



# *Weather*

. *by* Merton Goodrich

## PART ONE

### Some Events Prior to 1800

Almost from the beginning, the weather was an important factor in the history of Keene. For two or three years after the township was established a few of the earliest proprietors came to clear their lots in the wilderness, but they remained only during the warm summer months.

In 1736 three of them decided to stay during the winter, but in February their provisions gave out. They chose Seth Heaton to go to Northfield for a new supply, but he was unable to obtain anything there except some meal. He started back in a fierce snowstorm. A short distance beyond Winchester, further progress through the storm in the deep crust-covered snow became impossible, and he returned to Winchester. When he failed to arrive at Keene the others let their one horse and two oxen loose where they had access to their hay, and started out for Winchester on snowshoes. Early next spring, when they all came back to their cabin, they found the livestock still alive but nearly starved.

There is no record of the weather here for the next 30 years. The settlers had such a difficult time resisting the attacks of the Indians that resistance to adverse weather conditions was of minor importance. But it is told that at Keene in the winter of 1762-63 the snow came early and remained late, and the depth was about five feet much of the time. There was only one street in the village and it was piled so full of snow that no teams could get through. Those who needed firewood to keep their homes livable had to haul it in from the nearby hills on handsleds.

The winter of 1763-64 was comparatively mild, but the summer of 1764 was cold with "a hard frost" on June 1 and a frost on September 9, which "hurt the corn very much."

The winter of 1764-65 was a tough one with "hard Cold, deep Snows, and Difficult passing as ever was known."

Among papers bequeathed to the Historical Society of Cheshire County by Mrs. Ella E. Abbott is a bundle of envelopes on the backs of which are items which appear to have been copied from an old diary written by an unknown person. It tells the kind of weather that prevailed each day from March 1 to December 31, 1765. It states that the last snowstorm in the spring occurred on April 2, and the last frost on June 7. On October 26 "a snow fell almost knee deep." Snow fell on three days in November and on 13 days in December.

The winter of 1770-71 was an "Open Winter" with several freshets, the worst of which occurred in March, when many mills and bridges were carried away.

The "Journal" or Diary of Abner Sanger of Keene was begun October 1, 1774. His entry on the second day reads, "Sunday mn very Raney, before and after Day, forenoon wet, the sun brakes out tord noon, aftn clear and warm. none of us go to Meeting. Pleasant Evening." The first snowstorm of the following winter occurred November 16. On November 24 it was "Pleasant but ye snow is deep." Six days later there was "an exceeding hard rain toard night," followed next day by "great floods." During the winter there was much "warm thawy" weather.

There were thunderstorms on both March 20 and 21, 1775. A month later the forenoon of April 22 was "very snowy." Great extremes continued all year. The latter part of May had many "very hot days," and on May 28 "Toard Night comes up a Terrible Hurricain Thunder shower. Trees are whirled down in Great Plenty." Three weeks later, on June 21, there was "a hard frost." The first frost that fall came September 12. It rained from October 18 to 21, and on

October 22 "This remarkable great Rain caused a Great Flood." The first snowstorm came November 9 and in the next storm, November 15, "the Snow fell Knee deep."

In contrast with the early snowfall in November 1775, the first snowstorm in 1776 did not blanket Keene until December 12.

The diary continues into 1777 with mention of the weather each day, but there were no remarkable events.

The great hurricane of 1788 had an extremely narrow path, but it was intense and cut a swath through all the North Atlantic and New England States except Maine. This is the first hurricane of which there is a news story in a Keene newspaper. The *New Hampshire Recorder*, in the issue of September 9, 1788, does not name it correctly, but states, "the violent tornado which was experienced in this county on August 19 extended as far as Philadelphia with dismal effects both on sea and land . . . The damage to houses, barns, and cattle is beyond conception . . . By the accounts we have received of the damages in this County not less than 100 cattle were killed by falling trees, and in many places, acres of excellent timber are entirely level." This storm is referred to in Griffin's History (p. 283), but the date there is wrong.

The winter following this hurricane was the warm winter of 1788-89 described as "the Most Agreeable Winter I ever knew."

During the last 20 years of the 18th century several winters were described as "comfortable," "midling," or "pretty open." But the winters of 1779-80, 1791-92, and 1798-99 were severe. The *New Hampshire Sentinel*, March 30, 1799, has this news story: "The oldest man scarce recollects such a winter as the past. Since the middle of November the ground has been covered with snow. The mail *sleigh* from Boston to Walpole has passed through this town eighteen weeks successively." And on May 11, "The snow now in many parts of the town is two or three feet deep."

## PART TWO

### Some Outstanding Weather Events, 1800-1890

#### *Cold Days and Cold Waves*

The temperatures mentioned in old diaries are not considered accurate by the Weather Bureau, but from several diaries and other

sources listed in the references, important and general information has been obtained.

The earliest very cold morning came on January 18, 1806, when 38° below zero was reported.

What was long known as "Cold Friday" occurred January 19, 1810. This truly awful day is unique in the annals of the weather and caused indescribable suffering in all the states on the northern border of the country. The preceding day was unusually mild with rain and temperatures in the fifties, but during that night and the next forenoon there came a sudden drop of about 70° with a fearful gale. It blew down barns and houses. Cattle were frozen in their stalls. Even wild animals perished. Recent scientific studies have proved that a winter gale has the same effect as a drop in temperature of between 30° and 40°. Although the thermometers did not read lower than 20° below zero on the 19th, the gale produced the same effect as a temperature of 50° or 60° below.

There was a very cold day on December 16, 1836, when the reading was 14° below zero at 1 P.M.

In his weekly report printed in the *Keene Sentinel*, January 19, 1840, Reverend Zedekiah Barstow stated, "This is the coldest week there has been since I have taken any notice of the weather." Seven of the eight days from January 12 to 19 had temperatures below zero and the coldest was January 17, when his thermometer registered 37° below zero at sunrise. Five consecutive mornings had average minima colder than 20° below zero.

The cold wave of January 18-26, 1857, by comparison with both official and unofficial standards, appears to be the most severe cold wave ever experienced in Keene.

For several years at this time, Charles Sturtevant, the register of deeds, made many notations about the weather in the books of land records of Cheshire County. They were found and compiled by Roy M. Pickard into a manuscript from which the following data about this cold wave are quoted.

"The week of January 18 to 26 inclusive, 1857, was the coldest week ever known in Keene." This cold wave really lasted nine days, but only the following thermometer readings were put down: "Jan. 18, 25 below at 7 A.M., 10 below at noon. Jan. 23, 22 below at 8½ A.M., 28 below at 10 P.M. Jan. 24, 36 below at 7½ A.M., 40 below by some thermometers. Jan. 26, 25 below at 7½ A.M., 20 below at 9 A.M." These readings show that not only was the temperature far below zero at dawn, but it remained below zero all day for several



*A "fine day" in 19th century Keene—residence of  
Dr. Charles Adams, site of the old fort*

days. The mean temperature on January 18 was 17.5° below zero. The very low readings late in each day are most remarkable. The 40 below on January 24, 1857, is the coldest unofficial record in Keene.

The old diaries which were read indicate that there were more "awful hot" days than usual in the summers between 1864 and 1868 and again in 1884.

#### PRECIPITATION

##### *Floods and Freshets*

During the period 1800-1890 there were many floods and freshets which did varying amounts of damage to roads, bridges, mills, and meadows.

In the first part of the period some of the worst spring freshets occurred in 1801, 1813, and 1818. A warm rain melted a lot of snow in February 1824 and the high water carried away a bridge at South Keene, did much damage on the turnpike from Keene to Surry, and at the Faulkner and Colony mills. In November 1828 the newspaper stated that the "Connecticut River was the highest in 40 years."

##### *The Freshet of September 24, 1882*

As told in the *Sentinel*, "The great rain of Friday and Saturday (September 22 and 23) raised the water in the Ashuelot River to an

unprecedented height. It submerged the pottery on Winchester Street beyond the bridge and inundated parts of Surry Road, and Water, Church, Island, Pearl, Ralston, and Emerald streets, but now it has begun to subside (25th). Mills are all shut down. Many corn and potato fields are flooded. Referring to the preceding drought, some said, 'If only we could have had this water eight weeks ago, how much good it would have done.'"

### *The Freshet of March 26, 1884*

From the *Sentinel* news story: "The heavy rain last Wednesday (March 26) washed out quite a portion of the roadway on North Elm Street, and a landslide near South Keene covered the Cheshire railroad track for quite a distance. . . . Beaver Brook was swollen so that the water flowed over Church, Roxbury, Spring, and other streets. It was six inches higher than it has been for some fifteen years."

### *Hurricanes*

On October 9, 1804, a tropical storm of small size swept the Middle Atlantic states, but it developed hurricane force when it reached New England. A cold air mass was on the western side of the storm which produced a very heavy snowfall driven by a fierce gale.

A company of men from Gilsum started early in the morning to go to Keene to participate in the annual "muster" of the militia, but "a fearful snowstorm came on with a violent wind," which blocked the road with deep snow and trees, so that many suffered severely, some could not reach Keene, and a drummer from Sullivan nearly perished before he could get home.

The next severe hurricane in New England occurred September 23, 1815. The *Keene Sentinel* said this: "The distressing details of destruction by the late unparalleled storm occupy a large portion of our paper. In this vicinity the damage was trifling, some elms and forest trees were prostrated and old sheds blown down." The center of this gigantic tropical disturbance passed over eastern New Hampshire and inflicted enormous damage. This hurricane was long considered to be the worst storm of its kind in New England. But it was not as severe in Keene as the hurricane of 1788, and no other comparable storm came this way until the Great Hurricane of 1938.

## *Violent Local Storms*

A small tornado. In July 1807, "During a shower a whirlwind passed across the northern part of the village," destroyed several buildings and carried shingles to the top of Beech Hill. Its chief force was confined to a path a few rods wide and a little more than half a mile in length.

On August 9, 1813, a great hailstorm hit Keene after passing through several towns north of the "village." Hailstones 1¼ inches in diameter fell in Keene and covered the ground to a depth of three inches. Great damage was done and many houses had almost all their window panes broken.

On July 26, 1819, during the Sunday afternoon services in the meetinghouse in Keene, there was a violent tempest of wind, rain, thunder, lightning, and hail. For fifteen minutes rain fell heavier than ever seen before with hailstones of considerable size. There were more and gentler showers the remainder of the afternoon, with incessant streams of lightning darting in every direction. Many buildings were struck in surrounding towns. It was reported that before the shower the temperature was as high as 100° in some localities.

At noon on August 4, 1870, there was a severe electrical storm in Keene. Edwin G. Metcalf's house and barn were burned. The lightning struck in several other places.

What was called "The worst thunderstorm in many years" occurred October 8, 1874. The chimney of Lapham and Rawson's tannery was struck and completely demolished.

In a shower July 21, 1881, "the display of lightning was very grand; numerous balls of fire were shooting across the heavens in all directions." Lightning struck A. B. Skinner's house on Roxbury Street and the water main in the street was torn up for a distance of about 700 feet.

### *1839, The Year of Four Great Storms*

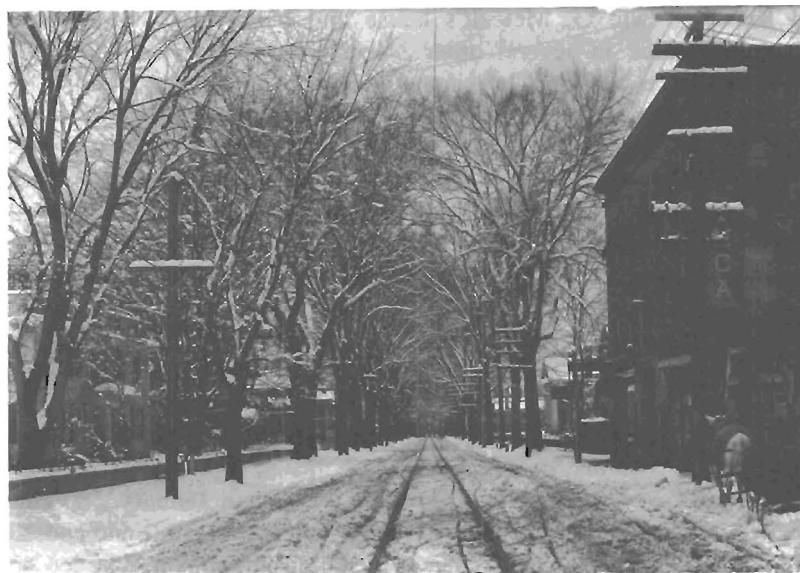
The year 1839 was notable for having four very severe storms, the greatest number in any one year.

The first of these was a rainstorm that began January 26. This melted a large amount of snow, washed it into the streams, and caused a great flood all over New England including this region. The ice on the Connecticut and Ashuelot Rivers broke up and many bridges were carried away.

The second storm was another violent rainstorm which began before the effects of the preceding one were over. The *Sentinel* states, "papers from the Kennebec River to Lake Champlain west and as far south as Pennsylvania are filled with accounts of disasters," and a whole column is devoted to the details of the loss of millions of dollars of property.

The other two storms were "nor'easters." One began on Sunday morning, December 15, and continued all day, all night, and part of Monday. The *Sentinel* tells the story. "The roads were badly blocked by snow. The Boston mail of Sunday arrived on Wednesday. There was no mail from Nashua for five days. It took nine hours for a sleigh to get to Keene from Walpole on Wednesday. Such a snow has rarely been experienced in December. In the valley it is more than two feet deep."

Only two weeks later, on December 28-29, the region had another violent storm which deposited about 15 inches of snow, borne by a wind "that rocked our firmest houses, piling up mountains of very damp snow." The period without mail was a day longer than in the preceding storm. The mail carrier from Concord had to bring the mail a portion of the way on his back.



*Winter comes to West Street*



## *Snowstorms Prior to 1888*

Previous to 1888 the diaries describe "hard" winters and "open" winters. There were winters when frequent snowstorms piled the snow up as high as the tops of the "kitchen windows," or, rarely, a tunnel had to be dug through a drift to go from the house to the barn. By contrast, some winters had so few snowstorms that the total accumulation was not more than two feet.

Frequently there have been snowstorms in April in which there was a fall of several inches in nearby towns while little or none has fallen in Keene. On April 18, 1879, there was "a very violent snow-storm." The snow melted rapidly in the valley, but twelve inches accumulated on the surrounding hills.

Rarely has snow fallen in May. On May 8, 1803, a storm deposited so much snow that many people rode to church in sleighs. On May 15, 1834, "the snow drifted as if it were February." On May 3, 1841, several inches of snow fell in the night but it all melted the next day. On four occasions noticeable amounts of snow have fallen later than May 15. None of these unofficial records have mentioned this snow remaining on the ground more than a day.

Several times in the fall storms with one or more inches of snow have occurred in October; the earliest of these was October 6, 1836.

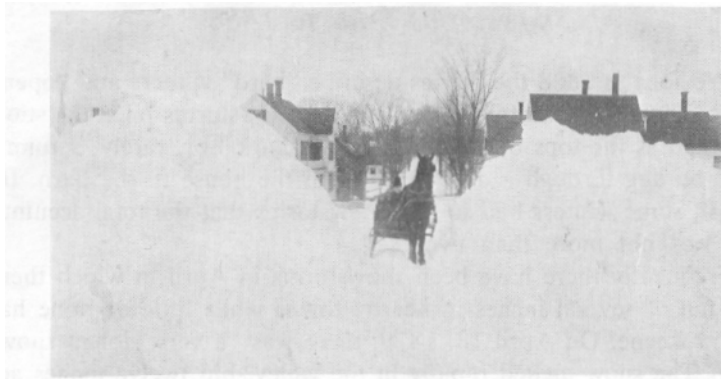
During the winters there have been major snowstorms with more than a foot of snow in each in about 30 of the 90 seasons.

A curious incident is recorded in regard to the storm of December 3, 1806. One of Joseph Baker's sheep was lost and buried in the snow. A month later it was found alive in a drift. It had survived because the heat of its body beneath the drift had melted the snow which supplied enough water and it had fed on the dead grass.

The storm of December 2, 1854, did much damage "in the village" of Keene. Several buildings were destroyed and 50 chimneys were blown down. In Ash Swamp more than 500 old pine trees were uprooted and many trees were felled in other parts of the town. That next summer a steam sawmill was set up for the purpose of sawing all this timber.

## *The Blizzard of 1888*

The overpowering snowstorm of March 11-14, 1888, was the worst in this region since Keene was settled. Detailed accounts of this terrific storm have been found in the diaries of Emily Z. Mark of



*After the Blizzard of 1888*

Gilsum and A. A. Woodward of East Swanzey and others, and in published histories too numerous to mention. The storm developed over the Great Lakes and swept eastward over New York State and New Jersey, increasing in intensity as it came until it blasted all of New England. Everywhere the story was the same.

The two days preceding the storm were "a warm day" and "a warm lovely day." There were "snow squalls" in the afternoon of the 11th, but that night the storm really began with thick falling snow and a very high wind. It continued all next day, all that night, and all the following day, and did not "let up" until the 14th.

Drifts of hard-packed snow from 12 to 15 feet deep were piled across the roads, and half way to the top of the second story windows on the lee side of the houses. Horses hitched to sleds floundered in the drifts, were "cast" and had to be unharnessed before they could get up. The strongest men became exhausted trying to fight their way through the drifts and took refuge in the houses of friends and neighbors where they were compelled to stay one or two nights. On the 14th, the Gilsum diary states, "There is no getting from one town to another, even from here to Keene. . . . They telephoned they had only broke out the square and a few of the principal streets."

Stage drivers on Monday had to stop part way to their destinations. Travel was not resumed and no mail could be delivered for three or four days after the storm ceased. During all this time crews of many men were shoveling snow out of the roads. On Saturday, the 17th, Swanzey got its first mail from Keene since the Monday morning before, a space of five days.

Many estimated the snowfall at over 40 inches.

### *Sleighbing Parties*

About a hundred years ago, on evenings when the winter weather was clear and bright, and the snow in the roads had been smoothed and hardened by the great rollers that were used then to roll it down, it was the custom to have "sleighbing parties."

On January 7, 1836, there were two parties, one of 25 sleighs from Sullivan to Keene, the other of 40 sleighs from Dublin to Keene. "In the center of the latter party was an omnibus well filled with a band for music."

On January 15, 1836, 72 sleighs with about 150 people rode from Keene to Walpole.

### *The Year Without a Summer*

The summer of 1816 was the coldest ever known in the northern part of the country. By those who lived at the time 1816 was called "the year without a summer," "the poverty year," or "eighteen hundred and froze to death."

Stories were handed down for generations about a spring so late, cold, and wet that seeds merely rotted in the ground. There were severe frosts every month in the year. At Keene, on June 6 and 7, snow fell to a depth of several inches and the frosts were very severe on August 20, 21, and 26. There was scarcely any rain for the 12 weeks ending September 14.

The corn crop was nearly a total loss everywhere. In this region no corn was raised except "pig corn" and most of that spoiled. "People were very much straitened for food to eat." Pigeons furnished most of their meat. Fodder was so scarce that many cattle had to be turned out of the barns the following January to live by browsing on trees, some of which were cut down to bring the twigs within reach.

In an adjoining town the ground froze very hard every night from June 5 to June 12. Everywhere in northern New England there were storms during June and July with a snowfall of two inches or more. The summer was also very cold in Europe where there was much rain in contrast to the dry weather in New England.

### *Extreme Seasons*

Some of the most extreme seasons of this period, with the exception of the year that had no summer, are included in this section.

The summer of 1857 was a cold one. The register of deeds recorded that April, May, and June were very cold and wet. There was a snowstorm on May 17. Every day from June 15 to 19 and again on July 1 it was so cold in his office that it was necessary to have a fire in the stove. On June 13 he wrote, "Some astronomers have predicted that we were to be wiped out this day by a comet, but it seems the comet can't come it."

The summer of 1877 was also cold. On June 22 there was a freeze so severe that "ice the thickness of window glass froze in pails of water left standing over night."

The winters of 1820-21, 1835-36, 1848-49, 1868-69, 1876-77, and 1884-85 were unusually cold. The winter of 1821-22, which followed a cold one, was notable because only 12 inches of snow fell during the entire winter.

Some very mild winters were those of 1825-26, 1847-48, 1875-76, and 1889-90.

There were late springs in 1803, 1820, 1834, 1843, 1850, 1876, 1884, and 1885.

### PART THREE

## Information From the Official Records, 1886-1966

### *Weather Stations in Keene*

The first official weather records in Keene were begun by Henry S. Mackintosh, at 42 Roxbury Street, January 1, 1886. These were records of temperature only.

In 1892 records both of temperature and precipitation and other data concerning the weather were begun by Samuel F. Wadsworth, at 29 Beaver Street, less than a quarter of a mile from the first location. His period of service as cooperative weather observer was notable for its length, 38 years, and his records for their detail and completeness. He made many summaries of importance.

He was succeeded by Robert P. Hayward who lived at "The Knoll," a name he gave to his home located on the Hurricane Road about three miles north of the city.

To adjust the averages of the data in the city to the rural condi-

tions at "The Knoll" Wadsworth and Hayward kept separate records, each in his own location, for three years, 1928, 1929, and 1930, and compared these data. They computed the adjustments that needed to be made in the averages of the Wadsworth records in order to establish a fair basis for comparison.

Hayward carried on his observations as long as his health permitted, a period of 13 years. He also made valuable tabulations of the records. While his health was failing he was assisted by Walter Barnard who copied the old records in a condensed form. His excellent copies are now preserved in a vault at the Keene National Bank.

In September 1940 the weather station was returned to a location within the city at 18 Beech Street and the records were kept by Charles F. Robbins for nearly four years.

In June 1944 Clifford E. Titcomb became the official weather observer and the station was moved a short distance to 43 Willow Street. He began the practice of supplying the *Keene Evening Sentinel* with monthly weather reports.

After serving a little more than four years Titcomb asked for a replacement and in December 1948 Merton T. Goodrich was appointed to the position. Again the station was moved only a short distance, this time to 36 Wyman Way, where the records are now being kept. The duration of this period of service is 18 years up to the present time.

The official records of precipitation at Keene have now been kept continuously for 75 years and the records of temperature for 81 years. During this long period, with the exception of the few years at "The Knoll," all the locations have been not more than half a mile from each other, in the same urban environment and at nearly the same elevation. Adjustments of the averages of records at "The Knoll" have been made to allow for the return to an urban area so that all the averages have a uniform basis.

The weather station at Keene is among the very few stations in the whole country which have such a long period of continuous records under such uniform conditions.

From data left by his predecessors and from his own, Goodrich has prepared more than a score of different tables and graphs concerning nearly all elements of the weather. He has instructed college students in the construction of these graphs and has exhibited some of them at the Public Library. For this voluntary work and the results he has been complimented by officials of the Weather Bureau. Using Goodrich's plans, a model of three dimensions has been made recently

under the direction of Arthur J. Giovannangeli, head of the Science Department of Keene State College. This model shows graphically the precipitation for each month of every year. Goodrich has also devised a method of making graphs of winter weather with a typewriter. This is described in the issue of December 1965 of the magazine *Weather-wise*.

## TEMPERATURE

### *Cold Waves and Cold Days*

In news stories any group of uncomfortably cold days is called a cold wave, but officially we may define the minimum temperature for a day as the lowest during the 24 hours, and a cold wave as five or more consecutive days with minimum temperatures zero or below. There have been 20 of these cold waves in Keene since 1886.

The two most severe cold waves came in a pair. For six days, from January 21 through January 26, 1961, the average of the minima was 20.2° below zero. Then came one day, January 27, with a minimum temperature five above. Immediately following this, for the seven days, January 28 through February 3, the average of the minima was 19.9° below. The average of the minima for the entire 14 days was 18.2° below zero. If we include the afternoon readings the average for the whole period was 0.8° below. This is the longest and most severe cold spell in the records.

The coldest official temperature in Keene is 32° below zero. This low record was made on two dates, January 5, 1904, and February 16, 1943. Twice, on January 28, 1935, and February 18, 1958, the thermometer has registered 31° below; and twice, on February 9, 1934, and January 18, 1957, it has registered 30° below.

The day with the coldest average temperature for the whole day was December 30, 1933, when the average temperature for the whole day was 17° below zero.

### *Frosts*

The first frosts in the fall occur at earlier dates outside the city limits than at the weather station. The average date of the first autumn frost at the weather station is September 18. Frosts have occurred in August in six years, 1908, 1912, 1925, 1934, 1940, and 1965.

The average date for the latest frost in the spring is May 24. There have been three times when frosts have occurred late in June.

They were June 21, 1918, June 21, 1927, and June 22, 1940. But each of these dates was preceded by a period of warm weather. In 69 of the 81 years of records the last freezing temperature in the spring has been felt before June 7.

### *Extreme Hot Days*

No temperatures as high as 98° were recorded in the first 15 years of the records. In 1901 the temperature rose to 98° twice. On July 7, 1908, and on May 22, 1911, it again reached 98°. In July 1911 a hot spell without parallel spread over all New England. It lasted 12 days, from July 1 through July 12, and at Keene seven of these days were hotter than 98°, and on one of them, July 3, 1911, the all-time high record of 104° was made. The maxima for these 12 days were: 91°, 95°, 104°, 103°, 103°, 101°, 88°, 91°, 99°, 102°, 99°, and 95°. Beginning in 1911, the official thermometers in Keene have registered 98° or higher on 33 dates.

### *Floods and Freshets*

Among the most damaging floods and freshets of recent years are these:

April 9-14, 1895. Old residents agreed that there had not been such a flood for 24 years. It was brought on by copious rain and melting snow. The water in the Fairfield reservoir escaped on April 9. By the night of the 14th Beaver Brook was higher by almost a





foot than anyone remembered, and the Ashuelot River had reached the old high water mark.

July 12-14, 1897. A downpour of 5.56 inches of rain in two days did great damage to crops.

February 13, 1900. Two inches of rain and large quantities of melting snow raised the level of the Ashuelot River more than 10 inches higher than at any time since 1869, overflowing meadows and roads.

April 12-13, 1933. High winds did as much damage as the high water, especially to electric power lines.

March and April 1936. It rained every day for two weeks, from March 9-22 inclusive. The rain took away all 12 inches of snow cover. In April rain fell in 11 of the first 16 days. The total rainfall in six weeks was 11.5 inches. All streets at low levels in the city were flooded. The river rose three feet and 250 persons were given shelter in the churches.

September 13-20, 1938. During the eight days preceding the Great Hurricane 6.12 inches of rain fell and all the lower area of the city was flooded.

The completion of Surry Mountain Dam and more recently Otter Brook Dam has prevented serious floods in Keene during the past score of years.

### *The Great Hurricane*

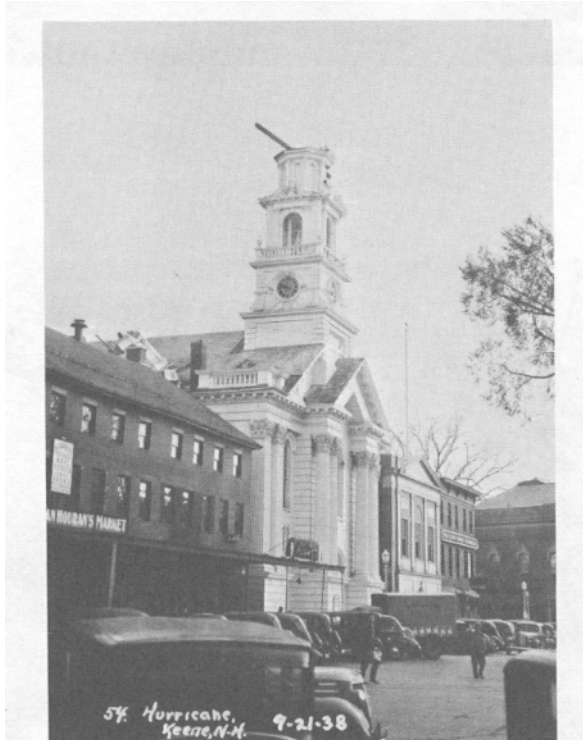
Keene was not hit severely by a hurricane during the 150 years between 1788 and 1938, but several passed by over southern and



southeastern New England. Then came the Great Hurricane of 1938.

This hurricane had followed the typical path of such storms along the Atlantic Coast and was headed away from the land north-eastward over the ocean, when, several hundred miles south of Long Island, its leading edge bumped against an area of high pressure which blocked its motion in that direction. At the same time, covering the Connecticut Valley was a large area of low pressure which had remained there for eight days. It had already dumped more than six inches of rain in Keene and raised the Ashuelot River to flood stage. Suddenly and unexpectedly, on September 21, the center of the storm swerved from its normal course. It rushed north toward this low pressure area, hit the coast near Narragansett Bay, and with terrific force roared directly up the Connecticut Valley.

Keene lay a little to the east of the path of the center, in the quadrant of these storms where the energy is greatest. In the city



*Steeple of First Congregational Church  
after 1938 hurricane*



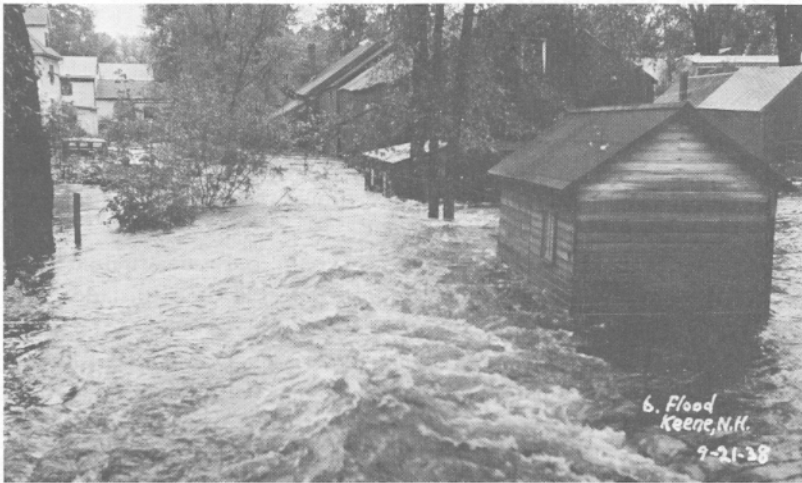
62. West St. Keene, N.H. 3-19-36



61. Hurricane, Keene, N.H. 9-21-35



The factors in the atmosphere which govern the amount of water that has been changed for a while by the great hurricanes in the past few years instead of hurricanes being a rarity in New England they were frequent and brought heavy rainfall to Keene. While they did very little damage in the region they caused much destruction



6. Flood  
Keene, N.H.  
9-21-28

From 1.40 inches of rain in about 12 minutes  
July 18-23, 1928. Heavy rain followed very dry for five

scores of elm trees, some of them more than four feet in diameter, were torn up by their roots, ripping up sidewalks and pavements as they fell. Chimneys were toppled, sides of buildings were pushed in, and some small garages and sheds were picked up and crushed. All the beautiful pines of Wheelock Park were tangled into a mass as if they were jackstraws. The soil, softened by the recent rains, could not hold down the roots of the trees. On many thousands of acres in the valley, the trees were uprooted and flattened like fresh mown hay.

For a long time the only contact Keene had with the outside world was by amateur radio. Although all electric lights and power were out of commission, the *Keene Evening Sentinel*, by hand labor, got out its regular edition the following day. During the storm a barometer at the Sentinel Building recorded a minimum low pressure of 28.45 inches. The men students at Keene Normal School, as it was then called, spent several days helping to clear fallen trees from the campus. For many weeks crews of linemen from as far west as Minnesota worked to repair the damage to electrical communications at a place they called "Keeney."

The factors in the atmosphere which govern the motion of storms seem to have been changed for a while by this great hurricane. In the next few years, instead of hurricanes being a rarity in New England, they were frequent and brought heavy rainfall to Keene. While they did very little damage in this region, they caused much destruction in southern New England.

### *Violent Local Storms*

Among the violent local storms in the official records are these:

July 8, 1915. The big cloudburst in Keene, 3.6 inches, the most ever recorded in one day, fell during a thunderstorm in the afternoon and much damage was done.

September 9, 1921. Keene had rain, hail, and a destructive wind while Croydon and vicinity were being devastated by a tornado.

Shortly before 5 P.M., July 22, 1926, a wind storm of terrific intensity passed through Keene, and within a space of 10 minutes caused property damage of many thousands of dollars, including \$10,000 to lines of the Keene Gas and Electric Company. About 125 trees were blown down.

August 24, 1933. A very severe thundershower with a down-pour of 1.40 inches of rain in about 15 minutes.

July 18-23, 1938. Heavy thundershowers every day for five

days, which deposited 3.72 inches of rain in this time.

There were a great many showers during June 1944. The worst, on June 16, did great damage to trees and power lines. On the 24th 2.02 inches of rain fell in one shower.

June 29, 1948. A very heavy thundershower flooded the streets with 1.17 inches of rain in a short time after 2 P.M.

### *The Great Drought*

The Great Drought in this region began with November 1962 and had not ended when this report was written in January 1967. Other droughts have lasted for a few months, but this drought has lasted more than four years. We compare only the four consecutive years from 1963 to 1966. The total precipitation for each year is respectively 31.15, 29.37, 30.54, and 31.07 inches. Based on normals computed for each year by combining the annual total with the total for the entire period of records, the deficiencies are 7.70, 9.36, 8.07, and 7.44 inches. The total deficiency is 32.57 inches and this is greater than the whole precipitation in any year of the four consecutive years. This is true whichever way the comparison is made. From the beginning of this drought to the present time, out of 51 months 42 have been dry. In the 75 years of records there is no situation comparable to this.

### *Normals*

The normals related to temperature are the averages of 81 years of records and those related to precipitation are the averages of 75 years of records.

Annual temperature, 45.7°.

Annual precipitation, including rain and melted snow, 38.5 inches.

Winter snowfall, 61.7 inches.

Length of growing season between freezing temperatures, the latest in spring and earliest in fall, 115 days.

Length of snow season between first and last snowstorms of one inch or more in a winter, 131 days.

Based on 36 years of records the number of degree days in a season between July 1 of one year and June 30 of the next, 7178 degree days.

### *Extremes for Years and Seasons*

Highest annual average temperature, 1949, 49.6°.

Similarly, the coldest year, 1904, 42.3°.

Year with greatest precipitation, 1951, 51.20 inches.

Similarly, the driest year, 1894, 27.12 inches.

Winter with greatest snowfall, 1915-16, 101.5 inches.

Winter with least snowfall, 1912-13, 27.2 inches.

Coldest winter (the combined averages of December, January, and February), 1917-18, 14.2°.

Similarly, the mildest winter, 1948-49, and 1952-53, tied for first place, 29.7°.

### *Other Extremes*

Month with least precipitation, March 1915, 0.04 inch.

Month with most rainfall, July 1915, 11.09 inches. It is surprising to note that both these extremes of precipitation occurred in the same year.

Greatest amount of snow in one storm fell on March 4-5, 1960, 21 inches.

### *Changes in Climate*

It has been proved by many scientists that changes in climate are constantly taking place. The records at Keene agree with this conclusion, and show definitely that when the records began in 1886 a cooling trend was taking place, that between 1905 and 1955 there was a very noticeable warming trend, and since 1955 a cooling trend has been going on.

By dividing the time into periods of five years each we find that between 1886 and 1905 the average temperature of the periods decreased by 1.1° from 45.4° to 44.3°. During the next 50 years the average temperature increased 3.7° and during the last 10 years it has decreased 2.2°. Using other methods of computation similar results are obtained and a comparison of other elements of climate, such as the length of the growing season, show corresponding changes.

These changes of climate may be likened to the waves of the ocean. The ripples on the surface correspond to the difference between consecutive years and often appear roughening the surface with very little system. But the ripples ride upon the small waves and these upon large waves, and all are borne along by the great swells which correspond to the fluctuations of periods of 50 years or more.