The drainage and glacial history of the Still River Valley, southwestern Connecticut

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ABSTRACT

THE DRAINAGE AND GLACIAL HISTORY OF THE STILL RIVER VALLEY, SOUTHWESTERN CONNECTICUT

BY

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The Still River is located in southwestern Connecticut. From its origin on the New York border, it passes through Danbury and flows northward to its junction with the Housatonic River in New Milford.

Interpretation of the Still River's history is based on its surficial geology and bedrock topography. High bedrock surfaces to the south, east, and west of the river show that its preglacial direction was probably to the north. The Still River has developed along the easily eroded Inwood Marble as a subsequent tributary to the Housatonic.

Pleistocene glaciation left a variety of deposits in the Still Valley. The oldest of these is the "lower" till, of either Illinoian or Altonian age. This till unit is overlain in turn by the Woodfordian "upper" till. The upper till has basal and ablation facies. Ice-contact deposits formed in the fringing stagnation zone of the last retreating ice sheet. As the glacier withdrew along the Still Valley, proglacial Lake Danbury was impounded against the highlands to the south. Glacial retreat opened progressively lower outlets for this lake. Its final stage was contained by a till (?) barrier at the Housatonic Gorge in New Milford. Filling of the lake by glacial outwash was soon followed by downcutting of the dam and establishment of the modern Housatonic and Still River channels.

PREFACE

The author gathered field data for this study in the summer of 1970, while employed by the U. S. Geological Survey as field assistant to Fred Pessl, Jr. This work was part of a cooperative program between the U.S.G.S. and the State of Connecticut. The program involves in part the mapping of the surficial geology of quadrangles in the western part of the state.

The writer wishes to thank Mr. Pessl for assistance in the field, and for providing advice and base maps for this report. The author is also indebted to Prof. W. P. Wagner for his help as faculty advisor and for reviewing this manuscript. Robert Melvin, of the Hartford branch of the U.S.G.S., supplied extremely useful bedrock contour and subsurface drilling data for the Still River Valley.

An abbreviated system of designating field localities is used here. An example is locality E-1-4. "E-1" means that it is found in the northeast ninth of the Danbury quadrangle (Plate I). One may proceed to this part of the map and find a circled "4" which indicates the locality mentioned in the text. Similarly, C-2-7 (no underlining) refers to locality "7" in the central ninth of the New Milford quadrangle, and E-2-3 is in the east central ninth of the Danbury quadrangle.

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INTRODUCTION

GEOGRAPHY AND GEOMORPHOLOGY

The Still River is located in southwestern Connecticut (Figure 1). Its headwaters are a series of small brooks, ponds, and reservoirs near the New York border. The main tributary, and the one that bears the river's name, originates west of Danbury at the village of Mill Plain. At this point it is separated by a very low divide from the drainage basin of the Croton River in New York. As the Still River flows through Danbury it remains a small stream. Its course has been modified by human activities in places, and it occasionally disappears under the city streets. Before leaving Danbury the Still is joined by a tributary that drains reservoirs and ponds to the northwest.

The Still River begins its predominantly northern course just east of Danbury, where it meets Limekiln and Sympaug Brooks entering from the south. The river flows north in a meandering path for the next 9.5 miles and joins the Housatonic River near Lanesville. In this reach the valley floor is unusually wide for the stream that occupies it (an average of half a mile). However it does narrow for about a mile in Brookfield and passes through a straight bedrock gorge. Being considerably wider and less populated than its beginnings in Danbury, the main Still River Valley is heavily

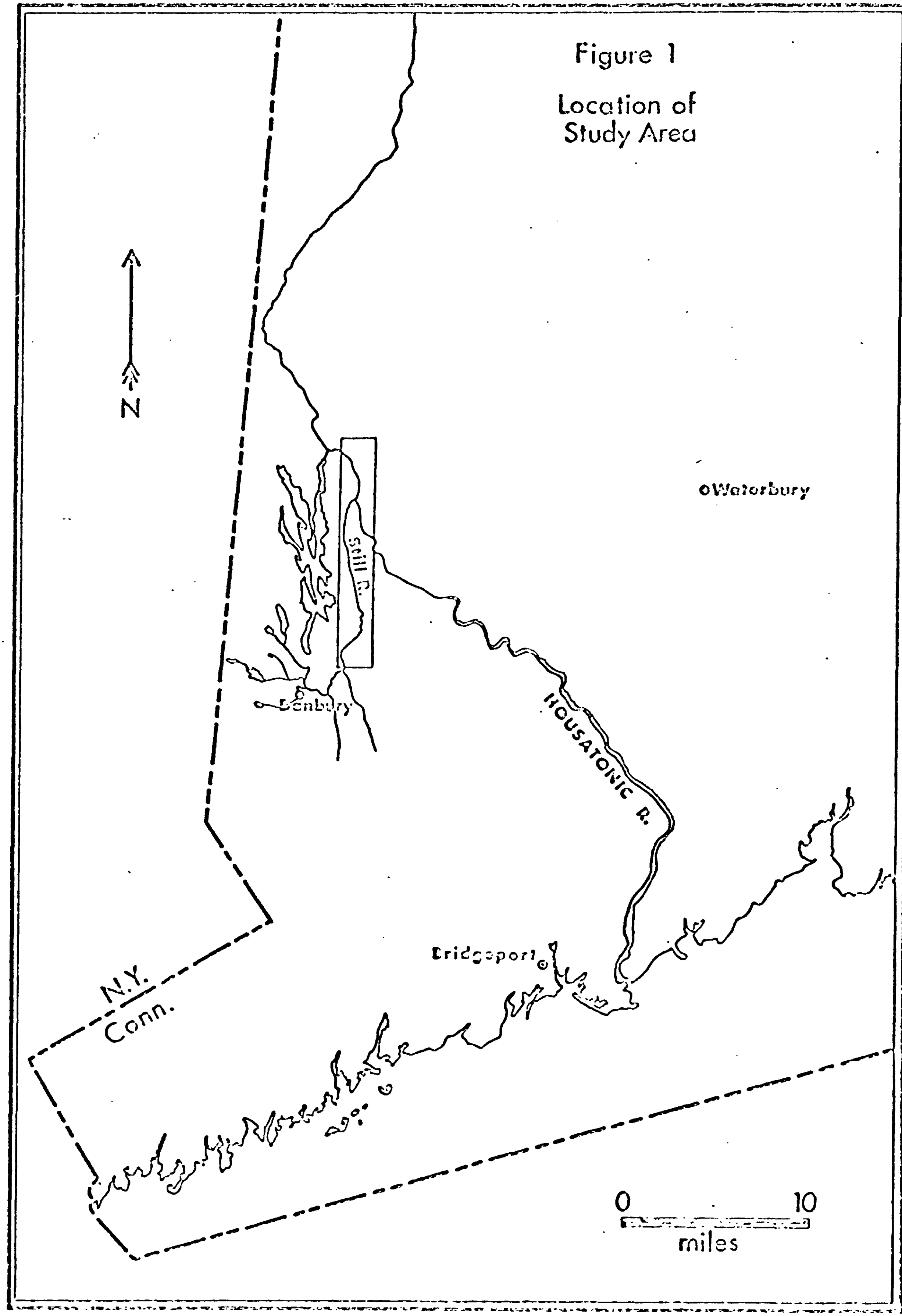


Figure 1
Location of Study Area
N
Still R.
Danbury
Waterbury
HOUSATONIC R.
Bridgeport
N.Y.
Conn.
0
10
miles

farmed. The flat valley floor abruptly meets the steep uplands on either side, resulting in a rectangular cross section. Maximum relief between the river and the adjacent ridge tops is 560 feet. Because the Still Valley is so closely confined by the uplands, the only tributaries north of Danbury are a few short brooks. The Still River drops 250 feet along its 23 mile path from Mill Plain to the Housatonic. Its average gradient is about 11 feet per mile, though there are long reaches that are much more gentle.

The drainage basin of the Still River is bounded on the east by that of the Housatonic. To the northwest lies the basin of the Rocky River. The river itself is practically nonexistent. It has been flooded along its entire length to form the Lake Candlewood Reservoir. The lake drains northward (as did the Rocky River) and enters the Housatonic via an aqueduct. The East Branch of the Croton River is also west of the Still and is tributary to the Hudson River. The Saugatuck River lies to the south. The Danbury lowland is connected to each of these drainage basins by a pronounced valley or gap. Their presence has led to much speculation about possible drainage changes in the area.

BEDROCK GEOLOGY

The bedrock geology of the Still River Valley has had much influence on the geomorphology and glaciation of the region. The river overlaps both the Danbury and New Milford

7.5 minute quadrangles, but only the former has been mapped in detail (Clarke, 1958). However, one may extrapolate Clarke's bedrock formations to the north and correlate his terminology with the old formation names that geologists have used in the New Milford area.

The formations along the Still River are Paleozoic except for the Precambrian Highlands west of Danbury. Nearly all of the river has developed its course on a marble belt which Clarke correlates with the Inwood Formation. The marble also underlies most of Limekiln and Sympaug Brooks. On either side of the Still Valley are more resistant rock types that Clarke has identified as the Manhattan Gneiss, Hartland Schist, Brookfield Plutonic Series, and a "younger granite."

From the amount of postglacial weathering it is evident that the surface of the Inwood Marble is more susceptible to decomposition than the other formations. In shallow excavations, one repeatedly encounters about a foot of sugary rottenstone that quickly grades into solid marble. The softness of the bedrock is responsible in part for the rectangular cross section of the Still River Valley. A combination of erosion and glacial scouring have removed large amounts of the marble across the full width of the valley, leaving the resistant ridges on either side. This also explains the anomalous width of the Still, Sympaug, and Limekiln Valleys.

The Inwood Formation may be dolomitic, calcitic, or both. It also contains variable amounts of tremolite, phlogopite, and other silicates, which are concentrated in layers (Clarke, 1958, p. 19). Such differences in mineralogy may account for the comparative resistance of the marble to erosion in a few places. One of the best exposures of the Inwood Formation is a glacially scoured knob west of Brookfield at C-1-1 (Figure 2).

GLACIAL DEPOSITS

The Pleistocene ice sheets have deposited a wide variety of glacial materials in the Still River Valley. However, the Wisconsinan ice advance(s) has removed older drift, except possibly the Illinoian deposits. Two varieties of till overlie the bedrock ridges, while the valley is filled mostly with water-laid glacial sediments. This heavy accumulation of fluvial materials is another factor that is responsible for the flatness of the valley floor. Farming is limited to the bottom sediments to such an extent that the forest margins commonly mark the till-stratified drift contact. In general the thickness of the till is greatest at intermediate elevations. Bare ledges occur on many hill tops, and till deposits are usually thin or absent on the valley bottom. Drumlins in the uplands to either side of the valley are exceptions and may be composed largely of till.

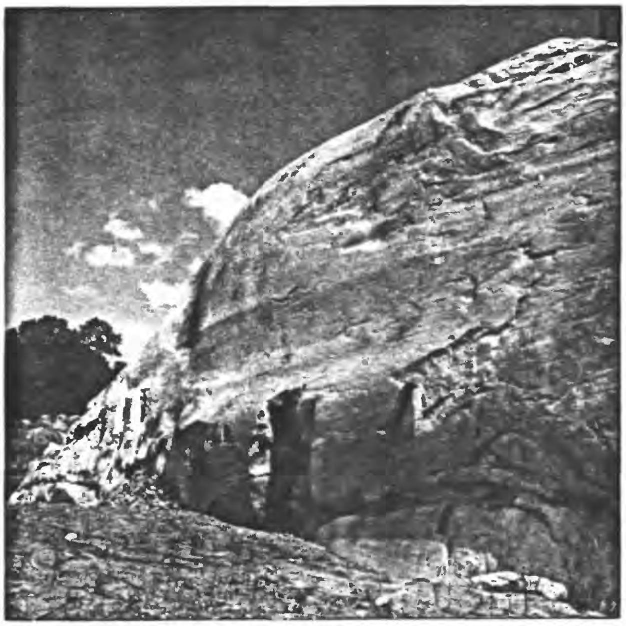


Figure 2. Glacially Scoured Outcrop of the Inwood Marble West of Brookfield at C-1-1

Figure 3. Basal Mixed Zone of the Upper Till at E-2-3 (the Dark Area on the Pit Face is Wet)

PURPOSE AND SCOPE

This study deals with two major problems associated with the Still River. The first is its drainage history. Was the preglacial course of the stream different than its present path? Several features imply that it may have been so. The river's gradient is very gentle, and its direction is opposite to the regional southward trend. There are also several nearby gaps (now dry) that look as if rivers may have formed them. The width of the Still Valley has led to suggestions that a larger stream such as the Housatonic must have carved it. Finally, one can infer minor drainage changes from the bedrock countours (Plate I).

The other problem discussed here is the glacial history of the Still Valley. The glacial lake sequence is of particular interest because lacustrine sediments occur along the whole length of the valley. Different outlets became available to the lake as the last ice front retreated. After locating these outlets, it was possible to infer the outline of the water body at each stage.

It was decided to limit the detailed field mapping for this project to the portion of the Still River Valley between Interstate Route 84 and New Milford. This includes all of the principal, north-south valley. The reach of the Still River in and west of Danbury is a small brook that has been modified by urban development. The area chosen for mapping gives abundant information on the cited problems, except for an early, high level stage of glacial Lake Danbury that is believed to have occupied the valleys of Sympaug and Limekiln Brooks. These tributaries should be mapped in the future so that they can be tied in more fully with the area discussed here. In a sense the present investigation is a progress report. When additional mapping is done in the vicinity of Bethel, the results can be integrated with this study to give a detailed history of the whole Still River drainage basin.

THEORETICAL FRAMEWORK

In interpreting the glacial history of the Still Valley it was helpful to make some working assumptions about the mode of till deposition, ice retreat, and isostatic rebound. These assumptions are based partly on the writer's field observations and partly on the geologic literature pertaining to southern New England.

There are two varieties of till in the Danbury-New Milford region, as there are in many other parts of New England. Pessl and Schafer (1968) have described similar tills in the nearby Naugatuck-Torrington area. They set forth cogent evidence for deposition of the tills by separate glaciations. The alternate view is that the two units represent the basal and ablation facies of a single ice advance. Evidence from the Still River Valley supports the theory of Pessl and Schafer, so it is accepted in this report as well. Further details concerning the two-till controversy and its application to the Still Valley are presented in the following chapter.

The configuration of an ice front during its retreat has much bearing on the kinds of glacial deposits that result. The waning ice margin in the Danbury region presumably had one of three possible forms:

1. a solid, active terminus, without an appreciable zone of stagnant ice to the south

2. a solid ice front, accompanied as it receded by a stagnation zone that was no wider than a few miles

3. no distinct terminus; regional stagnation accomplished by the thinning of ice over hundreds of square miles at a time

The first possibility is ruled out. One should not find abundant ice-contact deposits if there had been such an ice front. Instead there are many kames, kettles, and other ice-contact features that indicate the presence of stagnating ice. Flint (1957, p. 163) says that the high relief and fine-textured topography in New England may have produced a broad zone of glacial thinning. The difficulty is in determining the width of this stagnant ice margin. Field evidence in the Still River Valley favors the second of the above possibilities--a massive ice terminus behind a decaying ice zone of limited extent. It will be shown that such an ice front was necessary to produce some of the observed glacial lake features.

The amount of postglacial isostatic rebound is still another variable that is useful in reconstructing the history of the Still Valley. Because there is only one unequivocal glacial lake delta, and it is situated very close to that lake's outlet, it is not easy to determine a rebound figure. Therefore, the author accepts the estimate of Jahns and Willard (1942). From a study of glacial Lake Hitchcock deltas in the Connecticut River Valley of Massachusetts, they placed postglacial uplift at 4.2 feet per mile. It seems reasonable to accept an approximation of four feet per mile for the Danbury region as well. Scant field evidence (possible deltas) show that rebound may have deviated only slightly from this figure. It certainly was not the 15 feet per mile proposed by Hokans (1952) for the Still River area.

PREVIOUS WORK

Three previous workers have attempted to unravel the late Tertiary and Quaternary history of the Still Valley. The first was Hobbs (1901). He pointed out that the Still River flows contrary to the regional drainage pattern. Citing the unusual width of the valley, he believed that the Housatonic River must have carved it initially. His proposed outlet for the Housatonic was across either the present Still-Saugatuck or Still-Croton divide. A dam of glacial drift presumably forced the river to cut a new channel through a structurally weak part of the ridge east of Lanesville. The product of this downcutting was the present-day Housatonic Gorge. The Still River then developed as a consequent stream in the abandoned Housatonic channel.

In 1920 Harvey published a detailed field study of the geomorphology of the Still River and reconstructed its drainage and glacial history from her observations. She concluded that in an early preglacial stage the Still River occupied the now-vacant valley north of Lanesville and entered the Housatonic near New Milford. At this time the Still did not extend south more than a few miles. Instead the ancient Saugatuck River supposedly headed north of its present divide and drained most of the Still and Rocky River valleys. At some preglacial date the Still River captured the Rocky River and the headwaters of the Saugatuck (Sympaug Brook). The result was a combined Rocky-Still River that flowed south to Danbury and then north to New Milford. Glaciation then deposited a till barrier north of Danbury. This caused the Rocky River to double back to the north along its eastern tributary and overflow a divide into the Housatonic. Unfortunately, the Lake Candlewood reservoir has flooded the Rocky River area, but one can follow Harvey's reasoning on the old (1892) 15 minute Danbury quadrangle. She decided that the final effect of glaciation was to produce the modern Still River drainage, including a change in its outlet when glacial drift blocked the former entrance to the Housatonic.

Hokans (1952) was the next to consider the Still River controversy. He claimed that the Housatonic River formerly flowed down the Still Valley and across the present Still-Saugatuck divide. Although Harvey had hinted at the presence of a glacial lake in the area, Hokans defined it more clearly and named it Lake Danbury. He believed that during deglaciation a marine estuary extended up that portion of the modern Housatonic Valley that lies east of Brookfield. The final stage of Lake Danbury drained across Pumpkin Hill (east of Lanesville) and into the estuary. The drainage initiated the formation of the Housatonic Gorge with the result that the postglacial Housatonic River took a new path through the ridge. The abandoned valley then became the site of the Still River. Thus, Hokans' ideas were very similar to those of Hobbs.

Pessl recently mapped the surficial geology of the Newtown quadrangle, which is just east of the Danbury map area. He discovered the same tills that he and Schafer (1968) described near Waterbury. This in turn prompted the rewarding search for the two tills in the Still River basin. Both types are found there and coexist at several localities in the Danbury and New Milford quadrangles.

MEANS OF INVESTIGATION

The present author undertook field work in the summer of 1970 in an attempt to further resolve the history of the Still River Valley. This work was carried out under the employment of the U. S. Geological Survey. The sources of field information included the examination of topography, borrow pits, shovel and auger holes, and natural stream exposures. Air photos and subsurface drilling data (Melvin, 1970) were useful supplements to firsthand observations. Drainage changes along the Still River have been inferred from both surface topography and bedrock contours. Glacial striations and drumlin axes were used to indicate the direction of the latest ice advance, but it was more difficult to assess the hydrologic conditions that prevailed as the glacier retreated. To determine current directions and other parameters in glaciofluvial deposits, the author recorded features such as primary structures, grain size, and bedding attitudes. The great abundance of borrow pits in the Still Valley facilitated the examination of surficial materials.

Chapter 2

GLACIAL AND POSTGLACIAL DEPOSITS

TILL

Before reconstructing the history of the Still River Valley, it is appropriate to describe the glacial and postglacial deposits that occur there. They will be discussed in this chapter in their order of deposition.

The tills are the oldest of the surficial materials in the Still Valley. There are two principal varieties, which are henceforth referred to as the "lower till" and "upper till." Although it is not very common in the valley proper, excellent exposures of the lower till occur in many parts of the New Milford and Danbury quadrangles. They are usually located on drumlins. A typical lower till locality is C-2-2, on Beaver Brook Mountain. The usual color of the till is olive-gray to olive (5Y 5/2 - 4/2 - 4/3 according to the Munsell scheme) in the upper oxidized zone and gray (5Y 4/1-5/1) in the non-oxidized portion. The oxidized zone has a characteristic blockiness that results from sheet jointing (parallel to the land surface) and vertical jointing. Near the top of the lower till, dark-brown, rusty staining is very common on the joint faces. The oxidation zone is thick and often seen in outcrops. The till is silty and compact in both oxidation states and certainly deserves the name "hardpan." Although it may be very stony, the great majority of the clasts are no larger than pebbles.

The upper till is also stony, but the individual rock fragments often reach cobble and boulder sizes. Its matrix is coarse-grained and sandy, and it lacks the tightness of the lower till. Also, the upper till does not have either the jointing or the rusty staining. It is usually capped by up to a foot of eolian mantle that formed in early postglacial times. The wind-blown silt and some of the underlying till are affected by weathering and soil development. This gives them a deceptive yellowish color. The true color of unweathered upper till is gray to light-olive-gray (5Y 5/1 - 6/2). It sometimes has small lenses of sand and gravel or areas in which the till matrix itself is very sandy. These zones have a yellowish to brownish color.

Unlike the lower till, which always has the texture of a basal zone, the upper till has two facies. They are a compact, finer-grained basal facies and a loose, sandy ablation facies. Fragments of lower till may occur in either one. Upper till is common at high elevations along both sides of the Still River Valley. Figure 2 shows a typical example of a basal mixed zone at E-2-3. Since borrow pits in till are scarce, exposed two-till contacts are hard to find. One such contact was discovered in a stream bank near the Housatonic River (E-1-4).

The combination of compactness and small grain size has understandably led people to suggest that the lower till is a basal facies of the two-till association. However, several properties distinguish it as belonging to a separate and earlier glaciation. Pessl and Schafer (1968) pointed out that the deep oxidation zone in the lower till is probably due to a period of interglacial weathering. They found that iron staining is absent on the surfaces of oxidized lower till inclusions in the upper till. Therefore, the weathering that stained the lower till must have predated the upper till. Also, the joints in the lower till are often truncated along sharp erosional contacts with the upper unit. At some localities Pessl and Schafer have even found shear zones with large slabs of the old till included in the new till. White (1947, p. 757) has found two tills in northeastern Connecticut which are very similar to their counterparts in the southwestern part of the state. They have the same textures, oxidation states, and contact relationships. Like Pessl and Schafer, White attributed them to multiple glaciation. There is no evidence in the Danbury-New Milford area to contradict these findings, and this writer agrees that the lower till originated during an earlier glaciation. The presence in the study area of basal and ablation facies within the upper till lends further support to this idea. One would not expect all three of these physically distinct forms of till to have resulted from a single glaciation.

ICE-CONTACT DEPOSITS

Ice-contact stratified drift is abundant along the Still River. It is found mainly along the lower parts of the valley walls, at elevations below the till uplands and above the lacustrine deposits of the valley bottom. The ice-contact material has a coarse texture and contains large amounts of cobble and boulder gravel. These sediments were deposited by meltwater and slumping as stagnating portions of the last ice sheet melted back from the sides of the valley. Bedding in the gravels is slumped and irregular in thickness. Figure 4 shows a classic ice-contact gravel deposit on the west side of the Still Valley at C-3-5. Another example is the coarse sand and gravel accumulation that flanks a spectacular meltwater-abraded ledge of marble at C-1-1 (Figure 5). Slump folds are interlayered with undisturbed bedding in the sand at this locality (Figure 6). Although most commercial use of these deposits has been on the west side of the valley, much of the sand that is high on the east side is probably of ice-contact origin as well. Lack of exposure in this area creates difficulty in evaluating the later influence of lacustrine activity.

Special forms of ice-contact deposits along the Still River include kames, eskers, and crevasse fillings. The kames are isolated mounds of sand and gravel that project from the valley floor. Some of them appear to have formed in stable

Figure 4. Ice-Contact Boulder Gravel on the West Wall of the Still River Valley at C-3-5

Figure 5. Ice-Contact Sand and Gravel Banked against Meltwater-Abraded Marble at C-1-1

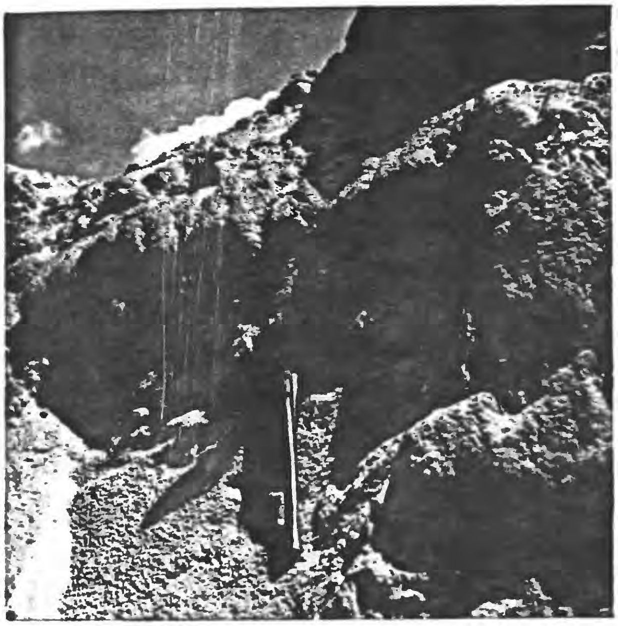


Figure 6. Slump Folds in Ice-Contact Sand at C-1-1

Figure 7. Cross Section of the Esker North of Lanesville at C-2-7

englacial streams because bedding in their cores is not deformed. In other cases there is no recognizable bedding. Kames without bedding probably formed by slumping of debris from adjacent ice masses. Kames of this kind are apt to contain boulder gravel that was emplaced more by gravity than by stream currents. An example of a well-bedded kame is the prominent knob of coarse sand at C-3-6.

Two major eskers are located in the center of the valley, north of Lanesville (Plate I). They stand out as topographic ridges of cobble and boulder gravel. A cross section of one esker is exposed in a gravel pit at C-2-7 (Figure 7). This esker formed along one of the feeder channels for the large glacial lake delta at Lanesville.

A few crevasse fillings occur along the sides of the Still River Valley. Unlike the eskers described above, they slope steeply down into the valley and trend perpendicular to it. The crevasse fillings are no longer than a few hundred feet and are similar in morphology to eskers. A typical ridge of this sort is just south of the kame at C-3-6.

LACUSTRINE DEPOSITS

Glaciolacustrine sediments are abundant throughout the Still Valley. They may include 100 feet or more of fine sand, silt, and clay beds that were deposited at varying distances from the retreating ice front. The majority of the lake sediments are thin to very thick beds of fine sand and silt.

They occupy the flat valley floor on which most of the Still River flows. There are few artificial exposures in these bottom sediments, but stream cuts, augering, and subsurface drilling data (Melvin, 1970) reveal their true character.

There are no faults or other secondary structures in the lacustrine deposits that would indicate later disturbance (e.g. by a glacial readvance). There are small slump features or load casts in places, but the beds are generally undisturbed. There are some very interesting primary structures in the sand and silt beds at the north end of the valley (C-2-8). They include current ripples (Figure 8) and cross-bedded dune forms of various sizes (Figures 9 and 10). It is surprising to see bed forms such as the large dunes in a lacustrine deposit. One continuous sequence of three dunes along a 35-foot long pit face are composed of very-coarse, cross-bedded sand, with an average height of two feet and wavelength of 10 to 12 feet.

The above features are useful for determining the current directions and roughly estimating the depth and velocity of the water. All structures indicate a strong current toward the southeast at this locality. The dunes in particular are more characteristic of a river than a lake. They appear to have formed in a fast moving water body that was no deeper than 10 or 20 feet. The structures are located near the top of a terrace that has resulted from dissection of the lake sediments by the Housatonic River. The

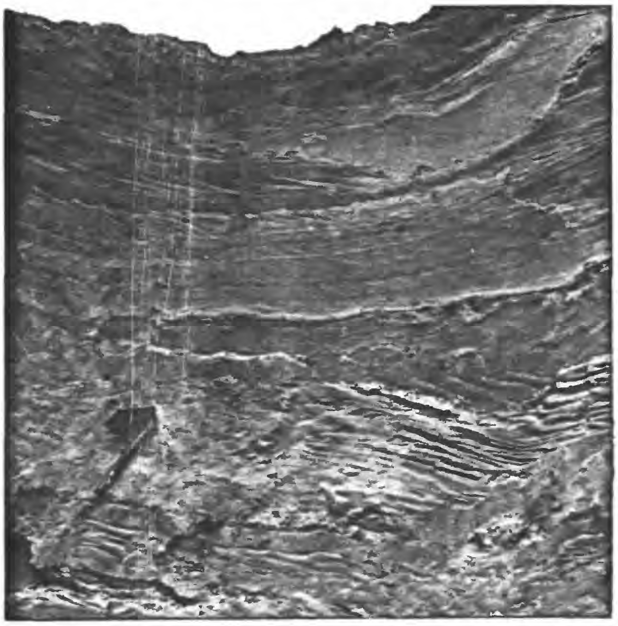
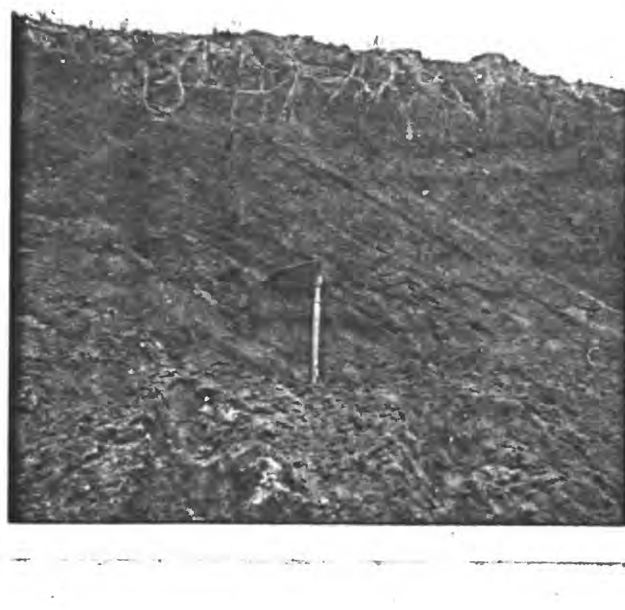


Figure 8. Current Ripples in Glaciolacustrine Sand Southwest of New Milford at C-2-8

Figure 9. Small Cross-Bedded Dune Structures in Glaciolacustrine Sand at C-2-8

Figure 10. Large Dune with Climbing Ripples in Sand at C-2-8

Figure 11. Foreset Bedding in the Lanesville Delta at C-3-10



terrace has a surface elevation of 250 feet and is capped by several feet of gravel (exposed in pits along the terrace margin). The outlet that controlled this lake was probably a drift barrier at the Housatonic Gorge and could not have reached an elevation much in excess of 250 feet. It is likely that when the dunes formed the lake was nearly filled with glacial sediment. Shoaling resulted in increased capacity of the meltwater to transport coarse debris and create the observed bedforms. The late-stage gravel followed a course near to that of the present day Housatonic River. In the valley southwest of C-2-8 there are no coarse sediments on top of the normal lacustrine deposits.

Melvin (1970) has compiled 18 test hole logs for the New Milford area. They show an interesting characteristic of the surficial deposits close to the Housatonic River in the reach between the Gorge and Boardman Bridge. All test holes penetrate lacustrine sand, silt, and clay. In 14 of the holes the lake sediments are overlain by 4 to 20 feet of gravel and sand. Near the junction of the Housatonic and Aspetuck Rivers (just upstream from New Milford), a typical test hole log shows 15 feet of gravel over 100 feet of layered silt, clay, and very fine sand. This difference in grain size indicates a drastic change in the regimen of the lake basin. According to the test hole data, these gravels are found at all elevations between 250 feet (the terrace mentioned above) and the present Housatonic level at 200 feet. The historical significance of these deposits will be discussed in Chapter 5.

The large delta at Lanesville is another important glacial lake feature in the Still River Valley. One can trace the distinct delta surface for about a mile along its northeast-southwest front. The topset surface lies between 290 and 300 feet, whereas the elevation of the topset-foreset contact is 285 ± 5 feet. Figure 11 shows foreset bedding in the delta at C-3-10. Bulldozing has destroyed the topsets at this locality. One test hole was drilled at C-3-11 in the delta bottomset beds. The log reveals 28 feet of clay over 26 feet of interlayered clay, silt, and sand.

POSTGLACIAL DEPOSITS

There are three principal types of inorganic postglacial deposits in the Still River Valley. They are weathered bedrock, eolian silt, and recent floodplain sediments. The Inwood Marble is very susceptible to weathering and erosion. In areas where surficial materials protect the marble from sheetwash, one finds varying thicknesses of clean carbonate sand. The rottenstone usually grades into solid marble at depths of about a foot. The much greater accumulations known from some test hole logs (Melvin, personal communication, 1970) are more likely the result of preglacial weathering. The neighboring rock formations have scarcely been affected.

There are some exceptions where the marble is unusually resistant to decay. At one locality it has even retained glacial striations. As mentioned before, differences in hardness can probably be attributed to variations in mineralogy.

The eolian mantle that blankets glacial deposits over most of New England is also present in the Still River Valley. It is yellowish-brown, loosely packed silt. The eolian sediment forms several inches of the soil horizon between the humus and weathered glacial drift. It was deposited in earliest postglacial times when a plant cover was not yet established.

Modern floodplain deposits do exist along the Still River, but they are not extensive. The Still is a small stream with a limited watershed, and it only floods the lowest areas that are very close to the river. The U.S.G.S. (Hartford branch) has prepared maps that outline the flood-prone parts of the Danbury and New Milford quadrangles. They show only a narrow, discontinuous strip along the river that is subject to the "50-year flood." Melvin's test hole data reveal some floodplain alluvium within these boundaries. There are commonly 5 to 10 feet of "dirty" river sands overlying glaciolacustrine deposits.

2. The Still River flowed southward until a glacial drift dam or ice scouring in its headwaters reversed it.

3. The Still River initially had a southward course through one of the divides near Danbury. A northward flowing tributary of the Housatonic then captured and reversed it at some preglacial date.

4. The Still River developed entirely by headward erosion to the south from its junction with the Housatonic. It has always flowed north.

Each of these theories will now be considered in light of present evidence.

One of the unusual characteristics of the Still Valley is its width. Hobbs attributed this to the former presence of a larger stream--probably the Housatonic. The present author prefers Harvey's conclusion. She pointed out that the valley's width is more a function of easily eroded bedrock than of stream size. This idea is convincing if one looks at Clarkes's map and the bedrock contours (Plate I). The valley is wide where it overlies the marble belt, though there are exceptions. Lithologic control is also evident along Sympaug and Limekiln Brooks, which are low topographic areas overlying the Inwood Formation.

Although the Still River Valley is not uniformly wide, neither is the valley of the Housatonic. The Housatonic Gorge is an example of how narrow the latter becomes in places. Therefore, more proof is necessary before one can say that

Chapter 3

PREGLACIAL HISTORY

PREGLACIAL DRAINAGE

The Still River's preglacial drainage pattern will be the first part of its history to be reviewed here. Interpreting the early history of the river is a speculative undertaking because the evidence is indirect and even intuitive in some cases. Nevertheless, one can use bedrock surface contours, topography, and other means to reach some conclusions.

Several characteristics of the Still River suggest that it may have had a different drainage pattern at one time. Among them are its very low gradient and northward direction (contrary to the regional trend). The low divides with adjacent river systems also indicate a possible drainage change. The theories of Hobbs, Harvey, and Hokans have already been mentioned. Hobbs and Hokans both thought that the Housatonic River occupied the Still Valley until early postglacial times. Harvey claimed that the Housatonic always followed its present course through the Gorge. She examined the topography of the area in great detail and made some astute observations. Harvey offered four possible explanations for the Still River's northward drainage:

1. The Housatonic used to occupy the Still Valley, and a dam of glacial drift south of Bethel diverted it to the east. The Still River then developed north of the dam.

the Housatonic River never occupied the Still Valley. The topographic and bedrock contours are important to the solution of this problem. The elevation of the Still's mouth is only 180 feet. The Saugatuck and Croton divides are at about 405 feet and 460 feet, respectively. A similar relationship exists on the bedrock surface. Its elevation is also 180 feet where the Still River enters the Housatonic. There is bedrock to nearly 400 feet at the Saugatuck divide, and there is closure on the 400-foot contour just west of Danbury. Unless there has been a tremendous amount of glacial overdeepening along the marble belt, it is unlikely that the Housatonic River ever passed through Danbury.

The above argument also casts doubt on the theory that glaciation reversed the Still River from a southerly course. The high bedrock surface around Danbury would have prevented the Still from escaping to the south or west just before glaciation. It is equally doubtful that it took an eastward course across the high divide with Pond Brook. The available evidence favors preglacial drainage to the north.

However, the bedrock contours do show that glaciation removed vast quantities of marble from the Still River region. Instead of being a continuous, evenly sloping trough from Danbury to Lanesville, the surface of the Inwood Formation is a series of alternating rises and depressions (Plate I). The bedrock high at Brookfield is the most prominent example in the main valley. In this area marble outcrops at elevations ranging from river level (240-265 feet) to 320 feet. To the south, between Brookfield and Danbury, the rock surface has several closed basins at elevations of under 200 feet. The author believes that they are the consequence of glacial scouring. Their formation probably required at least 50 feet of local overdeepening. Perhaps this figure approaches 100 feet at the city of Danbury. In postulating a southward preglacial drainage for the Still River Valley, Hokans had to explain the present-day elevation of the Saugatuck divide (which he called a preglacial channel of the Housatonic River). He invoked glacial scouring near Danbury. As explained above, this process alone was not enough. Hokans also claimed that uneven isostatic rebound failed to return the Danbury area to its original elevation. However this theory is unsubstantiated.

Assuming that the Still River flowed northward just before glaciation, it is still necessary to decide if this had always been its direction. Harvey (p. 40) believed that the southern part of the Still was a tributary of the Saugatuck River in the earliest part of its history. She found some bedrock terraces near the present Still-Saugatuck divide that may have been the site of the channel. In this case, the lower part of the Still captured the tributary by headward erosion. Her conjecture is reasonable but difficult to prove. The alternate possibility is that the Still River originated as a small tributary of the Housatonic near

Lanesville. Then it lengthened its course toward Danbury, but without stream capture. In either event the river is a subsequent stream upon the marble belt.

The bedrock contours disclose minor changes that have occurred in the Still River drainage as a result of glaciation. There is a topographic extension of the Still Valley southwest of New Milford that is now occupied by a couple of small brooks. Harvey speculated that the preglacial Still River flowed through this area, but the bedrock contours suggest a different interpretation. There were formerly two streams that originated in the valley, like their modern counterparts. One was tributary to the Still River, while the other flowed north to the Housatonic. Glaciofluvial deposits choked these streams, but the erosion process has started anew in slightly different locations. Another drainage change may have taken place at Brookfield. Both the surface and bedrock topography look as if the preglacial Still River occupied the long ravine west of the bedrock high. A large accumulation of ice-contact gravel now blocks this channel.

In summary the present author believes that the Still River flowed to the north in preglacial times as it does today. The age of the river is uncertain, and it may have had a different course long before the Pleistocene epoch. The current topography and bedrock contours are a reflection of the most probable drainage pattern at the start of glaciation.

HOUSATONIC GORGE PROBLEM

Understanding the origin of the Housatonic Gorge is prerequisite to considering the glaciation of the Danbury-New Milford area. Its origin is a controversial subject, as the Gorge had important effects on the glacial histories of both the Housatonic and Still Valleys. The Gorge is located northeast of Lanesville and immediately south of where the Still River enters the Housatonic. It is cut into resistant schist and has nearly vertical bedrock walls. The topography sharply contrasts with the broad valley to the north. Harvey did not comment on the Gorge, but Hobbs and Hokans supposed that it was of early postglacial origin.

The writer doubts that the Housatonic Gorge is a postglacial landform. The Gorge has several features that support a preglacial age. For one thing, the chasm is unusually deep to have been carved after the ice receded. Its depth in bedrock ranges from 80 feet at the entrance to 140 feet at the south end. The durability of the rock makes this much postglacial erosion unlikely. It is possible that the river follows a fault zone as Hobbs suggested, but preglacial erosion would have also taken advantage of a structural weakness.

High on the sides of the Gorge are large, flat ledges where the metamorphic rock has split along foliation planes. These outcrops are exposed such that currents should have abraded them if the Gorge was cut by ponded meltwater.

Instead there is no sign of fluvial action. The rock surface looks as if it has been freshly glaciated, although no striations have been found.

One stage of glacial Lake Danbury is believed to have drained across the north end of Pumpkin Hill into the Housatonic Gorge. An outlet channel slopes down to an embayment in the west wall of the Gorge. The sides of the Gorge present a smooth plan except for this indentation. The bay is probably a plunge pool that formed where the lake water from the Still Valley spilled over from the outlet. The site of the waterfall is now a mass of jumbled bedrock blocks with a lower slope than the rest of the Gorge wall. Assuming that the embayment is a plunge pool, it follows that the Gorge had to be there for it to form in the first place. The lower end of the Gorge cannot be postglacial unless it developed "overnight."

It was demonstrated in the previous section that the Housatonic River probably did not occupy the Still Valley in preglacial times. If this theory is accepted, then the river must have gone through the Gorge as it does today. Admittedly, this line of evidence (like the others) is based on some intuition as well as fact. It is also true that the chasm could not be entirely pre-Pleistocene, for the ice sheets must have altered the Gorge somewhat.

Chapter 4

GLACIATION OF THE STILL RIVER VALLEY

Although the Danbury-New Milford area was undoubtedly covered by the pre-Wisconsinan ice sheets, only the "upper" and "lower" tills remain. The physical properties of these deposits have already been outlined. This chapter deals with the historical significance of the tills and associated ice-contact deposits.

The lower till is the oldest surviving glacial deposit in the valley. Its exact age is still unknown. The deep oxidation zone and the nature of the two-till contact imply that it belongs to an earlier glaciation than the upper till. Schafer and Hartshorn (1965, p. 119) thought that the lower till might be Altonian, but they did not have any proof. It could just as likely be Illinoian. There are currently no radiometric dates on lower till from the Danbury area or elsewhere in New England.

Aside from the deep oxidation, there is no record of the interglacial period that presumably occurred after deposition of the lower till. Nor is there any proof of how long it lasted. The next documented event in the Still River area was the Woodfordian glaciation and emplacement of the upper till. Bedrock striations and drumlin axes indicate a consistant ice advance direction of 155 to 175 degrees. The drumlins east and west of the valley trend from 155 to 160 degrees. The striations near the river have more southerly directions that probably reflect topographic control.

The ice sheet that deposited the upper till also removed earlier deposits in places. For example, the upper till directly overlies bedrock at E-2-3. There are included fragments of lower till, but the latter is no longer present as a discrete layer. In other places (such as E-1-4) the two tills coexist. Whether the old till survived subsequent glaciation at any given locality must depend on several variables. They include weathering, physical state of the till (texture, moisture content, and composition), topographic location, and nature of the overriding ice.

The basal facies of the upper till is the older of the two. It was emplaced at the bottom of the last Wisconsinan ice sheet. Because of its origin the basal facies is usually more compact and finer-grained than the ablation facies. Inclusions of the lower till are especially common, as at C-1-12. As the glacier began to recede, the ablation facies formed over the basal zone. A typical locality with loose, sandy, bouldery upper till can be seen on the side of a drumlin at E-2-13.

The two upper till facies were probably time-transgressive. Stagnation deposits could have been forming on the glacier surface while lodgement till was still being deposited at depth. Then, as the active ice margin gave way to the stagnation zone, the ablation facies could have continued to develop without the formation of any new basal till.

The age of the upper till in the Still River area is not known with certainty, but one can make a closer approximation than with the lower till. The upper till must have been emplaced during the last glaciation in southern New England. Schafer and Hartshorn (1965, p. 120) placed the beginning of this event at about 20,000 years B.P. The same authors gave 13,000 years B.P. as the time of the readvance near Middletown, but it would not have reached the Danbury-New Milford region. This means that the upper till in the study area must have been emplaced between these two dates.

As the last ice sheet melted back from the Still River Valley, ice-contact stratified drift accumulated in and around the glacier. These coarse sands and gravels were deposited by meltwater currents and slumping. They were either banked against the valley walls or formed eskers, crevasse fillings, and kames. The vigorous fluvial activity removed much of the pre-existing till from the valley floor. Test hole records (Melvin, 1970) show till at only a few localities. At the surface one commonly finds ice-contact sediments overlying waterworn bedrock. A prime example is the marble ledge at C-1-1 (Figure 2).

The retreating ice front and stagnation zone were replaced in turn by proglacial Lake Danbury. The only major pause in the ice recession seems to have been just north of Lanesville. During this pause, the Lanesville delta built out into Lake Danbury.

There is no classical valley train (Flint, 1957, p. 139) along the Still River. The sediments that washed out of the glacial ice could not travel in the manner required to form an outwash plain. Instead, they encountered the proglacial lake, and the coarse debris immediately settled out as irregular mounds on the lake bottom. The silt, clay, and fine sand travelled varying distances and became part of the normal lacustrine deposits. The history of Lake Danbury is described in the following chapter.

Chapter 5

GLACIAL LAKE DANBURY

INTRODUCTION

During the withdrawal of the last ice sheet from the Still River basin, meltwater was ponded between the ice front and the highlands to the south, east, and west. There were several successively lower lake levels as the disappearance of the ice opened different outlets. The stages go under the collective name of Lake Danbury (Hokans, 1952). The locations of possible outlets depend in part on the assumed amount of postglacial rebound. Hokans gave a rebound estimate of 15 feet per mile. In this writer's opinion, his isobase map of southwestern Connecticut is based on insufficient and (in the Still Valley) misinterpreted data. For example, there is no evidence that the delta near Lanesville is a marine estuary deposit. According to Hokans it fits into a Housatonic estuary delta profile. However, his profile is based on very few plots and changes slope at two points. As mentioned in Chapter 1, the rebound estimate of four feet per mile is used here. Since this assumption results in a new definition of the glacial lake stages, the present author uses a different nomenclature for them. From oldest to youngest, the Lake Danbury levels described here are the Saugatuck, Pond Brook, Pumpkin Hill, and Housatonic stages. The first three are at the same elevations as Hokans' Bethel, Brookfield, and final Lanesville stages.

SAUGATUCK STAGE

When the ice was just beginning its recession from the Danbury area, the meltwater backed up against the Still-Saugatuck divide to form the high level Saugatuck stage of Lake Danbury. The divide is a narrow ravine at an elevation of about 405 feet and is flanked by bedrock hills. The lake drained southward through this outlet and into the Saugatuck River basin.

The outline of the Saugatuck stage must have been complex because of the hilly, finely-textured topography. This landscape has resulted from the many knobs of bedrock and ice-contact deposits. Two main arms of the lake probably existed on either side of the ridge north of Bethel. They would have occupied the valleys of Sympaug and Limekiln Brooks. If this was the case, the latter arm constituted a higher level in itself and drained into the Sympaug portion. There is a minor divide at 415 feet in Bethel that caused this to happen. This divide was apparently as high as 450 feet in the earliest phase of the Saugatuck stage. The topography (Plate I) and preliminary field work reveal prominent kame terraces and/or deltas east of Limekiln Brook. They were graded to an average present elevation of 450 feet.

In the same part of the township of Bethel at locality E-3-15, Pawloski (1967, p. 664) discovered a marl bog which he believed to have formed in the bay of a glacial lake whose surface also stood at 450 feet. The topographic location of the bog does lend credibility to a shallow glaciolacustrine origin. The fossils at this site include 28 species of Pleistocene invertebrate shells, along with the remains of various plants and insects. Cooper (1930, p. 238-259) described a similar faunal assemblage from a bog at Park Lane (north of New Milford). Although the latter bog is undoubtedly a pond deposit, Pawloski's claim that both bogs formed in the same lake is highly improbable.

It is an interesting fact that three of the shell species which are common to both marl localities are among the five significant mollusks that Taylor (1965, p. 604) lists as typifying an early Wisconsinan climate. They are the pelecypod Pisidium ferrugineum and the gastropods Valvata tricarinata and Lymnaea stagnalis appressa. Taylor's study was based on fossil assemblages from southwestern Kansas and northwestern Oklahoma. It is inadvisable to attempt a correlation of climate indicators between Connecticut and the High Plains. This is especially true because Cooper noted that most of the New Milford species still live in Connecticut ponds. Nevertheless, the possibility remains that the mollusks in the Bethel marl lived in a proglacial lake.

As the higher, eastern arm of the Saugatuck stage drained into the Sympaug branch of the lake, it cut down the divide at Bethel. By the end of the stage the divide stood at about its present elevation of 415 feet. The two portions of Lake Danbury were then nearly at the same level.

In the flat, swampy area southwest of Danbury there may have been another small proglacial lake that was contemporaneous with the Saugatuck stage. Initially it would have drained westward across the Still-Croton divide. As soon as the ice front retreated to Danbury it could have drained eastward into the other lake. The history of these early lakes currently involves much conjecture because the exact configuration of the ice front is not known.

POND BROOK STAGE

By the time the ice front started to withdraw up the main Still River Valley (north of Route 84) the first stage of Lake Danbury was well established at the elevation of the Saugatuck outlet. This state of affairs could not have lasted for long. When the solid part of the glacier terminus reached a point only three miles north of Danbury, a new lake outlet became available on the east side of the valley. This was the low divide between the Still River and Pond Brook. The current elevation of the outlet is 375 feet. At the time of deglaciation it would have been even lower relative to the Saugatuck divide. During this stage of Lake Danbury the meltwater from the outlet followed the path of Pond Brook and entered the Housatonic just above its junction with the Shepaug River. The outlet channel drops 200 feet along the last four miles of its course. The size of the modern Pond Brook valley suggests a torrential flow of meltwater with great erosive power. The valley seems much too deep for the small brook that now occupies it.

The sediments of the Pond Brook stage are evident on the floor of the Still Valley. They are at elevations which are too high for later stages of the lake. South of Brookfield, at E-1-14, lacustrine silt beds are exposed in a cut along the Still River. Test holes for this area commonly show well over 20 feet of silt and clay. There are also substantial amounts of sand that washed into the lake from the ice front and valley walls. There is a peculiar deposit west of the outlet that may likewise date from this stage. It is a large conical hill of fine white sand. It looks very much like a lacustrine deposit, but it is too high and isolated to correlate with any other lake sediments in the area. The hill is more apt to be an exceptionally large kame that formed in a pool in the ice. Borrow pit operations have apparently removed any ice-contact structures that were present along the hillside.

According to Hokans, Lake Danbury found its next outlet between the long drumlins east of Brookfield. The lake water presumably followed the channel of what is now Hop Brook. If one assumes a rebound of 15 feet per mile for the three miles between here and the previous outlet, then Hokans' theory is plausible. However, that much rebound is excessive, and there is no field evidence for the outlet. Hop Brook is simply a small stream whose northward flowing reach has had its gradient diminished by rebound.

PUMPKIN HILL STAGE

Lake Danbury maintained the Pond Brook level while the glacier front pulled back seven miles to the vicinity of Lanesville. Until it reached this point, the hills on either side of the Still Valley prevented the lake water from escaping through new outlets. Then, as the ice receded from the north end of Pumpkin Hill, the lake was able to drain at a lower level over the ridge and into the Housatonic River. The outlet appears to have become temporarily fixed at 295 feet. A pronounced topographic outlet channel exists at this elevation (Plate I) and marks the Pumpkin Hill Stage of Lake Danbury.

The Lanesville delta is additional proof that the Pumpkin Hill stage was not short-lived. The southwestern end of the delta shows the influence of stagnant ice blocks. There are large boulders and slumped gravel beds along with the deltaic sand. The New Milford 7.5 minute quadrangle shows kettle holes, but excavations have since destroyed their original form. In spite of these signs of stagnant ice, the portion of the ice front that was up against the north end of Pumpkin Hill must have been solid. Otherwise the lake could have easily spilled around the tip of the ridge at a lower elevation.

The sediments of the Pumpkin Hill stage were deposited in the flat valley bottom south of Lanesville. Test hole data are scarce, but the U.S.G.S. log from the delta bottomset beds (C-3-11) shows 28 feet of clay over clay, silt, and fine sand.

Taking postglacial rebound into consideration, the level of the Pumpkin Hill stage at Brookfield would have a present day elevation between 275 and 280 feet. However, the current elevation of the Still River is 260 feet at that point. The 270 and 280-foot contours are also close to the river because of the bedrock high at Brookfield. Allowing for a few feet of postglacial erosion along the river, the main body of Lake Danbury had its southern limit about a half mile north of Brookfield during the Pumpkin Hill stage. Thus, the southern half of the Still Valley was free of the lake at this time. The upper reach of the modern Still River came into existence and flowed northward into Lake Danbury. The incipient river started to cut into the exposed lake bottom sediments of the Pond Brook stage. The low terraces on the east side of the valley and north of the Pond Brook outlet are probably remnants of the lake floor.

HOUSATONIC STAGE

The ice margin only had to withdraw a fraction of a mile to allow Lake Danbury to empty directly into the channel of the Housatonic River. When this happened, the lake did not disappear as one would expect from the present topography. The abundant lacustrine sediments near New Milford are evidence of a low-level lake. They indicate that the elevation of its outlet was at least 250 feet. The logical site for this outlet is the Housatonic Gorge, but the maximum elevation of its floor is currently 180 feet. So there must have been some kind of dam at the Gorge that held back the Housatonic Stage of Lake Danbury. The most likely materials for such an obstruction are a bedrock sill, an ice plug, a drift barrier, or a mixture of ice and drift. The vertical portions of the Gorge walls reach an elevation of 250 feet, and the dam also had to attain at least this elevation. It is possible that bedrock contained the lake, but extensive postglacial erosion in the Gorge has been shown to be unlikely. It is more probable that a glacial drift barrier choked the Gorge. Ice alone would have been too easily eroded by the outrushing lake water. However, there may have been a mixture of both ice and till. The constricting influence of the Gorge could have caused the lodgement of much glacial debris at this locality. Blocks of bedrock that the ice had plucked from the Gorge walls could have also been part of the damming material.

Lacustrine deposits of the Housatonic stage are evident in the northward extension of the Still Valley. The valley floor contains abundant clay, silt, and fine sand. The average surface elevation of the deposits is 250 feet. Across the river from New Milford, the Housatonic has cut into these lake sediments to form a terrace. The fluvial structures in this terrace were described in Chapter 2. They imply that the lake was shoaling in the last part of its history. It was filled with sediment to nearly the level of the spillway and became more of a broad river than a lake.

As mentioned in Chapter 2, gravel deposits overlie the lacustrine sediments close to the Housatonic River between New Milford and the Gorge. These gravels occur at elevations varying from river level to 250 feet. The writer believes that they were deposited during the development of the postglacial Housatonic River. The highest gravel (capping the lake terrace) formed when Lake Danbury shoaled. Then as erosion lowered the outlet at the Housatonic Gorge, a clear-cut stream channel began to take shape. Removal of the barrier at the Gorge shifted and lowered the Housatonic into its present course on the east side of the valley. This apparently happened before the ice front had retreated far to the north because the river simultaneously deposited coarse alluvium that washed down from the ice front. The final result was a sheet of sand and gravel over those lake deposits that are near the Housatonic.

While the postglacial Housatonic River was in its formative stage, a last remnant of Lake Danbury probably existed in the low area south of Lanesville. It could have persisted after outwash sediments filled in much of the lake north of the Lanesville delta. As soon as erosion eliminated the dam at the gorge, Lake Danbury became totally extinct. At the same time the Still River extended northward and assumed it present length.

Chapter 6

POSTGLACIAL HISTORY

Postglacial deposits began to form in the Still River area immediately after the Wisconsinan ice vacated the valley. These deposits include eolian silt, floodplain sediments, and decayed bedrock (mostly marble).

In a regional sense, much of the eolian silt was contemporaneous with deglaciation, along with proglacial Lake Danbury. However, it is grouped here with postglacial deposits because eolian deposition probably persisted in the area after deglaciation. This was the case in larger New England river valleys, such as the Merrimack in New Hampshre. The many dunes in the latter area were derived from extensive lacustrine deposits under the influence of westerly winds (Stone, personal communication, 1971). On the other hand, no dunes have been discovered in the Danbury-New Milford area, and the eolian mantle itself is seldom thicker than a few inches. The absence of dunes may be due to the rapid establishment of a plant cover. It is more likely due to a small source area and the sheltering effect of the north-south ridges on either side of the Still Valley. The thin wind-blown deposits that do cover the valleys and uplands near Danbury probably came from the erosion of till as well as fluvial materials.

Postglacial fluvial deposition in the Still River area has taken place primarily along the floodplains. This process continues in modern times, though on an infrequent basis. The

Housatonic River has carved into the glaciolacustrine sediments south of New Milford and developed its floodplain at the base of the resultant terrace. The Still River also has a floodplain, but it does not extend the full width of the valley. The present day Still River is not a vigorous agent of geomorphic change. It is eroding through bedrock in some reaches, but is generally a small, sluggish stream. It has developed intricate meanders along most of its course. Two factors are responsible for the incompetence of the Still River. Glacial deposits (known from test holes) have choked the valley, and isostatic rebound is offsetting the northward stream gradient. Damming of the Housatonic has raised the Still's base level and further impeded its tendency to erode.

Postglacial weathering in the Still Valley is most noticeable on the surface of the Inwood Marble. As mentioned earlier, the upper foot of this formation has decomposed to form a layer of sugary sand (Figure 12). Greater erosion of the marble has occurred in some places and formed a yard or more of rottenstone. Today one can see many fragments of marble in the overlying till. They are so weathered that they crumble on touch.

Recent dissolution of carbonate sand in the New Milford lacustrine terrace is producing another unusual phenomenon. The dissolved carbonate at C-2-8 is migrating laterally through the sand as a result of groundwater flow. There is apparently an upward component to this movement. The carbonate easily permeates the sand layers, but it forms a limestone precipitate when it reaches one of the more impervious silt beds. These concretionary layers average one inch in thickness and extend laterally for several tens of feet. They are so abundant that they are spaced every few inches throughout the exposed 20-foot vertical section of lake sediments. This is evidence that a great amount of fine-grained marble sand was originally incorporated into the glaciolacustrine sediments.

Figure 12. Exposure of Postglacially Weathered Rottenstone Marble in the Still River Valley

Chapter 7

SUMMARY

The Still River is located in southwestern Connecticut. Starting as a small brook on the New York border, it widens as it flows northward along the broad valley between Danbury and New Milford. The Still lowland has developed on easily eroded marble and is flanked by resistant ridges of schist and gneiss. Erosion of the bedrock and filling by abundant glacial deposits are responsible for the valley's rectangular cross section. Its northward direction also distinguishes the Still River from other nearby streams.

The present writer carried out field work in 1970 in an attempt to unravel the drainage and glacial history of the Still River. Detailed mapping for this study was limited to the part of the valley between Interstate Route 84 and New Milford. Subsurface drilling data, air photo interpretation, and a bedrock contour map were useful supplements to field data. Some fairly well-proven assumptions were used in the interpretation of the above information. The author decided that a multiple glaciation theory best explained the two tills. During the final glacial retreat, there was presumably a solid ice front with a fringing zone of stagnant ice. Postglacial rebound has probably not exceeded four or five feet per mile.

The Still River's gradient, direction, and relation to neighboring waterways are signs that it may have had a different preglacial course. Minor drainage changes are implied by the bedrock contours. Earlier investigators who studied the surficial geology of the Still Valley were Hobbs (1901), Harvey (1920), and Hokans (1952). Both Hobbs and Hokans concluded that the Housatonic River flowed through the valley in preglacial times. Harvey disagreed and claimed that the Still River has always occupied its valley, though its headwaters may have originally belonged to the Saugatuck River. All of the current evidence implies that the preglacial Still River flowed northward as it does today. Even when glacial overdeepening of the valley is considered, the bedrock surface is too high for a preglacial outlet to the south, east, or west. Examination of the Housatonic Gorge (near Lanesville) revealed that it too was a preglacial landform. This is further evidence that the Housatonic River did not occupy the Still Valley at the start of the glaciation.

The Still River's glacial history is also of interest. Two tills occur in the valley. They are the same two tills that Pessl found in 1968 while mapping in the nearby Newtown quadrangle. A wide variety of other glacial and postglacial deposits occur in the study area. They include ice-contact stratified drift, lacustrine sediments, decayed bedrock, eolian silt, and floodplain material. Ice-contact sands and gravels abound along the valley and have several forms. They may be banked against the valley wall or occur as kames, eskers, and crevasse fillings. Glacial lake sediments are also common along the whole length of the valley and are best exposed in a terrace near New Milford. The decayed rottenstone marble stands out as the most unique feature of recent origin.

Although each of the four major Pleistocene glaciations may have deposited one or more till sheets in the Danbury area, only the two tills have survived subsequent erosion. Both of them may be Wisconsinan deposits. Alternately, the lower till may be Illinoian. There is no remaining record of the interglacial stages, and radiometric age dates are also lacking. The upper till is certainly the product of the last major Woodfordian ice advance in this area.

As the final ice sheet pulled back, glaciofluvial sediments were deposited in the Still River Valley. Ice-contact drift formed around the glacier, while a proglacial lake was ponded against the highlands to the south. Glacial Lake Danbury stood at progressively lower levels as ice retreat opened up new outlets. The final stage of the lake was near New Milford and drained through the Housatonic Gorge. The modern Still River then developed as a small, tightly meandering stream. Minor floodplain deposits and bedrock erosion are the only current signs of postglacial activity.

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