one inch above normal across Northern Indiana, Southern Michigan and Northwest Ohio. Much of the rainfall was concentrated in two events. The first one occurred from the 3th through the 6th. Maximum amounts of over 7 inches were reported over Grant County in Northern Indiana. A band of 3.5 to over 7 inches extended from Peru Indiana to Paulding Ohio. The band of heavy rain extended across Miami, Wabash, Huntington, Wells, Adams Counties in Indiana and Paulding County in Ohio. This rain was followed by nearly two and one half weeks of mostly dry weather allowing the rivers and streams to recede to more normal levels.

The dry spell was then broken by another storm system which was pushed through the entire HSA by a slow moving cold front from the 24th through the 25th. This system brought very heavy rain in a band 30 to 50 miles wide across Northern Indiana, Southern Michigan and Northwest Ohio. Rainfall totals topped 6 inches in Northwest Ohio, specifically over Williams County. A band of 2 to 3 inches fell from South Bend to Northwest Ohio. An area covering Southwest Williams, Southern Fulton, Northeast Defiance and Northern Henry received nearly 7 inches in some locations.

Temperature

Temperatures were, on average, warmer than normal across Northern Indiana, Southern Michigan and Northwest Ohio. The average high temperature reached the lower 80s and the average low temperature was in the lower 60s. As a result, the average temperature was about one degree above the normal which is around 71 degrees.

Weather

August began cooler than normal. However, the cool airmass retreated northeast as a warm front advanced on the region from the southwest. By the 4th of the month the warm front was located across Northern Indiana. This front served as a focusing mechanism for showers and thunderstorms. The greatest concentration of rain fell in the vicinity of the front as it pushed north. Particularly hard hit were Grant and Southern Huntington counties in Northeast Indiana. Much of the rain fell during the afternoon and evening of the 4th, in Marion the largest city in Grant County. This intense rainfall extended east into Blackford, Jay and Southern Adams Counties. As a result, both the Mississinewa and Salamonie Rivers rose rapidly on the morning of the 5th. Extensive flooding occurred in both Warren and Marion Indiana. The Mississinewa River at Marion crested at 16.00 feet on the 5th which was the 4th highest crest on record. Record keeping at Marion began back in 1913. At Warren, the Salamonie River crested at 16.76 feet on the 5th which was the 3rd highest on record. Record keeping at Warren began back in 1957.

Flooding resulting from the heavy rains of August 3rd and 4th had its effect on the Wabash River as well. The river rose above flood stage at both Linn Grove and Bluffton on the 5th and the 6th respectively. A crest of 12.91 feet was reached at Linn Grove on the 6th and a crest of 13.6 feet was achieved at Bluffton on the 8th. River levels reached their highest levels on the Wabash since late July of 1998. Flooding, however, failed to reach the city of Wabash on the Wabash river because most of the rainfall was concentrated south of the river where it was contained by the flood control projects on the Mississinewa and Salamonie Rivers. Minor flooding was noted in the lower Tippecanoe River Valley with the river stage at Ora Indiana getting to only 0.7 of a foot above flood stage. All of the rivers retreated below flood stage by the 13th.

The weather then turned quite dry and warm for the next two weeks. This allowed the rivers and streams in the HSA to return to more normal summer levels. Then another storm system approached the area from the west on the 23rd and the 24th. First an upper level disturbance from Northern Wisconsin moved southeast across the area producing very heavy rain across extreme Southeast Lower Michigan and Northwest Ohio. A second storm system caused by another upper air disturbance rapidly traversed the HSA from Northern Illinois during the afternoon of the same day. The primary threat with this system was very strong winds. Rainfall totals were considerably lighter with this system. However a third storm system moved through the area early on the 24th with waves of very heavy rain and some severe winds. This cycle of storms finally ended when the cold front finally moved through the that morning. Heavy rain fell across a 30 to 50 mile wide band, extending across Northern Indiana, Southern Michigan and Northwest Ohio. Northwest Ohio was hit hardest by the intense rain and as a result the Tiffin and St Joseph (Ohio) Rivers rose rapidly with the Tiffin leading the way. The Tiffin at Stryker rose above flood stage on the 24th and crested at 15.89 feet on the 25th, almost 5 feet above flood stage. Much of Southern Williams, Southern Fulton and Northern Defiance Counties were affected by flooding along the Tiffin River. Areas surrounding Stryker were particularly hard hit. The flooding was much less severe on the St. Joseph (Ohio)

River with a crest at Newville on the Indiana/Ohio state line reaching 13.83 feet on the 26th, nearly 3 feet above the 11 foot flood stage. The very heavy rainfall which occurred over the St. Joseph (Michigan) River Valley did not prompt any river flooding because much of the area had a dry summer up to this time.

NWS FORM E-5 U.S. DEPARTMENT OF COMMERCE
NOAA, NATIONAL WEATHER SERVICE

HSA OFFICE:
North Webster, IN

REPORT FOR (MONTH & YEAR):

October 1998

MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS

DATE:

November 5, 1998

TO: NATIONAL WEATHER SERVICE
HYDROMETEOROLOGICAL INFO CENTER
1325 EAST-WEST HIGHWAY
SILVER SPRING MD 20910

SIGNATURE:
Michael Sabones, MIC

When no flooding occurs, include miscellaneous river conditions, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (WSOM E-41).

X An X inside this box indicates that no flooding occurred within this Hydrologic Service Area.

Precipitation

Unlike September, October was much wetter. Average rainfall was around 2.8 inches across Northern Indiana, Southern Michigan and Northwest Ohio. Some areas had above normal rainfall totals while other locations recorded below normal amounts. Fort Wayne had nearly 4 inches of rain which was 1.5 inches above normal while South Bend recorded just over 2.5 inches which was 0.5 inches below normal. The most significant rainfall occurred over the HSA on the 6th and the 7th. A strong upper level low anchored itself over the Northern Plains. This system slowed the advance of a cold front into the area which allowed warm moist air to pool over our HSA on the 6th and 7th. Weak disturbances moving along the front initiated the heavy rainfall. Nearly 3 inches of rain fell at Fort Wayne during this time. The rest of the month saw lighter rainfall amounts with measurable precipitation occurring on only 5 or 6 days.

Temperature

October was slightly warmer than normal with temperatures averaging around 1.3 degrees above the normals for the month. High temperatures were in the lower to middle 60s and low temperatures averaged in the lower to middle 40s.

Weather

October, like September began cooler than normal. This cool spell was temporarily interrupted by the invasion of warm air of tropical origin on the 6th and 7th. A slow moving cold front passed through the HSA which caused temperatures to quickly fall below normal as cold Canadian high pressure built in from the northwest. This cooler than normal weather continued through the middle of the month. As the high pressure system moved east, temperatures responded by quickly rising to 10 to 20 degrees above normal as warm air quickly poured into our HSA. The warmth lasted for only a couple of days being ended by another Canadian cold front which brought scattered showers and a return to below normal temperatures. This cool spell lasted only a week and warmer than

normal temperatures returned for the balance of the month.

October was dominated by continental polar air masses originating from Canada. The only heavy rainfall occurred when a tropical maritime airmass moved into the HSA from the Gulf of Mexico.

Area rivers continue to be in a low state due to the dry weather which occurred in September over most of the HSA. The more abundant rainfall during October caused only minor rises on area rivers and streams. As a result, no hydrologic products were issued other than the daily river stage, precipitation and river stage forecast reports.

REPORT FOR (MONTH & YEAR):

November 1998

MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS

DATE:

December 1, 1998

TO: NATIONAL WEATHER SERVICE
HYDROMETEOROLOGICAL INFO CENTER
1325 EAST-WEST HIGHWAY
SILVER SPRING MD 20910

SIGNATURE:
Michael Sabones, MIC

When no flooding occurs, include miscellaneous river conditions, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (WSOM E-41).

X An X inside this box indicates that no flooding occurred within this Hydrologic Service Area.

Precipitation

November was quite dry in 1998. Average rainfall was around 1.4 inches across Northern Indiana, Southern Michigan and Northwest Ohio. Those rainfall totals were about 1.4 inches below normal for November. Ft Wayne reported 1.65 inches in November which was 1.14 inches below normal. South Bend reported only 1.24 inches which was the driest November on record, 2.03 inches below normal. The most significant weather event in the HSA occurred on the 9th and 10th. An intense low pressure system made its way northeast from the Southern Plains on the 9th and 10th. This system set records for the lowest pressure in some locations to our west. The primary threat was wind. The system caused a major wind event across the area with winds clocked in excess of 60 mph in some locations. However rainfall totals were generally less than an inch. Peru and Auburn had around an inch amounts for both days. Most of the rest of the month produced scattered rain showers on the 25th and the 30th with cold frontal passages. Most totals were a half an inch or less. On the 30th there were some isolated amounts around an inch.

Temperature

November was warm with temperatures averaging 2.4 degrees above seasonal normals. Average high temperatures were in the lower 50s and the average lows in the middle 30s.

Weather

November began with below normal temperatures. They averaged nearly 5.5 degrees below normal for the first 9 days. A strong upper level trough dominated the area's weather for the first days of November. This allowed Canadian air to penetrate the region bringing in the colder temperatures. By the 9th, an intense low pressure system made its way into the area from the southwest. It was this system that brought the strong winds and the most significant rain to the HSA in November. There was, however, little cold air that followed in the storm's path. The upper level flow became more west to east and

as a result, temperatures rebounded as modified maritime polar air from the Pacific dominated the region's weather. Near record high temperature were reported at Ft. Wayne on the last 3 days of November, however high temperature records were broken at South Bend on the last three days of the month.

Continental polar air masses dominated the first 9 days of November with modified maritime polar Pacific air holding sway over the remainder of the month. The intense storm system which plowed through the Midwest on the 9th and 10th brought up some maritime tropical air from the Gulf of Mexico which aided in the rainfall which occurred on those days.

Area rivers continue to be in a low state due to the dry weather which persisted through November. As a result, there was no threat of flooding in the Northern Indiana HSA in November. Thus, no hydrologic products were issued other than the daily river stage, precipitation and river stage forecast reports.

NWS FORM E-5 U.S. DEPARTMENT OF COMMERCE
NOAA, NATIONAL WEATHER SERVICE

HSA OFFICE:
North Webster, IN

REPORT FOR (MONTH & YEAR):

December 1998

MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS

DATE:

January 5, 1999

TO: NATIONAL WEATHER SERVICE
HYDROMETEOROLOGICAL INFO CENTER
1325 EAST-WEST HIGHWAY
SILVER SPRING MD 20910

SIGNATURE:
Michael Sabones, MIC

When no flooding occurs, include miscellaneous river conditions, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (WSOM E-41).

X An X inside this box indicates that no flooding occurred within this Hydrologic Service Area.



Precipitation

December was a month of great contrasts in 1998. It was, however dryer than normal as was November for Northern Indiana, Southwest Michigan and Northwest Ohio. Precipitation for Fort Wayne was 1.1 inches which was 1.79 inches below normal and South Bend had 2.04 inches which was 1.26 inches below normal. On average precipitation totals were 1.5 inches below normal for the HSA. Precipitation averaged about 1.3 inches in December across the entire area. The month started out much above normal in temperature with some days as much as 28 degrees above normal. A line of severe thunderstorms then moved quickly through the area on the 6th dropping between a quarter and a half of an inch of rain. There were isolated amounts greater than an inch in Laporte County Indiana and in Berrien County in Michigan. South Bend reported 1.4 inches of rain with these storms. These storms were accompanied by very strong winds. Speeds as high as 54 mph were recorded at South Bend and 43 mph at Fort Wayne. Once this system passed, temperatures began a downward trend for the rest of the month. The first measurable snow finally occurred on the 17th which set a record for the latest measurable snowfall at both Ft. Wayne and South Bend. Only one inch of snow fell at Ft. Wayne for December, but over 17 inches were recorded at South Bend. Most of the snowfall at South Bend occurred as a result of the influence of Lake Michigan, with most of the fall occurring during the last 10 days of December.

Temperature

December, due to its torrid start, averaged about 5.8 degrees above normal across the HSA. Average highs were in the lower 40s and average lows were in the middle 20s.

Weather

December began on a torrid pace with temperatures in the upper 50s to the 60s occurring on the first 6 days. There were even a few reports of 70s as well. Lima Ohio reached 70 degrees on the 6th. Then a cold front associated with a northern storm system moved through the area on that evening spawning severe thunderstorms with high winds and brief heavy rain. This storm system left quite a bit of wind damage in its wake. With its passage the temperature trend reversed itself and began a fall to below normal status by months end.

Temperatures, were however, still above normal into Christmas Week. There were a series of weak fronts and storm systems which moved north of the HSA from 16th through the 21st giving spotty rain fall and some mostly light snow amounts after cold frontal passages. By the 22nd the lake effect snow machine was turned on at South Bend when nearly 5 inches fell. In the week after Christmas, nearly 11 inches more fell there due to the lake effect. Some of these lake effect snow bands crossed our western and central counties making their way south to Southern Indiana to the Ohio River in some cases. There were temperature records set or tied in December, high temperature records. Fort Wayne recorded high temperature records of 69 degrees on the 6th and 64 degrees on the 4th. South Bend had record highs of 67 on the 3rd, 64 on the 4th and 65 on the 6th.

Maritime Tropical air dominated the region's weather in the first week of December. There was an upper level ridge over the eastern half of the country which funneled warm air into the region. This pattern began to shift on the 6th when the first in a series of storm systems began carving a trough over the eastern half of the country. Gradually Maritime Polar air began to dominate with a couple of outbreaks of Arctic air as December ended.

There was little change in area rivers during December as the dry weather continued. There were some minor rises of rivers and streams in the St. Joseph River Valley where the heaviest rain fell but they posed no threat. Low flows continued to dominate all rivers and streams elsewhere across the area. As a result there was no threat of flooding in the Northern Indiana HSA in December.

There were no hydrologic products issued other than the daily river stage, precipitation and river stage forecast reports in December.