Late Pleistocene Archaeology & Ecology in the Far Northeast

Edited by Claude Chapdelaine
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in the Far Northeast

Edited by Claude Chapdelaine • Foreword by Christopher Ellis

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# CONTENTS

[List of Figures and Tables] vii  
[Foreword, by Christopher Ellis] xi  
[Acknowledgments] xv

## CHAPTER I. Introduction: Toward the Consolidation of a Cultural and Environmental Framework
*Claude Chapdelaine and Richard A. Boisvert* 1

## PART I. REGIONAL SYNTHESSES

### CHAPTER II. Paleoindian Occupations in the Hudson Valley, New York
*Jonathan C. Lothrop and James W. Bradley* 9

### CHAPTER III. Maritime Mountaineers: Paleoindian Settlement Patterns on the West Coast of New England
*John G. Crock and Francis W. Robinson IV* 48

### CHAPTER IV. The Paleoindian Period in New Hampshire
*Richard A. Boisvert* 77

### CHAPTER V. Geographic Clusters of Fluted Point Sites in the Far Northeast
*Arthur Spiess, Ellen Cowie, and Robert Bartone* 95

## PART II. SPECIALIZED STUDIES

### CHAPTER VI. New Sites and Lingering Questions at the Debert and Belmont Sites, Nova Scotia
*Leah Morine Rosenmeier, Scott Buchanan, Ralph Stea, and Gordon Brewer* 113

### CHAPTER VII. The Early Paleoindian Occupation at the Cliche-Rancourt Site, Southeastern Quebec
*Claude Chapdelaine* 135

### CHAPTER VIII. The Burial of Early Paleoindian Artifacts in the Podzols of the Cliche-Rancourt Site, Quebec
*François Courchesne, Jacynthe Masse, and Marc Girard* 164

### CHAPTER IX. The Bull Brook Paleoindian Site and Jeffreys Ledge: A Gathering Place near Caribou Island?
*Brian S. Robinson* 182

### CHAPTER X. Between the Mountains and the Sea: An Exploration of the Champlain Sea and Paleoindian Land Use in the Champlain Basin
*Francis W. Robinson IV* 191

### CHAPTER XI. Late Pleistocene to Early Holocene Adaptation: The Case of the Strait of Quebec
*Jean-Yves Pintal* 218

[Contributors] 237  
[Index] 239
FIGURES

2.1. Physiographic regions of New York 10
2.2. Late Pleistocene landscapes and key deglacial events in eastern New York and vicinity 12
2.3. Schematic of maximum footprint of Glacial Lake Albany 12
2.4. Digital elevation map of west-central New York, showing west-to-east trending Cross State Channels 17
2.5. Locations of selected Paleoindian sites in eastern New York and vicinity 18
2.6. Railroad 1 site, bifaces 22
2.7. Railroad 1 site, evidence of toolstone reduction 22
2.8. Railroad 1 site, unifacial tools 22
2.9. Twin Fields site, fluted points and endscrapers 23
2.10. Twin Fields site, gravers, sidescrapers, and utilized flakes 23
2.11. Sundler sites, selected tools 24
2.12. County centroids and rank order for ten New York counties with highest fluted point densities 27
3.1. Map of Vermont showing the location of Paleoindian sites and spot finds 50
3.2. Bull Brook/West Athens Hill fluted projectile points and projectile point fragments 52
3.3. Quartzite projectile point preforms and biface fragments and chert biface, Mahan site 53
3.4. Chert scrapers recovered from the Early Paleoindian Mahan site 54
3.5. Tools from the Jackson-Gore site, attributable to the Middle Paleoindian period 56
3.6. Reagen site points attributable to the Middle and Late Paleoindian periods 58
3.7. Michaud/Neponset projectile points attributed to the Fairfax Sandblows site 59
3.8. Michaud/Neponset fluted points and fragments from Vermont 60
3.9. Crowfield type tools from Vermont, attributable to the Middle Paleoindian period 61
3.10. Cormier/Nicholas projectile point and point fragment from Vermont 62
3.11. Ste. Anne/Varney chert projectile point and Mount Jasper/Jefferson rhyolite bifaces and projectile point bases 64
3.12. Ste. Anne/Varney projectile point fragments recovered from Vermont 67
3.13. Map of the Far Northeast showing sources of lithic raw materials 70
3.14. “Miniature” chert fluted point from Newbury, Vermont 71
4.1. Map of Paleoindian sites and isolated finds in New Hampshire 78
4.2. Colebrook site and terrain 82
4.3. Whipple site and terrain 83
4.4. Potter site shovel test pits 84
4.5. Potter site and terrain 84
4.6. Israel River Complex sites and terrain 85
4.7. Thornton's Ferry and Hume sites and terrain 85
4.8. Thorne site and terrain 86
4.9. Paleoindian points from New Hampshire sites 89
5.1. Geographic clusters of Paleoindian sites in the Far Northeast 96
5.2. Michaud site points 97
5.3. Vail geographic site cluster in the flooded Magalloway River valley 101
5.4. Azischohos large biface made of red Munsungun chert 102
5.5. Lower Wheeler Dam site fluted point 102
5.6. Morss site points 103
5.7. Vail area Kill Site 2 point 103
5.8. Michaud geographic site cluster 104
5.9. Lamoreau site artifacts 105
5.10. LaMontagne site artifacts 105
5.11. Taxiway site under excavation, Auburn airport 105
5.12. Taxiway site artifacts 106
5.13. Beacon Hill site artifacts 106
5.14. Keogh site artifacts 107
5.15. Cormier site fluted points 107
6.1. Radiocarbon dates for features at the Debert site 114
6.2. Schematic section of the Debert deposit 115
6.3. Original field profiles and plan view of a unit excavated at the Belmont I site 116
6.4. Belmont II 2 unit showing profiles to the level of the presumed living floor 116
6.5. Roofing shingles dumped at the original MacDonal site 117
6.6. Elder Douglas Knockwood and executive director Donald Julien 117
6.7. Schematic of Debert Site Delineation Project unit with test pits 118
6.8. Schematic of Debert Site Delineation 119
6.9. Artifacts found in the Debert Site Delineation Project survey testing 119
6.10. LIDAR relief base map showing locations of 20 m survey squares 120
6.11. Map of the 2006 Debert geological augering survey 121
6.12. Size distribution histograms for selected sand deposits, Debert site 122
6.13. Typical soil expression at Debert, showing L-F-H, Ac, Bf, B, and C horizons 123
6.14. Debert unit 12–20 showing a possible buried soil expression 124
6.15. LIDAR image showing Debert archaeological sites in relation to the Younger Dryas cover sands 124
6.16. Comparative stratigraphies of the Debert sites and four nearby geological sections 125
6.17. Extents of glaciation, sea levels, vegetation, and glaciofluvial/glaciolacustrine activity during the late Allerod and Younger Dryas 126
6.18. Chronology, climate, and pollen stratigraphy compared with a Greenland ice core 128
7.1. General location of the Cliche-Rancourt site 136
7.2. Map of the Cliche-Rancourt site 136
7.3. Map of the Mégantic Lake area 137
7.4. Projectile points, Cliche-Rancourt site 139
7.5. Large alternate beveled biface, Cliche-Rancourt site 141
7.6. Biface fragments, Cliche-Rancourt site 141
7.7. Endscrapers, Cliche-Rancourt site 142
7.8. Sidescrapers, Cliche-Rancourt site 144
7.9. Gravers, Cliche-Rancourt site 147
7.10. Wedges, Cliche-Rancourt site 150
7.11. Channel flakes, Cliche-Rancourt site 152
7.12. Nuclei or cores, Cliche-Rancourt site 153
7.13. Tool distribution in Cliche-Rancourt Area 1 154
7.14. Tool distribution in Cliche-Rancourt Area 3 155
7.15. Debitage distribution in Cliche-Rancourt Area 3 155
7.16. Cliche-Rancourt lithic network and the locations of major related sites 158
8.1. Profile distributions of artifacts at the Cliche-Rancourt site 165
8.2. Mégantic Lake area and location of the Cliche-Rancourt site 166
8.3. Plan view of the five Cliche-Rancourt site excavation areas and location of soil profile D 166
8.4. Plan view of Cliche-Rancourt Area 3 and location of soil profiles A, B, and C 167
8.5. Values of soil pH in water and organic carbon content in soil profiles, Cliche-Rancourt 170
8.6. Concentrations of extractible Fe and Al in soil profiles, Cliche-Rancourt 171
8.7. Ancient pedoturbation in soil profile A, Cliche-Rancourt 172
8.8. Ancient pedoturbation in soil profile B, Cliche-Rancourt 172
8.9. Recent pedoturbation in soil profile C, Cliche-Rancourt 172
8.10. Two-dimensional spatial distribution of artifacts, Cliche-Rancourt 173
8.11. Three-dimensional spatial distribution of artifacts, Cliche-Rancourt 174
8.12. Floralturbation of a forest soil in the Lower Laurentians, Quebec 174
8.13. Faunalturbation of a soil profile 175
8.14. Cryoturbation in a soil of the Rupert River area, Quebec 175
8.15. Synthesis of vertical distribution of dominant pedoturbation processes, Cliche-Rancourt site 179
9.1. Gulf of Maine showing exposed land at lowstand, circa 10,500 14C yr BP 184
9.2. Features of the southern Gulf of Maine at the Late Pleistocene lowstand 185


10.1. Overview of the Far Northeast region and the Champlain Sea, ca. 11,800 cal BP 194
10.2. Close-up view of Bull Brook/West Athens Hill Paleoindian sites 200
10.3. Paleoindian sites in relation to the Champlain Sea maximum 201
11.1. General map of the study area around Quebec City 219
11.2. Holocene relative sea-level fluctuations in the St. Lawrence estuary 220
11.3. Paleovegetation maps of Quebec, 13,000–9000 cal BP 221
11.4. Strait of Quebec, ca. 11,500 cal BP 221
11.5. Locations of archaeological sites, Quebec City and surroundings 222
11.6. “Fluted” biface and knife from site CeEt-657, lower occupation level 223
11.7. Corner-notched point and borer from site CeEt-657, upper occupation level 224
11.8. Point, drill, and gravers from site CeEt-778 224
11.9. Lanceolate to leaf-shaped points with concave bases from site CeEt-481 226
11.10. Lanceolate to leaf-shaped points with oblique bases from site CeEt-481 227
11.11. Basally thinned points from site CeEt-481 227
11.12. Leaf-shaped points with undulating parallel oblique surface patterns from site CeEt-481 228
11.13. Points or drills tips from sites CdEt-1 and CdEt-2 228
11.14. Basally thinned point and drill from site CeEv-5 228
11.15. Corner-notched point, scraper, and drill from site CeEv-5 230

TABLES

2.1. Comparison of modal point forms, New England–Maritimes and eastern Great Lakes 15
2.2. Settlement characteristics of Hudson Valley Paleoindian sites 20
2.3. Rank order of ten New York counties with highest fluted point densities 26
2.4. Transport of Paleoindian toolstone into and from the New York region 29
2.5. Investigated Paleoindian sites with reported artifacts of Normanskill Group cherts 31
2.6. Jasper tools found at selected fluted point sites in the Hudson-Mohawk Lowlands 33
4.1. Paleoindian sites and isolated finds in New Hampshire 80
4.2. Fluted point temporal sequence for the Far Northeast 88
6.1. Dates for features from the Debert site 115
7.1. Early Paleoindian lithic assemblage from the Cliche-Rancourt site 138
7.2. Major attributes of fragmented fluted points, Cliche-Rancourt site 140
7.3. Endscraper attributes, Cliche-Rancourt site 143
7.4. Sidescraper attributes, Cliche-Rancourt site 145
7.5. Graver attributes, Cliche-Rancourt site 148
7.6. Utilized flake attributes by area, Cliche-Rancourt site 151
7.7. Lithic distribution in the five areas of the Cliche-Rancourt site 153
7.8. Relative chronologies of Paleoindian point styles 157
8.1. Physical properties of the horizons of soil profile A, Cliche-Rancourt site 168
8.2. Exchangeable cations and cation exchange capacity in soil profiles A, B, and D, Cliche-Rancourt site 169
8.3. Mineralogy of the clay fraction in soil profile A, Cliche-Rancourt site 170
8.4. Mineralogy of fine silts in soil profile A, Cliche-Rancourt site 170
8.5. Synthesis of the temporal changes in the dominant pedoturbation processes, Cliche-Rancourt site 178
11.1. Main attributes of the most complete points, Quebec City sites 225
11.2. Preliminary chronological sequence for the late Pleistocene/early Holocene occupation of the Strait of Quebec 231
I am very pleased to provide some comments that can serve as a brief preview of this fine collection of studies pertaining to the earliest known human occupants of the Far Northeast (northern New England and adjacent area of Canada). The volume brings together several up-to-date regional data syntheses, for which there is always a need (and especially in these days when many discoveries can remain hidden in gray CRM or planning literature or deep in the bowels of small museum collections), as well as specialized studies that address several mostly well-known problems pertaining to the age, geological and paleoenvironmental context, and subsistence practices of these early peoples. I am especially happy to see the results of CRM work being published (e.g., Boisvert, Spiess et al., this volume) and the increasing involvement of local Native communities in exploring, managing, and protecting cultural resources (Rosenmeier et al., this volume).

Throughout the volume, progress is evident on several other fronts: to name but a few examples, identifying stone raw material sources (Boisvert), isolating potential routes of entry or migration into the area (Lothrop and Bradley), explaining site formation processes (Courchesne et al.), documenting and understanding site layouts and the spatial organization of activities (Chapdelaine; Rosenmeier et al.), and determining the particular geographic settings that were being sought for occupation (Crock and Robinson; Spiess et al.). Even more basic, and with Maine leading the way in discoveries, the syntheses show that the number of actual sites reported has grown exponentially and puts to shame the recent efforts in areas where I have worked, notably the central to eastern Great Lakes, where work has tailed off somewhat since the heady days of the 1970s and 1980s. Although several new sites have been discovered through CRM activities in Ontario, unlike the Far Northeast there has been little effort to publish that work (although there are exceptions such as Woodley [2004]).

The number of finds is even more remarkable when one considers that unlike the eastern Great Lakes— which are today densely populated, heavily developed, and under intense cultivation—much of the Far Northeast is rugged and forested with much lower density populations and much less modern development. Combined with the fact that finding any of these rare early sites is difficult, literally like finding a needle in a haystack, locating even one site in this landscape is exceedingly difficult, although like Claude Chapdelaine (this volume) one can be extremely lucky. Clearly we are way beyond the situation in the 1970s when only a handful of Far Northeast sites—such as Debert, Nova Scotia (MacDonald 1968), Bull Brook, Massachusetts (Byers 1953), and Reagen, Vermont (Ritchie 1953)—were known or widely reported. And, as other recent publications (e.g., Robinson et al. 2009) and the chapters in this volume by Rosenmeier et al., Crock and F. Robinson, and Brian Robinson make abundantly clear, there are still many things we can learn about even those long-known sites.

The syntheses presented here also confirm earlier suggestions, going back to at least Spiess and Wilson’s (1987:129–155) conception of a “New England–Maritimes Paleoindian Region,” that the Far Northeast is distinctive in the earlier time periods and notably in relation to the areas I know best just to the west. Evidence of this distinctiveness has been somewhat clear from near the beginning, such as in the presence of deeply indented-base fluted points from sites like Debert, and the more recent work reported here only serves to confirm these differences and highlight more of them. To be sure, there are echoes of similarity that have to indicate a common origin and some degree of interaction between these two areas: the presence of the ultra-thin Crowfield type fluted points (Deller and Ellis 1984), well known in southern Ontario, at sites like Reagan, or even the recovery from Quebec’s first reported fluted point site (Cliche-Rancourt: Chapdelaine, this volume) of a single example of the rare but distinctive large alternately beveled bifaces/knives reported from several Ontario sites (Ellis and
Deller 1988). Also, and similar to the Great Lakes case, material from a limited range of distinctive stone sources shows up time and again on Far Northeast sites, often in considerable quantities and at long distances (250–300+ km) from their origin points (e.g., Burke 2006, and several chapters herein).

These patterns do indicate that high settlement mobility and widespread social interaction networks were held in common in the two areas, albeit using different raw material sources, but in my opinion the reasons behind Paleoindian raw material choices still remain obscure (Ellis 2002). In any case, I am more impressed with the differences. In comparing the Paleoindian occupation between the two areas I am reminded very much of Douglas Byers (1959:254) great analogy in his discussion of the Eastern Archaic: “All show points in common. They are as familiar as a contemporary class picture from another school—the clothes and poses are familiar, but the faces are different.” Notable differences extend from the distinct Far Northeast point forms such as the Ste. Anne, Cormier/Nicholas, and aforementioned Debert style to the common presence in the earlier components of twist drills, pièces esquillées, and the like.

It is plausible that the toolkit differences are to some extent explained by geographic isolation and consequently more limited east-to-west interaction patterns, perhaps due to the presence of physical geographic barriers such as the Champlain Sea, differences reinforced by the fact that little in the way of certain stone raw materials shows up in both areas—although the location of sites throughout the area, as along the north shore of the St. Lawrence, certainly indicates that Paleoindians had watercraft. It is also plausible that these and other contrasts indicate differing adaptations in the two areas. Certainly, as the chapters in this volume clearly demonstrate, these early inhabitants of the Far Northeast were living in an area that contrasted in several respects with the Great Lakes. In some locations such as southern Quebec and the Canadian Maritimes, all evidence suggests to me that these peoples were living in true tundra environments at the northern edge of the area closer to the ice sheet; in Ontario the evidence still suggests that Paleoindians avoided those areas (Ellis 2002). They also, as the Rosenmeier et al. chapter in this volume makes abundantly clear, had to cope in at least part of the region with rapid and substantial environmental changes induced by the Younger Dryas climatic event, which apparently had more limited and less rapidly appearing consequences for Paleoindian peoples living elsewhere (Meltzer and Holliday 2010)—including, although the exact extent of the effects is disputed, the Great Lakes (Ellis et al. 2011; Eren 2009).

Several authors in this volume also suggest that these peoples were able to, and were, exploiting marine resources of the Champlain Sea, the lower reaches of the St. Lawrence River area, and, one presumes, the Atlantic coast. I remember being exposed to this idea by my first mentor, the late William Roosa, who talked of the possibility that the inhabitants of Bull Brook, Massachusetts, were hunting seals (he even suggested this in print: Roosa [1962:265]), but I was highly skeptical of this idea at the time. Later investigators also began to raise this possibility (e.g., Keenlyside 1985:83–84). Although I would certainly love to see direct faunal evidence, I believe this idea is now on a much more plausible footing based on improved dating of the Champlain Sea, which makes it definitely contemporary with the Paleoindian occupation, and the recent models of the geographic and geological settings of the sites reported in this volume, notably at locations in Vermont and Quebec.

Such a unique set for resources should have had an effect on overall site locational preferences. In fact, I wonder if the ability and willingness to inhabit the more extreme environments or tundra areas closer to the ice sheets in the Far Northeast, but seemingly not in the Great Lakes, were due to the fact the far northeastern peoples could also access resources unavailable to the west, such as the marine resources. A greater abundance of resources might also explain why anyone entering the area from warmer, more southern climes would be attracted to these areas in the first place. The rarity of these early sites suggests that it was not population pressure that forced people into new, previously uninhabited, more marginal areas; unless one wants to assume that Paleoindian peoples simply had a wanderlust to explore new places (and they may have!), there had to be some attraction of these difficult-to-traverse areas with their extreme climates and lower inland carrying capacities. Researchers should be able to build on the foundation provided by the contributions to this volume to explore these kinds of ideas in more detail in future studies.

It is fair to note that some questions remain partly unanswered or controversial. I am certainly saying nothing
new here, for the same problems have been noted in commentaries in Paleoindian volumes and syntheses since archaeological time immemorial (e.g., MacDonald 1971; Mason 1962; Wright 1989). One obvious one, hinted above, is the paucity of preserved faunal (and floral) remains. As is evident in this volume (e.g., F. Robinson; B. Robinson), the subsistence models we are currently developing and using, especially those concerning the role of caribou, are much more sophisticated than the simplistic, and rightly criticized (e.g., Dinauze 1988), models of the past that drew one to one analogies with whatever particular ethnographic group happened to strike one’s fancy. Nevertheless, although they may be more sophisticated and realistic, in the absence of substantial faunal recoveries the new models remain simply well-informed models.

Another notable problem area revolves around questions concerning the absolute age of the sites, refined knowledge of which is basic to almost all archaeological interpretations. I used to think that we had a substantial foundation for our absolute age estimates of these occupations and especially when we had sites like Debert, with many fairly consistent radiocarbon dates; this suite of dates seemed to indicate that it was the best absolute-dated Paleoindian site in the East (e.g., Curran 1996:5–6; Ellis 2004). However, as Rosenmeier et al. suggest in this volume, even the best dated actually may not be well dated, or, at least, there are several ways one can interpret the dates—and I believe the situation may be even more complicated than how they portray it. Of course, part of the problem is that radiocarbon dates during the late Pleistocene, and Younger Dryas in particular, vary because of changes in atmospheric carbon, and radiocarbon dates of the statistically same age may actually be separated by hundreds of sidereal years (“radiocarbon plateaus”). One can even get reversals at some points such that one gets older radiocarbon dates on what are actually younger sites (e.g., Curran 1996; Fiedel 1999). I am convinced, for example, that plateau effects account for the fact that we seem to have a huge number of distinct point types (Bull Brook/West Athens Hill, Michaud/Neponset, Crowfield, Cormier/Nicholas) wedged into a narrow slice of radiocarbon time around 10,500–10,100 14C yr BP. We need to be exceedingly careful in how we treat and use those dates, and we need to supplement them with other lines of evidence. This volume does shows that efforts to use the other lines of evidence are well under way, most notably via geochronological techniques and especially the distribution of sites in relation to old levels of the Champlain Sea and the upper St. Lawrence River area (Pintal, F. Robinson, this volume), and through the continuing development and use of refined point typologies (Lothrop and Bradley, Spiess et al., this volume).

Well, all we can do is keep plugging away and hoping we find those Holy Grail sites with preserved fauna and flora, including charcoal suitable for dating, in undisturbed contexts. I am also hopeful that eventually we will begin to construct models and accumulate information that helps us to go beyond the more materialistic and pragmatic concerns of Paleoindian life such as subsistence practices. Perhaps, as Jess Robinson hints in his chapter, we may be able to one day speak of ideological aspects of Paleoindian peoples, of aspects such as their cosmological landscapes and how these perceptions may have influenced the colonization process and their use of space, a topic I find particularly fascinating, albeit difficult to deal with (Ellis 2009). Regardless, as this volume makes abundantly clear, studies in the Far North-east have come a long way even over the scholarly lifespan of this researcher, and I look forward to continuing progress in the coming decades.

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REFERENCES


Paleoindian archaeology calls for a multidisciplinary approach, and most scholars work with a broad geographic scale to coincide with the adaptive nature of the late Ice Age hunting groups they study. Today’s borders in the Far Northeast lose their significance in the face of the high mobility of these Paleoindian groups, which is visible in the long distances between sites and the primary lithic sources and is best illustrated by the use of Munsungun chert from northeastern Maine at the Bull Brook site in Massachusetts.

It may be said that scholars working in the Far Northeast form a large family and that sharing information is rarely a problem. As an example, in 2002, while I was starting a long-term project in the Mégantic Lake area, Richard Boisvert paid me a visit and, after looking at the few tools and flakes from the Cliche-Rancourt site, told me with a wide smile that I might have a very early site. Over several years, he had encountered Early Paleoindian sites with a striking feature that he recognized at Cliche-Rancourt in 2002: the combined presence of New Hampshire rhyolite and red Munsungun chert. I already knew about the latter lithic source, but I did not know about the rhyolite from Jefferson or Mount Jasper. Dr. Boisvert’s sixth sense turned out to be right, for we found the first two of our fluted point fragments the following year.

Collaboration was instrumental in the initial stages of our work at Mégantic Lake, as it is now with this book. I would like to acknowledge all the contributors of this book. They are not just active in the field and at meetings; they are also willing to use their precious free time to produce knowledge in published form. It is time-consuming labor, taking a good share of our energy, but we all know that written words endure longer than pretty talks enhanced by witty one-liners. My sincere thanks go also to Christopher Ellis, who enthusiastically accepted the request to write a foreword to this volume. As a veteran of Great Lakes Paleoindian studies, he was indeed a good choice, and his ability to accomplish this task in timely fashion is equal to his great generosity and willingness to share data with the Far Northeast family. Along with Kurt Carr, Dr. Ellis also acted as a reviewer, and their comments helped to broaden the scope of this book. They are both acknowledged here for the high quality of their constructive comments.

This volume can be considered as the official admission of the province of Quebec to the unofficial “Clovis Club,” a lofty claim that requires some background. When I was dreaming about finding the first Early Paleoindian site in Quebec back in the early 1980s, I had the opportunity to dig one long weekend with Michael Gramly at the Vail site in Maine, near the Quebec border. Accompanied by David Keenlyside of the National Museum of Canada (now the Canadian Museum of Civilization), we uncovered a nice endscraper and several flakes while having the pleasure of working on this famous site. After that experience, I asked Mike if he would be interested in publishing in French, since he had new data collected after his 1982 publication. He accepted, and I seized the opportunity to look at the whole Paleoindian situation in southern Quebec, basically to ask geographers to contribute to the physical and biological environment, to discuss the potential of finding fluted point sites, and to examine new data from late Paleoindian sites. Following the publication of this special issue of Recherches amérindiennes au Québec in 1985, the late Pierre Dumais organized another issue in 2002 in the same journal on Paleoindian questions from southern Ontario, the Maine-Maritime peninsula, and Quebec. The following year we found the first fluted point site in all of Quebec. I freely admit that this discovery was an archaeologist’s dream come true. However, it would have been impossible without the consent of M. Jean Cliche and Mme Catherine Rancourt, who let us invade their property and run our summer field school from 2001 to 2009. Their generosity is equal to the support they have given us all these years,
and we will be working on the Cliche-Rancourt site for some time to come, combining small-scale research with the challenge of developing an interpretation center.

This volume is in part the result of the long-term collaboration between myself, during a sabbatical leave from the Université de Montréal, and Richard Boisvert, New Hampshire State archaeologist, who came to the Mégantic Lake area almost every year with a group of volunteers to assist in various research aspects. It was Dr. Boisvert who made the suggestion to submit our manuscript to the Center for the Study of the First Americans. Given the reputation of this institution over the past twenty years, it was our idea to find a western publisher to build a more continental audience for Far Northeast archaeology and ecology. I thank series editor Michael Waters for his immediate enthusiasm for the project, and my gratitude also goes to Mary Lenn Dixon of Texas A&M University Press for having supported this venture through all the stages leading to publication. I hope that scholars working on the Paleoindian era in North America, and elsewhere, will find an interest in the diversity of these chapters on the Far Northeast.

Claude Chapdelaine
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CHAPTER I

Introduction

Toward the Consolidation of a Cultural and Environmental Framework

Claude Chapdelaine and Richard A. Boisvert

The concept for Late Pleistocene Archaeology and Ecology in the Far Northeast derives from a long-term collaboration between the two of us and the desire to share the results of the past decade or so of research by the many active scholars addressing the Paleoindian era in this region. The Far Northeast is not a new concept (Sanger and Renouf 2006); it refers to a large glaciated territory that holds a particular geographic and ecological position, affording it a distinct chapter in the peopling of North America. The Far Northeast is a peninsula incorporating the six New England states, New York east of the Hudson, Quebec south of the St. Lawrence River and Gulf of St. Lawrence, plus the Maritime Provinces. This region was inhospitable before 13,500 years ago, especially in its northern latitudes. The fundamental issue for this volume focuses on the derivation of the Clovis pioneers from their eastward migration into the Far Northeast, who were distinguished by the more numerous fluted point style form variations than previously thought (Bradley et al. 2008; Morrow and Morrow 1999, 2002).

The archaeological record of the Far Northeast indicates that the area was probably settled slightly after 13,000 years ago. Several sites might apply to be among the oldest sites, but decisive data based on secure radiocarbon dates are still lacking (Bonnichsen and Will 1999; Gramly and Funk 1990). The contenders, on a logical basis, should be found in the western or southwestern portion of the Far Northeast. Sites such as Bull Brook in Massachusetts, Whipple in New Hampshire, or several sites in southeastern New York were certainly among the early settlements. Although all these sites are not well dated independently with firm radiocarbon assays, the fluted point styles from these sites are close to the older Clovis prototype that was the trademark between 13,500 and 12,800 years ago farther west and south.

No clear association between the extinct fauna and human occupation has been recorded in the Far Northeast, for few bones have been recovered so far. Although the proposition may seem tedious, caribou does seem to be the major prey, leading the majority of scholars to favor the caribou/tundra model of settlement subsistence during the early days and in northern latitudes. Within this perspective, the Vail site in Maine illustrates the Paleoindian capacity to explore and exploit a mountainous area around 12,500 years ago (Gramly 1982), and Debert in Nova Scotia (MacDonald 1968), dated to the same time range, could be the illustration of swift eastward mobility by Paleoindian hunters in relation to extensive caribou migration along a northeastern corridor.
The incentive of this book is to present new data and updates of some earlier interpretations. Among these, it is worth mentioning the synthesis provided for the early 1990s (Gramly and Funk 1990), revisited by others eight years later (Spiess et al. 1998; see also Spiess and Newby 2002). A lengthy foreword by the late James Petersen (2004) on the West Athens Hill Site, the Paleoindian period, and the contributions of Robert Funk is also of great relevance to grasp the accumulated knowledge on this early period of time. Still, there has not been a single book or article that makes a complete summary of the Paleoindian era for most of the Far Northeast. With this volume we attempt to address this need, admitting that our coverage is by no means complete. Of the Canadian provinces, New Brunswick and Prince Edward Island are not represented in this volume, since no discoveries have been made in the past decade although early human presence has been recorded previously (Keenlyside 1991).

This book offers a new opportunity to review new data and interpretations in most areas of the Far Northeast, including a first glimpse at the only known fluted point site in Quebec, the Cliche-Rancourt site. Given the annual investigation of sites throughout the Far Northeast, the accumulation of research findings has been steady, making it timely to present some of the most interesting results, changing our perception of this large area.

The process of assembling this volume began when scholars were invited to participate in a symposium at the annual meeting of the Quebec Archaeological Association in Sherbrooke, May 1–3, 2009. All nine participants involved in Paleoindian archaeology or ecology agreed to transform their presentations into chapters for the present book. After the Sherbrooke meeting, invitations were extended to additional colleagues who could fill key areas of the Far Northeast. The famous Debert site is now part of a cluster of sites, and a team led by Leah Rosenmeier agreed to contribute to this venture. Likewise, John Crock accepted our invitation to present an update on the Early Paleoindian occupation for the state of Vermont. A total of ten chapters along with this introduction are thus presented here, each presenting new data to the scientific community.

Each chapter is unique, ranging from site description (Chapdelaine) to site clusters (Rosenmeier et al., Spiess et al., Pintal), pedology (Courchesne et al.), subregional synthesis (Boisvert, Crock and F. Robinson, Lothrop and Bradley), and specific problems such as the relationship with the Champlain Sea (F. Robinson) and the existence of a caribou drive near the Bull Brook Site (B. Robinson). With reports incorporating Maine, New Hampshire, Vermont, eastern New York, Massachusetts, southeastern Quebec, and Nova Scotia, we feel that our coverage of the Far Northeast is adequate and hope that our efforts provide food for thought and stimulate a new interest in areas where archaeological research is lacking.

A collection of chapters covering such a vast territory could only be eclectic, which was the case for a comparable book on the Southeast (Anderson and Sassaman 1996), and we feel it is logical to present the regional syntheses first (part I), followed by specialized studies (part II).

Chapter 2, by Jonathan Lothrop and James Bradley on the Hudson Valley, covers the presumed territory from which specific groups may have entered the Far Northeast from the west, not excluding a southern entrance, and it might contain the most ancient sites of our study area. This chapter presents recent data and interpretations on Early and Middle Paleoindian lifeways during the late Pleistocene in the Mohawk/Hudson drainage basin. It provides current perspectives on late Pleistocene landscapes of eastern New York, scenarios for human colonization, and aspects of settlement, subsistence adaptations, and technology. It is thus a starting chapter for studying the peopling of the Far Northeast.

The state of Vermont was first in the Far Northeast to record a Paleoindian site, with the Reagan site (Ritchie 1953), but a long silence followed that is now broken by John Crock and Francis Robinson reporting an impressive set of new sites. In chapter 3 they challenge stereotypes by referring to Paleoindians located mostly along the Champlain Lake area as “Maritime Mountaineers” inhabiting the west coast of New England. A strong link can be made between their vision and the one developed by Pintal’s chapter 11 on the Quebec Strait, emphasizing both an intimate relation between a site’s location and the Champlain Sea episode with its presumed marine biodiversity. This welcome chapter describes the cultural affiliation, settlement type, content, and location of twenty-five recorded Paleo-
indian sites and well-documented finds in Vermont for the purposes of understanding human colonization and early settlement in the region.

The state of New Hampshire has also known a rapid increase in Paleoindian sites over the past fifteen years, and the synthesis provided by Richard Boisvert in chapter 4 is the first ever attempted while fieldwork and lab analysis are ongoing. It is thus not surprising that research conducted since 1996 has substantially enlarged the database for the state and contributed significantly to the region. This expansion is summarized and evaluated in this chapter. Patterns of site location within the state, evidence for behavior beyond the requirements of hunting, and indications of complex interactions with other areas lead Boisvert to a more nuanced model of settlement. The Potter site, which is mentioned in the chapter, is definitely a key site, and much attention will be devoted to it in the coming years.

The state of Maine has been making tremendous progress since the discovery and publication of the Vail site in the early 1980s (Gramly 1982). In chapter 5, Arthur Spiess and his colleagues Ellen Cowie and Robert Bartone bring us to another level with an analysis of clusters. The authors mention the discovery of almost twenty Paleoindian sites in Maine in the past twenty years. Two clusters are discussed in this chapter: Vail, and those associated with the Lewiston-Auburn airport. Styles of fluted points and range of raw materials used among various sites in a site cluster are examined to discuss the length of occupation and the range and variation in Paleoindian movement to and from each place. The seasonal aspect of Paleoindian settlement pattern is supported by this new recognition of successive occupations at specific areas. With this perspective in mind, several sites considered isolated in an area might be the start of new research to verify the existence of a cluster.

A new contribution on a cluster of sites in the general area of the Debert site by a team of scholars led by Leah Morine Rosenmeier starts part II and the specialized studies. With the support of Scott Buchanan, Ralph Stea, and Gordon Brewster, in chapter 6 Rosenmeier presents new evidence from several sites on soil, stratigraphy, and cultural content and discusses the implications on the dating and environmental conditions prevailing at the end of the Pleistocene. These new sites define a cluster that gives the region a new window into the past.

The Cliche-Rancourt site reported in chapter 7 by Claude Chapdelaine is the single known site for the entire province of Quebec that could be assigned to the Early Paleoindian period on the basis of fluted points and other distinctive artifacts. The site has received much attention since 2003, after the first two fluted points were discovered, and 205 m² have been dug so far. Four loci were delimited and extensive research has been carried out on Areas 1, 2, and 3. The 2009 field season confirmed that Area 4 was not occupied by fluted point makers, but the recognition of the new Area 5 in the southwestern portion of the site has given new breath for investigation. The chapter is limited to a detailed presentation of the first three areas. The tool assemblage is described, followed by a discussion on internal organization and domestic activities. External relations with adjacent regions are explored within a broader perspective with the implications of the Cliche-Rancourt site for our understanding of seasonal movements, adaptation, lithic acquisition, and cultural relations.

The unusual presence of artifacts at depths ranging from 20 to 80 cm within the otherwise sterile orange sand layer below the spodic gray sand at Cliche-Rancourt led to the collaboration of François Courchesne, pedologist, and his team to tackle this problem. The results of this study, given in chapter 8, question the mechanisms involved in this burying process. A polygenetic model of soil evolution was used as the theoretical framework to facilitate the identification work of pedogenetic processes, in particular, pedoturbation. This approach has helped to retrace the soil evolution since ice retreat and suggested the central importance of cryoturbation and bioturbation as major mechanisms in the burying of artifacts at the Cliche-Rancourt archaeological site.

Chapter 9, on Bull Brook, by Brian Robinson is part of a quest to understand a settlement pattern represented by a single organized event with thirty-six activity loci, along with the economic strategy to allow this important social aggregation. The hypothesis developed here stresses the importance of a lowstand of the changing sea level east of Bull Brook, favoring the emergence of Jeffreys Ledge, a drowned maritime island that may have provided abun-
dance, predictability, and landscape characteristics suitable for communal caribou drives. The location of Bull Brook could have been related to this late ephemeral Pleistocene landscape.

Chapter 10, by Francis Robinson IV, on Vermont is a much needed update on the exact relationship between the Champlain Sea episode and the known Paleoindian sites. The location of the Reagen site, a multicomponent Paleoindian site, near the expected sea shoreline or altitude tends to support the chronological framework based on fluted point forms developed recently (Bradley et al. 2008). Models of the inception and duration of the Champlain Sea have been revised significantly over the past decade, and the Paleoindian presence in Vermont is now considered coeval. The biodiversity of the late Pleistocene body of water brings a new perspective to discussions of Paleoindian settlement patterns and subsistence dominated by the caribou model.

In chapter 11, Jean-Yves Pintal presents a series of challenging sites found in the Quebec City area that are providing us with a unique view of the end of fluted point manufacture and its transition into something else. The inception and evolution of the Champlain Sea episode in the Strait of Quebec are the necessary general background for understanding human occupations in the area. The basic chronology suffers from a lack of radiocarbon dates for these oldest sites, but an Early Archaic site dated to 9000 \(^{14}\)C yr BP with a quartz assemblage is providing a solid upper limit for the Paleoindian period. The tool assemblage of these oldest sites in the Quebec City area shows resemblance to the Cormier/Nicholas point style, and it should be older than the Early Archaic site. The spatial distribution of these sites between 11,300 and 8800 years ago indicates a rather smooth change in the exploitation of the territory, starting with a tendency to occupy the same sites and later moving to a wider range of environments.

The chapters of this volume have much in common, but one source is especially pivotal. This is “What’s the Point? Modal Forms and Attributes of Paleoindian Bifaces in the New England-Maritimes Region,” by James Bradley, Arthur Spiess, Richard Boisvert, and Jeff Boudreau, published in the *Archaeology of Eastern North America* in 2008. Prior to its publication, researchers in the Northeast had to rely on external references to define and discuss the essential diagnostic artifacts of the region. The purpose of the study was “to propose a set of definitions for the Paleoindian bifaces currently known within the New England–Maritimes Region . . . to provide a clearly defined set of working terms to facilitate comparisons and test hypotheses.” (Bradley et al. 2008:119). These authors then set out to define the modalities of the Paleoindian bifaces metrically, stylistically, and geographically with a (partial) goal of clarifying the chronological and cultural parameters, thus offering a point of departure for future research. In a brief period of time this work has become a standard reference in Paleoindian studies. In a sense, this publication was a watershed event and represented a coming of age for the study of the Paleoindian era for the region. Its authors intended it to be used and tested as a tool, and one can judge its utility by its application in the chapters of this volume.

Another aspect touched on regularly in this volume is the importance of channel flakes (see Boisvert 2008). This particular type of artifact is mostly associated with the final stage of fluted point production. Channel flakes obtained from the final fluting process, nearly always as fragments, exhibit short truncated flake scars on their exterior that meet to form a central ridge parallel to the direction of force that removed the flake. These flakes are the product of the manufacture of the longitudinal grooves that are the diagnostic feature of Paleoindian fluted points.

The specificity of our geographic area is also worth mentioning. Recently, the impact of the Younger Dryas on North American Paleoindians has been challenged (Meltzer and Holiday 2010). If the impact seems to have been less severe in various parts of the continent, it was stressed that Paleoindians may have noticed climate changes in the Northeast (Newby et al. 2005). We can confirm that statement for the Far Northeast, which is a good example of extreme human adaptation at northern latitudes.

Other aspects make this eclectic volume thought provoking. Most chapters are concerned with settlement patterns and various recurrent themes such as high mobility expressed through an impressive lithic network including Hudson Valley chert to the west and Munsungun chert in northeastern Maine, seasonal caribou adaptation, as well as site locations and chronology. Site formation processes and the meaning of multilocus sites are other aspects discussed by several authors.

The radiocarbon-dating of North American Paleoindian
sites is one of its most challenging issues. Unfortunately, the Far Northeast is no exception, and problems such as the plateau effect (Fiedel 1999), lack of hearths with charcoal and bone, and the calibration curve with substantial differences between calendar and radiocarbon years still apply. This dating problem places the Paleoindian era in a constant debate. Although radiocarbon dating is instrumental to our discipline, its limited utility is not contributing significantly to the emerging point typology. It is with no surprise that the point typology is now the major chronological tool, a situation similar to that in the Great Lakes (Ellis and Deller 1997).

The geographic scope of this collaborative effort to bring together the existing data on the Paleoindian era at the end of the Pleistocene in the Far Northeast, though stressing the importance of environmental conditions (see Newby et al. 2005), is far from exhaustive. Still, this book should be helpful for at least a decade or more, depending on the dynamism of the field and its actors. It will thus be a basic reference for scholars interested in Paleoindian studies, the search for the First Americans, and comparisons with other areas of North America. It is our hope that in future comparative analyses the Far Northeast plays an active role and is not relegated to the background.

NOTE
1. Unfortunately, the team led by Pierre J. H. Richard, including Alayn C. Larouche, Tamyla Ellkadi, and Nicole Morasse of the Université de Montréal, was not able to meet the deadline for the book. Their paper was highly complementary to the chapters by Chapdelaine and by Courchesne et al. as well as having strong implications for the Far Northeast, with the detailed environmental reconstruction of southeastern Quebec and surrounding areas. Palynologically controlled radiocarbon ages are suggesting the maintenance of a tundra for a longer time period than previously thought and giving more support to a seasonal settlement subsistence pattern based on barren-ground caribou (see Chapdelaine, this volume).

REFERENCES


Part I
Regional Syntheses
Much of our current perspective on late Pleistocene adaptations in New York stems directly from work by former state archaeologist William A. Ritchie and his successor, Robert E. Funk. For five decades, their investigations defined the research framework for late Pleistocene occupations of eastern New York. In so doing, their research influenced interpretations of Paleoindian lifeways in glaciated regions that extend beyond New York, including the eastern Great Lakes, New England, and the Canadian Maritimes.

In recent years, new information has come to light on the environmental setting and landscape evolution of late Pleistocene New York, providing a better basis for understanding the physical contexts for postglacial human colonization after circa 13,000 cal BP. As well, new insights (and persistent questions) on systematics and chronology cast a different light on published data for Paleoindian sites and point finds in New York (Bradley et al. 2008; Lothrop et al. 2011). Coupled with recent discoveries and analyses, this allows us to reconsider what we think we know about how the late Pleistocene peoples colonized, and then adapted to, the dynamic deglacial landscapes of eastern New York.

In this review we discuss (1) late Pleistocene landscapes, (2) scenarios for human colonization, and (3) Paleoindian settlement, subsistence, and technology for the Hudson Valley and vicinity. We also consider possible roles of the Hudson Valley and the Champlain lowlands in peopling of the Far Northeast. Our geographic focus on eastern New York includes the Mohawk-Hudson drainage basin, adjacent upland provinces, and, to a lesser extent, the Champlain Basin. To complement this study area, we also draw on data from adjoining regions. In particular, we consider the eastern New York data in relation to the broader glacial landscapes extending north and east, collectively referred to elsewhere as the New England–Maritimes (Bradley et al. 2008; Lothrop et al. 2011; Spiess et al. 1998) but referenced in this volume as the Far Northeast.

As we discuss below, most site-based evidence for Paleoindian occupation in eastern New York consists of early fluted point occupations, by default defining our primary focus. Our chronological framework relies on Bradley et al. (2008), distinguishing Early Paleoindian, Middle Paleoindian, and Late Paleoindian over the time span of circa 12,900–10,000 cal BP. Unless otherwise noted, all age and date references are based on calibrated radiocarbon dates and calendar years before present (Fiedel 1999).
LATE PLEISTOCENE LANDSCAPES IN EASTERN NEW YORK

Physiography, Geology, Drainage

Figure 2.1 illustrates physiographic regions of New York (Cadwell et al. 2003). Areas of higher elevation in eastern sectors of the state include the Appalachian Plateau, Adirondack Highlands, and Taconic Mountains, all underlain by rock units more resistant to erosion. Known regionally as the Southern Tier of New York, the Appalachian Plateau is made up of Devonian limestones, shales, sandstones, and conglomerate. The Onondaga Escarpment and its chert-bearing limestones extend west-to-east across the midsection of the state. Highly metamorphosed rocks of the Middle Proterozoic—gneisses, quartzites, and marbles—make up the Adirondack Highlands in northern New York. To the east, the Taconic Mountains are composed of metamorphosed Cambrian through Middle Ordovician rocks, including sandstones, shales, and slates.

Most of the lowland provinces in New York and western Vermont are made up of limestones, shales, sandstones, and dolostones; erosion and glacial scouring created terrains of modest relief that transect the New York region. In prehistory, the Erie-Ontario, Hudson-Mohawk, and St. Lawrence-Champlain lowlands offered broad travel corridors for human and animal populations skirting the Appalachian Plateau and Adirondack Highlands. To the southeast, Long Island marks the Terminal Moraine and lies within the Atlantic Coastal Lowlands province.

The Hudson River is the master stream for eastern New York. Draining 36,000 km², the Hudson runs south from its source on Mount Marcy in the Adirondacks for 507 km to its mouth in New York Bay. The east-flowing Mohawk and Wallkill river tributaries provided entry for humans into the Hudson Valley from points west; the west-flowing Hoosic and Battenkill rivers led eastward (upstream) from the Hudson Valley into the rest of the Far Northeast.

Deglacial Chronology and Events

As the Pleistocene drew to a close, the face of eastern New York was dramatically reshaped by glacial retreat, sea level rise, isostatic rebound, massive drainage diversions, and the formation and draining of proglacial and inland marine water bodies (Bloom 2008; Cronin et al. 2008; Donnelly et al. 2005; Rayburn et al. 2005; Richard and Occhietti 2005; Ridge 2003; Stanford 2009; Teller 2004). Current chronologies suggest that many of these events transpired only centuries before Paleoindian colonization.

In New York, the Late Wisconsin advance of the Laurentide ice sheet reached its southern terminus circa 28,000–24,000 cal BP, creating the massive terminal moraine of Long Island. Ice margin retreat from this position began about 24,000 cal BP (Ridge 2003; Stanford 2009), a process that was periodically interrupted by glacial
Paleoindian Occupations in the Hudson Valley

readvances, forming smaller end moraines farther north. By circa 15,500 cal BP, the glacial margin had retreated 250 km northward up the Hudson Valley to near present-day Albany. Thereafter, the pace of ice withdrawal across New York accelerated, with final retreat into Quebec by circa 13,100 cal BP (Donnelly et al. 2005; Richard and Occhietti 2005; Ridge 2003).

During this final deglaciation of eastern New York, meltwaters pooled behind the retreating ice front in the Hudson and its tributary valleys, trapped by morainal ridges on the isostatically depressed landscape. Large and small proglacial lakes formed and drained, their shoreline footprints fluctuating in response to changes in meltwater input, outlet elevations, and isostatic rebound. Although a general sequence of proglacial lakes in the Hudson Valley is known, chronological control is poor, and rough dates are often available only for either the inception or draining of some lakes. After these proglacial lakes formed, clay to silt-size sediments settled out on their bottoms, and feeder streams constructed deltas where they discharged into these water bodies. (In some cases, geologists have conferred more than one name for a particular proglacial lake with multiple stages in the Hudson valley; for simplicity, we follow Stanford’s [2009:7] Lake Albany designation for proglacial water bodies that occupied the Hudson Valley bottom south of Fort Ann). After final draining of these proglacial lakes, streams dissected the lake bed sediments, and winds eroded exposed deltaic sediments, creating localized dune fields (Bloom 2008; Stanford 2009).

During initial ice retreat up the lower Hudson Valley between about 24,000 and 17,000 cal BP, small proglacial lakes Bayonne, Passaic, and Hackensack formed and drained in an overlapping sequence west of the Hudson Valley bottom (Stanford 2009:7–8). To the northwest, glacial retreat from the tributary Wallkill valley formed Lake Wallkill—a proglacial lake contemporary with earlier stages of Lake Albany (Stanford 2009:14).

Beginning about 22,500 cal BP, Stanford (2009:8) suggests, early Lake Albany was restricted to the lower Hudson, with a stable spillway outlet at Hell Gate, flowing eastward along the north side of Staten Island into what is now Long Island Sound. Thereafter, the location and size of Lake Albany’s footprint fluctuated as it migrated upvalley, eventually reaching its northern limit near Glens Falls, east of the Adirondacks (figure 2.2B) (Cadwell and Muller 2004; Cadwell et al. 2003; Dineen et al. 1992). The total footprint of Lake Albany through time extended circa 320 km (515 miles) from the Narrows upstream to Glens Falls, with a maximum width of 50 km (80 miles) near Albany (figure 2.3). During specific stages, however, the extent of the lake’s footprint was significantly smaller.

Over its lifespan, as new outlets opened, water levels in Lake Albany dropped to successive lower levels, with these later lake stages becoming more fluvial or riverlike (DeSimone 1992). Stanford (2009:14) proposes that, as the footprint of Lake Albany migrated northward up the Hudson Valley, declining water levels combined with isostatic rebound to the south exposed the former lake bed in the lower Hudson Valley. Beginning about 17,500 cal BP, the northward-shifting outlet of Lake Albany began incising the emerging lake bed downstream, creating the modern course of the lower Hudson River. Dineen (1982:3) suggests a date of 12,600 14C yr BP (ca.14,800 cal BP) for the final draining of Lake Albany, although this approximation is likely too old.

As ice withdrew up the Hudson Valley, the postglacial Atlantic shoreline of the New York region retreated at variable rates. At circa 18,300 cal BP, sea level lay 150 m lower than today, with the coastline near the outer edge of the continental shelf at the “Nicholls” shoreline position (ca. 208 km, or 130 miles, southeast of Staten Island) (Stanford 2009:Figure 2.3B). This broad exposed plain on the continental shelf was bisected by the southeast-trending course of the late glacial Hudson Valley. Between circa 18,300 cal BP and the end of the Pleistocene at circa 11,600 cal BP, regional isostatic rebound in southeastern New York nearly equaled eustatic sea level rise, resulting in only marginal landward retreat of New York’s Atlantic coastline (see figure 2.2A). After 11,600 cal BP, sea level rise began to outpace isostatic rebound, resulting in more rapid transgression and drowning of the lowermost Hudson Valley (Stanford 2009:9–10, Figure 2.5).

Northwest of the Hudson Valley, ice retreat from the Ontario basin after 16,200 cal BP created proglacial Lake Iroquois along the southern margin of the ice front. With meltwater input from other Great Lakes basins to the west, Lake Iroquois continued to expand, eventually exceeding the footprint of modern Lake Ontario (see figure 2.2A).
2.2. Late Pleistocene landscapes and key deglacial events in eastern New York and vicinity, depicting dramatic changes between (A) 13,400 cal BP and (B) 13,100 cal BP. (A) Maximum footprints of proglacial lakes Iroquois and Albany; at circa 13,400 cal BP, retreat of Laurentide Ice Sheet (LIS) ice margin from the Covey Hill Gap along the northern Adirondacks reroutes drainage from the Mohawk Valley to lower-elevation outlets, draining Lake Iroquois through the St. Lawrence, Champlain, and Hudson lowlands. (B) Circa 13,100–13,000 cal BP, continued ice retreat opens the St. Lawrence Valley, and the Atlantic Ocean floods the Champlain Basin, forming the Champlain Sea. Numbered routes illustrate possible corridors for Paleoindian colonization of eastern New York. A northern corridor (1) runs east along Erie-Ontario lowlands into eastern New York (2, 3). A southern corridor (4) trends northeasterly via the Upper Susquehanna or Delaware and Wallkill valleys to the Hudson Valley (5, 6) (after Bradley 1998:15; Newby and Bradley 2007:Figure 1).

Sometime between 14,600 and 13,800 cal BP, final ice retreat from the Mohawk Valley opened an outlet for proglacial Lake Iroquois near Rome, New York, routing meltwater via the ancestral IroMohawk River into later, lower stages of Lake Albany in the Hudson Valley (Ridge 2003; Stanford 2009; Wall 2008). Wall (2008) calculates astonishing maximum flow rates of at least 42,500 m³ per second (1.5 million cubic feet per second) (cfs) down the IroMohawk Valley for perhaps one to three centuries before the Lake Iroquois outlet shifted to the St. Lawrence drainage circa 13,400 cal BP (see below). This estimated flow rate is 275 times greater than the average flow rate today for the modern Mohawk River (154 m³ per second, or 5,440 cfs)(USGS 2010). At the IroMohawk–ancestral Hudson River confluence, these turbulent floodwaters stripped away glacial till and proglacial lake sediment, cutting massive potholes into bedrock (Hall 1871; Wall 2008:17–18). In 1867 construction workers discovered the Cohoes mastodon in one of these glacial potholes. AMS dating of this mastodon yielded an age of 11,070 ± 60 ¹⁴C yr BP (12,930–13,050 cal BP), providing “a minimum age for pothole exposure following a drop in high water discharge during the drainage of Lake Iroquois” (Miller 2008b).

Reflecting these events, surficial geology in the Hudson Valley consists of mostly glacial till on higher elevations and proglacial lake bed sediments in valley bottoms (Cadwell and Dineen 1987). In addition, coarse deltaic sediments deposited on the margins of Lake Albany became exposed sandy plains as the lake drained (Cadwell and Muller 2004; Cadwell et al. 2003), and prevailing winds reworked these
Paleoindian Occupations in the Hudson Valley

With isostatic rebound, the footprint of the Champlain Sea shrank through time and was cut off from the Atlantic Ocean at about 9800–9700 cal BP (Cronin et al. 2008). Importantly, by this current chronology the Champlain Sea overlapped the Paleoindian occupation of eastern New York and thus could have factored into regional Paleoindian subsistence and land use practices.

Late Pleistocene Paleoenvironment and Fauna
While dramatic deglacial events were fundamentally reshaping postglacial landscapes of eastern New York, regional late Pleistocene climates were also in flux, reflected by dynamic changes in vegetation as plant and tree communities recolonized the region after ice retreat and in response to subsequent climate changes. Beginning circa 14,700 cal BP, a general warming trend is indicated during the Bolling-Allerød interval. Over the next 1,400 years, both boreal and temperate forest species established themselves in the deglaciated middle and lower Hudson Valley of New York (Miller 2008a).

Between about 13,400 and 11,600 cal BP, a climatic reversal known as the Younger Dryas took place, with a sudden return to colder temperatures and decreased precipitation in the Canadian Maritimes and New England (Peteet et al. 1993). In east-central New York, mean annual temperatures were 5–10° C colder than present, similar to the modern climate of central Quebec (Miller 2008b:23). Paleoenvironmental data for the Far Northeast indicate that plant and tree communities responded quickly (perhaps one to two centuries) to the onset of the Younger Dryas climatic reversal, but that these vegetation changes varied across the region (Maenza-Gmelch 1997; Miller 2008a, 2008b; Newby et al. 2005; Lothrop et al. 2011:550–551; Peteet et al. 1993; Shuman et al. 2002, 2004; Toney et al. 2003). In the Maritimes, tundra partly replaced spruce forests. In southern New England, boreal forest taxa (spruce, fir, and occasionally alder or birch) became more common at the expense of deciduous species like oak and ash (Newby et al. 2005; Shuman et al. 2002). In the middle-lower Hudson Valley of New York and northern New Jersey, spruce, balsam fir, and alder increased in abundance, consistent with cooler and drier conditions (Miller 2008b). Miller (2008b:23) suggests that during the Younger Dryas the middle-lower

Circa 13,100–13,000 cal BP, with final ice retreat north of the St. Lawrence Valley, the Atlantic Ocean flooded the isostatically depressed St. Lawrence and Champlain lowlands, marking the end of proglacial Lake Vermont in the Champlain Basin and creating the Champlain Sea (see figure 2.2B) (Cronin et al. 2008; Rayburn et al. 2005; Rayburn, personal communication, 2008; Richard and Occhietti 2005; Rodrigues 2006). At its maximum extent, this vast inland sea stretched 600 km (375 miles) east-west between Ontario and Quebec and 300 km (185 miles) south from Quebec into the Champlain Basin of eastern New York and western Vermont, dwarfing modern Lake Champlain. With isostatic rebound, the footprint of the Champlain Sea shrank through time and was cut off from the Atlantic Ocean at about 9800–9700 cal BP (Cronin et al. 2008). Importantly, by this current chronology the Champlain Sea overlapped the Paleoindian occupation of eastern New York and thus could have factored into regional Paleoindian subsistence and land use practices.
Primary, bedded sources of toolstone used in prehistory by Native Americans outcrop across discrete sectors of the New York region (Funk 2004; Holland 2004). These include both Devonian and Ordovician chert-bearing formations; the most extensive outcrops consist of chert-bearing Devonian limestones along the Onondaga and Helderberg escarpments, fronting the northern and eastern margins of the Appalachian Plateau in New York (Fisher et al. 1970). Investigations of the Potts and Corditaipe sites in central and eastern New York document exploitation of these sources during the late Pleistocene (Funk and Wellman 1984; Gramly and Lothrop 1984; Lothrop 1989).

Members of the Ordovician Normanskill Group—the Mount Merino and Indian River formations—are mapped together discontinuously through the upper and middle Hudson Valley from Washington County southward into Dutchess County (Fisher et al. 1970). The Mount Merino Formation yields cherts ranging from green to black, and outcrops of the Indian River Formation may also contain green cherts (Fisher 1977; Landing 1988, 2007; Landing et al. 1992). Archaeological and geological investigations at the Greene County outcrops of West Athens Hill, Scott Farm Quarry, and Flint Mine Hill variously document mining and reduction of Normanskill chert from Paleoindian through later prehistoric times in the mid-Hudson Valley (e.g., Brumbach 1987; Burke 2006; Funk 1973, 2004; Parker 1924; Robinson et al. 2009), and fieldwork in Washington County reveals outcrops of this toolstone in the upper Hudson Valley as well (Holland and Ashton 1999). There may well be other, unrecorded outcrops in the Hudson Valley of this important toolstone source that were exploited by Paleoindians.

For the Wallkill Valley of southeastern New York and adjoining New Jersey, LaPorta (1996) and Holland (2004) describe Lower Ordovician chert-bearing formations that Native Americans mined for toolstone through much of prehistory. LaPorta (1996:73–74) notes the presence of eight different chert-bearing members in southern extensions of the Beekmantown Group in northern New Jersey. Surface finds (Lake 2003) and investigation of the Zappavigna site by Funk et al. (2003:16) indicate Paleoindian use of several Wallkill Valley chert sources, including the Epler and Ontelaunee formations.
In eastern Pennsylvania, jasper in the Hardyston Formation was mined by Native Americans throughout prehistory (Hatch 1994). Paleoindians appear to have transported this toolstone from quarries in Berks, Lehigh, and Bucks counties to sites in the Susquehanna and Delaware drainages of Pennsylvania (Carr and Adovasio 2002:21–23; Carr and McLear 2005; Fogelman and Lantz 2006; Hatch and Maxham 1995; Lothrop et al. 2008). The likely additional presence of eastern Pennsylvania jasper in Paleoindian site collections in the upper Susquehanna and Hudson valleys of New York strongly suggests that Paleoindians imported this toolstone to the region during seasonal travels (Funk 1993:174, 2004; Ritchie 1977; Whitney 1977). This notion is consistent with sourcing analysis that links jasper at the Bull Brook Paleoindian site in Massachusetts to eastern Pennsylvania sources (Robinson et al. 2009).

### Colonizing Eastern New York: Timing, Routes, and Resources

**Chronological Control**

The scarcity of reliable radiocarbon dates for Paleoindian sites in northeastern North America has led archaeologists to formulate biface sequences for relative chronological control. For the eastern Great Lakes, researchers have developed a sequence of Early (fluted) and Late (nonfluted lanceolate) Paleoindian bifaces (Deller and Ellis 1988; Ellis 2004a, 2004b; Ellis and Deller 1990, 1997; Jackson 2004; Simons 1997; White 2006). For fully fluted forms, the relative ordering is Gainey-Barnes-Crowfield (table 2.1), with Simons (1997) further suggesting that Butler points are transitional between Gainey and Barnes forms. In this formulation, Gainey is viewed as oldest based on greater similarity to Clovis forms. Late Paleoindian point forms include basally thinned Holcombe and Hi-Lo forms followed by nonfluted, lanceolate points.

Building on Spiess et al. (1998), Bradley et al. (2008) proposed a similar point sequence for the Far Northeast, spanning a suggested time interval of 12,900–10,000 cal BP for this sequence. Kings Road/Whipple forms are most similar to Clovis bifaces and therefore likely oldest in this series. For fully fluted bifaces in this sequence, trends through time include decreasing basal width and maximum thickness, increasing face angle (divergence of lateral margins), and increasing flute length (similar to trends in the eastern Great Lakes). As illustrated in table 2.1, Bradley et al. (2008) proposed Early Paleoindian and Middle Paleoindian subdivisions for fluted biface forms. Reflecting a shift to nonfluted bifaces after the Younger Dryas, Late Paleoindian forms include lanceolate Agate Basin–related and Ste. Anne/Varney bifaces (Bradley et al. 2008; Newby et al. 2005).

Gramly (2008, 2009) proposes an alternate Paleoindian biface sequence for much of eastern North America, including southeastern New York. He suggests that Cumberland points in the Southeast and Great Lakes Barnes points predate Clovis, and that Folsom and Crowfield forms derive directly from Clovis. Gramly reviews the five fluted bifaces

<table>
<thead>
<tr>
<th>Chronology</th>
<th>New England Maritimes</th>
<th>Eastern Great Lakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Paleoindian</td>
<td>Kings Road/Whipple</td>
<td>Gainey</td>
</tr>
<tr>
<td>~12,900–12,200 cal BP (-11,000–10,300 ¹⁴C BP)</td>
<td>Vail/Debert</td>
<td>?</td>
</tr>
<tr>
<td>Middle Paleoindian</td>
<td>Michaud/Neponset</td>
<td>Barnes</td>
</tr>
<tr>
<td>~12,200–11,600 cal BP (-10,300–10,100 ¹⁴C BP)</td>
<td>Crowfield-related</td>
<td>Crowfield</td>
</tr>
<tr>
<td>Late Paleoindian</td>
<td>Agate Basin–related</td>
<td>Agate Basin/Plano</td>
</tr>
<tr>
<td>~11,600–10,000 cal BP (-10,100–9000 ¹⁴C BP)</td>
<td>Ste. Anne/Varney</td>
<td>Eden/Plano</td>
</tr>
</tbody>
</table>

After Bradley et al. (2008) and Lothrop et al. (2011).
recovered from Dutchess Quarry Caves 1 and 8 in Orange County, New York (Funk and Steadman 1994; Steadman et al. 1997), and classifies the complete fluted point, one basal fragment, and one tip section as Barnes points and the two remaining tip sections as Cumberland points (Gramly 2008:31). Of these five fluted points, we are uncertain about the fragmentary tip specimens but note that metric attributes for the two specimens with surviving basal segments—the complete fluted point (NYSM A2001.17.001) and the basal fragment (NYSM A74952.001)—fall within the range of variability for Michaud/Neponset forms in the Far Northeast (Bradley et al. 2008:141–146).

Why Colonize New York?

Why colonize eastern New York at the end of the Pleistocene? Most theoretical and regional models of Paleoindian colonization are ultimately resource driven. Foraging theory suggests incentives for human colonization of adjoining regions in an evolving late Pleistocene deglaciation environment organized in a mosaic (as opposed to zonal) pattern (e.g., Barton et al. 2004). For example, patch choice models predict that colonizers to a new region focus on high-ranking resources such as megafauna (made more feasible by a pre-adapted hunting technology; Kelly and Todd 1988). Over time, population growth of foraging groups and depletion of prey species encourage groups to move into uninhabited regions nearby—an example of short-distance colonization of adjoining regions based on range shift (Spiess et al. 1998:247). Long-distance colonization may have also figured in this process, perhaps driven by other factors and relying on migration via major valley corridors, possibly moving out from ecologically rich zones (Anderson 1990; Anderson and Gillam 2000; Dincauze 1993).

For eastern New York and the Hudson Valley, a range of resources could have drawn Paleoindian explorers into the region. These included toolstone; eastern New York harbored good-quality cherts in Hudson Valley outcrops of the Ordovician Normanskill group and in Devonian formations along the east-facing Helderberg Escarpment.

The New York region also contained a variety of late Pleistocene fauna as potential prey—including caribou and mastodon—that overlapped human occupation of the region, before extinction or extirpation (Laub and Spiess 2003; Newby and Bradley 2007). Newby et al. (2009) argue that vegetation changes in the Far Northeast at the Younger Dryas onset (more open conditions to the north and southward-shifting spruce forests) created habitats favorable to local and long-range migratory herds of caribou. Dincauze and Jacobson (2001) point to migratory waterfowl populations in the late Pleistocene as potential food resources, especially where early postglacial lake shorelines intersected Atlantic flyways.

Perhaps the largest resource draw for the New York region in the late Pleistocene, the Champlain Sea likely formed only a century or two before human colonization of New York. Loring (1980) suggested that the Champlain Sea contained marine resources attractive to Paleoindian populations, a notion receiving renewed support (Newby and Bradley 2007; F. Robinson, this volume). Discoveries of fossil remains in the former footprint of the Champlain Sea reveal a rich marine fauna inhabiting this vast inland sea that fronted northeastern New York, including five species of whales, four species of seals, more than ten fish species, and shorebirds (Franzi et al. 2010; Harrington 1988; McAllister et al. 1988; Steadman et al. 1994). Fossils of saltwater fish species suggest coastal marine habitats comparable to southern Labrador today (McAllister et al. 1988:243).

Renewed consideration of how prehistoric peoples may have colonized uninhabited landscapes, particularly in late Pleistocene North America (e.g., Haynes 2002:239–262; Meltzer 2002, 2004; Rockman and Steele 2003), highlights the critical human strategies of “wayfinding” and “landscape learning.” From ethnographic data on how hunter-gatherers use landscapes, Kelly (2003:54) suggests that wayfinding through an unknown landscape was probably made easier and less risky by piloting between landmarks along easily traceable geographic features—most obviously major rivers, but also mountain ranges or other linear ecological margins. Conversely, landscapes lacking topographic relief or major waterways would have been more difficult to navigate and internalize and therefore were perhaps avoided initially.

These notions mesh well with Paleoindian colonization scenarios. Building on Bradley (1998), Newby and Bradley (2007) offer a detailed model of colonization scenarios, suggesting “northern” and “southern” corridors into eastern New York and the broader region (see figure 2.2B).

Paleoindian populations could have entered New York
Paleoindian Occupations in the Hudson Valley

2.4. Digital elevation map of west-central New York, showing west-to-east trending Cross State Channels, formed by east-flowing deglacial drainage (note drumlins truncated by these erosional channels). Abandoned before 13,000 cal BP, these relict low-relief channels could have provided pathways for movement across New York for colonizing and later Paleoindian populations (DEM imagery courtesy of Andrew Kozlowski).

from the west, perhaps from the Ohio Valley, following a northern route eastward between the Onondaga escarpment and early Lake Ontario (see figure 2.2B, 1). Traveling east along the Lake Ontario Plain, Paleoindians could have followed the Cross-State Channels (Kehew et al. 2009; Kozlowski and Pair 2007; A. Kozlowski, personal communication, 2008) (figure 2.4). These late Pleistocene erosional channels span much of the Ontario Lake Plain and were likely formed during deglaciation either by subglacial drainage or by meltwaters flowing eastward along the retreating ice front toward the Mohawk Valley. DEM imagery from central New York shows that these west-to-east trending channels run perpendicular to (and in some cases have truncated) north-south oriented Late Wisconsin drumlins on the Ontario Lake Plain. By the time of human entry into the New York region circa 13,000 cal BP, meltwater had long since abandoned these channels. With each channel measuring up to 0.5 km wide and incised 5–10 m into the late Pleistocene landscape, these features could have facilitated human colonization and later seasonal travels of Paleoindians across the Ontario Plain.

Paleoindians also could have entered eastern New York via a southern corridor, following the Susquehanna or Delaware valleys upstream (Newby and Bradley 2007; Ritchie 1957) (see figure 2.2B, 4). By crossing divides, these drainages lead into the Mohawk and Wallkill/Hudson valleys, respectively.

These northern and southern entry routes highlight the strategic importance of the Hudson Valley during the late Pleistocene, as a corridor for accessing toolstone and subsistence resources and also as a jumping-off point for initial entry, and later seasonal travels, into the rest of the Far Northeast.

Sequence of Colonization

Recent AMS radiocarbon dates on early Paleoindian occupations in northern Ohio and the upper Delaware Valley indicate that fluted point populations were present in regions proximal to western and southeastern New York by circa 12,900 cal BP (Gingerich 2007, 2011; Gingerich and Waters 2007; Waters et al. 2009). Consistent with the appearance of early fluted point sites and isolates across parts of the Far Northeast, we assume that this approximates the entry date for human groups into the New York region.

Paleoindian site locations in Bradley et al. (2008), calibrated with their proposed point sequence, offer a provisional window on the earliest incursions of Native American groups into the eastern New York, as well as later settlement trends. These data, combined with a subsequent review of Paleoindian site distributions across the Far Northeast (Lothrop et al. 2011), suggest changes through time in the Paleoindian occupation of eastern New York.

**Early Paleoindian.** Based on site distributions, eastern New York may have been most heavily occupied during Early Paleoindian times. Sites with Kings Road/Whipple points, including Port Mobil, Twin Fields, Kings Road,
Swale, and West Athens Hill, record perhaps the earliest occupations in the lower-middle Hudson Valley (figure 2.5). Northeast of the Hudson Valley, Kings Road/Whipple point sites are also present in the middle and upper Connecticut valley (DEDIC, Whipple, Jefferson III) (Bradley et al. 2008:Figure 2.7). Vail/Debert point sites—believed to postdate Kings Road/Whipple point occupations—appear to be absent in eastern New York. Occupying more northerly settings, these sites appear in northwestern Maine and farther east at the Debert and Belmont site cluster in Nova Scotia (Bradley et al. 2008:Figure 11; Rosenmeier et al., this volume). Bull Brook/West Athens Hill point sites are more broadly distributed across central and southern portions of the Far Northeast and in eastern New York, include West Athens Hill, the Davis site, and perhaps the Sundler site (Bradley et al. 2008:Figure 13). Bull Brook/West Athens Hill point sites at Wapanucket, Bull Brook, and Spiller Farm record near-Atlantic coastal occupations for the first time (dated at Bull Brook to ca. 12,400 cal BP; Robinson et al. 2009), and the Windy City site at the Munsungun chert source area indicates more northerly occupations also.

After first entering a new region such as the Hudson Valley, how long would it take immigrant Paleoindians to identify optimal travel routes and critical resource areas such as toolstone outcrops and productive lands for seasonal animal and plant resources? Petersen (2004:xxvi–xxvii) suggests that in the glaciated Northeast this process was probably fairly brief: “Pioneering must have come to an end in most areas relatively quickly, perhaps only a few generations or less than 100 years.” Considering the site-based evidence above for the earliest Paleoindian occupations of eastern New York, circa 12,900–12,400 cal BP, we can indeed envision “landscape learning” of the Hudson and Champlain lowlands taking place within a few generations after initial entry.

**Middle Paleoindian.** Later fluted point sites are much
Paleoindian Occupations in the Hudson Valley

Plications for site typologies from a functional standpoint. Second, we consider a companion data set—statewide published fluted point distributions—as evidence of Early-Middle Paleoindian landscape use in eastern New York. Finally, we consider data on trends in toolstone frequencies between sites as evidence for Paleoindian mobility ranges.

Sites and Site Typologies
To date, avocational and professional archaeologists have investigated eleven sites in the Hudson Valley of eastern New York (table 2.2) and a limited number of sites in adjacent areas (see figure 2.5). Typically, these sites consist of one to five small occupation areas (as defined by artifact concentrations) and yield a range of formal and expedient stone tools and flaking debris, suggesting residential camps.

Current perceptions of Paleoindian settlement in eastern New York are conditioned by the research of Ritchie and Funk. From the 1950s into the new millennium, as sites were discovered and documented, and sometimes investigated, Ritchie and Funk incrementally built models of Paleoindian site types and settlement strategies, with interpretations of new discoveries influenced by earlier findings.

Ritchie’s early studies of the Davis and Potts sites recorded small Paleoindian encampments in the Champlain Lowlands and Ontario Plain (Ritchie 1969). This was followed by Funk’s important early excavations in 1966 and 1969 at the West Athens Hill site in the middle Hudson Valley (Funk 1973). Excavations at this ridgetop setting, west of the Hudson River, revealed three Paleoindian occupation areas. Funk’s recovery of (1) toolstone reduction debris adjoining worked outcrops of Normanskill chert and (2) a range of unifacial tool forms led him to interpret West Athens Hill as a multipurpose site where Paleoindians...
Lothrop and Bradley

Funk returned to this locality to excavate a second reentrant containing Paleoindian material, Dutchess Quarry Cave 8 (Funk and Steadman 1994).

In the late 1960s, Tom and Paul Weinman discovered and surface-collected the Kings Road site, collaborating with Funk to document a major fluted point encampment in bottomlands near West Athens Hill, on the bed of glacial Lake Albany (Funk 1976; Funk et al. 1969; Weinman and

Table 2.2. Settlement Characteristics of Hudson Valley Paleoindian Sites (sorted north-south)

<table>
<thead>
<tr>
<th>Site</th>
<th>Physiographic Region</th>
<th>Host Landform</th>
<th>Drainage/Drainage Basin</th>
<th>Components/Point Forms*</th>
<th>No. Occup. Areas</th>
<th>Site “Function”</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corditape Hudson-Mohawk Lowlands</td>
<td>outwash terrace</td>
<td>Mohawk/ Hudson</td>
<td>EP/BB-WAH</td>
<td>5</td>
<td>residential</td>
<td>Funk and Wellman 1984</td>
<td></td>
</tr>
<tr>
<td>Putnam Hudson-Mohawk Lowlands</td>
<td>terrace</td>
<td>Saranac/ Hudson</td>
<td>MP/Crowfield</td>
<td>?</td>
<td>indeterminate</td>
<td>Funk and Walsh 1988</td>
<td></td>
</tr>
<tr>
<td>Sundler Hudson-Mohawk Lowlands</td>
<td>I. Pleistocene dune field</td>
<td>Hudson</td>
<td>EP/BB-WAH</td>
<td>Multiple</td>
<td>residential</td>
<td>Bradley et al. 2010; Ritchie 1957</td>
<td></td>
</tr>
<tr>
<td>Railroad 1 Hudson-Mohawk Lowlands</td>
<td>I. Pleistocene lakebed</td>
<td>Hudson</td>
<td>EP or MP</td>
<td>1</td>
<td>residential/quarry reduction</td>
<td>Funk 1976, 2004</td>
<td></td>
</tr>
<tr>
<td>Dutchess Quarry 1 and 8 Hudson-Mohawk Lowlands</td>
<td>Cave</td>
<td>Wallkill/ Hudson</td>
<td>MP/M-N</td>
<td>2</td>
<td>residential</td>
<td>Funk and Steadman 1994</td>
<td></td>
</tr>
</tbody>
</table>

*EP, Early Paleoindian; MP, Middle Paleoindian; LP, Late Paleoindian; KR-W, Kings Road/Whipple point component; BB-WAH, Bull Brook/West Athens Hill point component; M-N, Michaud/Neponset point component.

engaged in chert extraction and reduction during residential encampments at this important toolstone source.

Shortly thereafter, early investigations by the Orange County chapter of the New York State Archaeological Association and the New York State Museum at Dutchess Quarry Cave 1 in southeastern New York led to the “presumed association” between fluted points and late Pleistocene fauna, including caribou (Funk et al. 1970). Later,
Paleoindian Occupations in the Hudson Valley

21

(1976:206) to conclude (and we agree) that a strong case can be made for a fluted point occupation at the Railroad 1. As at the ridgetop setting of West Athens Hill, the three valley bottom sites—Kings Road, Swale, and Railroad 1—produced tool forms suggestive of residential encampments, along with quarried chert blocks from nearby outcrops and debris from early- through late-stage reduction of Normanskill chert. By 1973 these discoveries and findings at other eastern New York Paleoindian sites led Ritchie and Funk (1973) to formulate a Paleoindian settlement model for eastern New York, later refined by Funk (1976, 2004). In their initial formulation, they dichotomized quarry workshop sites such as West Athens Hill versus open-air encampments like Potts and Davis.

In 1973 and 1974, Leonard Eisenberg directed a field school at the Twin Fields site in Ulster County in the lower Hudson Valley (Eisenberg 1978:Appendix). The brief site report indicates that, in addition to Archaic and Woodland occupations, systematic excavations recorded an Early Paleoindian occupation in the western sector of the site. Twin Fields is a near-surface site located on a high Pleistocene terrace overlooking a tributary of the Wallkill River. Based on raw material and morphology, Eisenberg (1978) segregated 121 Paleoindian tools from the site assemblage. Recent review of this collection indicates that diagnostics include a Kings Road / Whipple fluted point base of jasper and a second fluted point tip of chert. Paleoindian unifacial tools are common and include endscrapers, sidescrapers, gravers, and utilized flakes (figures 2.9, 2.10). Toolstone is dominated by Normanskill chert, with smaller amounts of probable Pennsylvania jasper and other regional Devonian or Ordovician cherts.

With accumulating data on fluted points sites in eastern New York, Funk (1976, 1977) continued to distinguish quarry workshops at outcrops (exemplified by West Athens Hill), open-air encampments (“hunting camps”—Davis, Potts, and Kings Road (Swale had not yet been documented), and rockshelters, exemplified by the Dutchess Quarry Caves 1 and 8. He did note the seemingly hybrid nature of the Kings Road site, yielding evidence for both residential occupations and quarry-related toolstone reduction, but in a bottomland setting removed from chert outcrops.

Funk and Wellman (1984) reported on the Corditaipe...
Lothrop and Bradley (Zappavigna, Potts, Davis), implying to him procurement of different resources.

With hindsight, we offer brief comment on these initial Paleoindian settlement models. First, lacking radiocarbon dates and a regional Paleoindian point sequence, the Ritchie and Funk models necessarily collapsed all sites into a single time frame, potentially obscuring any temporal variation in settlement. Reflecting Funk’s intensive research at West Athens Hill, these models distinguish between quarry workshop stations at outcrops and all other sites, again potentially obscuring some variation between these sites and the settlement poses they represent. Finally, several of the sites used for these modeling efforts (e.g.,

Site in Oneida County, discovered by Noel Strobino on a stream tributary terrace near the headwaters of the Mohawk. Investigations documented five Paleoindian occupation areas and both unifacial and bifacial tools made on Devonian cherts from the nearby Onondaga escarpment. Perhaps reflecting a perceived scarcity of Paleoindian sites in the vicinity, Funk and Wellman characterized Corditape as a small “isolated” Paleoindian campsite, “reminiscent of Davis, Port Mobil, and other relatively small sites in the Northeast” (Funk and Wellman 1984:72, 76). In his final synthesis, Funk (2004:115) further distinguished open-air residential sites associated with larger streams (Port Mobil, Twin Fields, Corditape) from those near smaller creeks (Zappavigna, Potts, Davis), implying to him procurement of different resources.

With hindsight, we offer brief comment on these initial Paleoindian settlement models. First, lacking radiocarbon dates and a regional Paleoindian point sequence, the Ritchie and Funk models necessarily collapsed all sites into a single time frame, potentially obscuring any temporal variation in settlement. Reflecting Funk’s intensive research at West Athens Hill, these models distinguish between quarry workshop stations at outcrops and all other sites, again potentially obscuring some variation between these sites and the settlement poses they represent. Finally, several of the sites used for these modeling efforts (e.g.,

2.6. Railroad 1 site, bifaces. Left to right: two middle-stage bifaces, distal fragments; fluted point base, broken by plunging flute removal (all Normanskill chert).

2.7. Railroad 1 site, evidence of toolstone reduction. Top row, left to right: hammerstone and tabular abrader (both sandstone). Bottom row, left to right: Exhausted polyhedral core and large biface (possible core) (both Normanskill chert).

2.8. Railroad 1 site, unifacial tools. Top row, left to right: sidescrapers with bits on left, right, and oblique lateral margins (all Normanskill chert). Bottom row: endscrapers (all Normanskill chert); (on specimen on right, note reworking of base to create narrow unifacial bit).
Paleoindian Occupations in the Hudson Valley

As context for future research, we note some implications of the settlement data from these investigated sites. First, with a relative chronology (Bradley et al. 2008), we can weigh possible evidence for temporal change in settlement behaviors. We note Funk’s view of the West Athens Hill site (1976, 1977, 2004) as a unique upland toolstone extraction and reduction station that also served as a residential camp for entire Paleoindian social units. Perhaps because of their bottomland settings and physical separation from exploited chert outcrops, he viewed the Kings Road, Swale, and Railroad 1 sites as primarily open-air residential encampments where toolstone reduction also took place. As with West Athens Hill, however, all three of these sites witnessed early- through late-stage reduction of quarried Normanskill chert. In contrast to West Athens Hill, Paleoindian visitors at Kings Road, Swale, and Railroad 1 brought blocks of toolstone from nearby outcrops, reducing them in these valley bottom encampments.

As noted, Paleoindian occupation at Kings Road and Swale appears to be primarily associated with Kings Road/Whipple points (Bradley et al. 2007). Our preliminary reanalysis shows that West Athens Hill produced both Kings Road/Whipple and Bull Brook/West Athens Hill points, although finished examples of the latter appear to be more common. In this light, fluted point occupations at Kings Road and Swale may partially predate the most intensive occupations at West Athens Hill. The possibility that this signals changes through time in Early Paleoindian toolstone procurement and settlement in the middle Hudson Valley requires further evaluation.

Funk (1976, 1977, 2004) highlighted Dutchess Quarry Caves 1 and 8 as unique examples of Paleoindian rockshelter occupations in the Hudson Valley. In retrospect, we can consider why this is still true today. Excavations of rockshelter/cave deposits elsewhere in the Hudson Valley region by Funk (1976) and others (Funk 1989) record a redundant pattern of mostly Middle/Late Archaic and Woodland occupations, typically with Archaic materials appearing in the lowermost cultural strata. By contrast, at Dutchess Quarry Caves 1 and 8, the original entrances to the caves had partially (Cave 1) or completely collapsed (Cave 8). At Cave 8, excavators sampled deposits from what likely was the

2.9. Twin Fields site, fluted points and endscrapers. Top row, left to right: fluted point base, Kings Road/Whipple form (jasper), fluted point tip (unidentified chert). Bottom row: endscrapers; note double lateral notches on specimen 1 (specimens 1–3, Normanskill chert; 4, jasper; 5, indeterminate chert).

2.10. Twin Fields site, gravers, sidescrapers, and utilized flakes. Top row, left to right: 1, graver on biface flake (Normanskill chert); 2, 3, gravers on flakes from polyhedral cores (indeterminate chert); 4, combination graver and double-bit, convergent sidescraper on biface flake (Normanskill chert). Middle row, left to right: Sidescrapers on flakes from polyhedral cores; 1, 2, single-bit examples; 3, double-bit, convergent sidescraper (1, jasper; 2, indeterminate chert; 3, Normanskill chert). Bottom row, left to right: 1, 2, utilized flakes on biface-derived flakes; 3, pièce esquillée (1, jasper; 2, 3, Normanskill chert).
middle or rear portions of the original cave; this could explain the absence of toolstone flaking debris in the recovered artifact sample (Funk and Steadman 1994).

Rockshelters and caves have finite life spans dictated by local geology. This begins with formation of the reentrant, a horizontal cavity that enlarges over time, ultimately leading to roof fall collapse and burial of the entrance. By way of example, in France's Périgord region (where limestone bedrock prevails) the average life span for rockshelters is circa 25,000 years (Farrand 2001). Archaeological investigations in eastern New York suggest that the cycles of cave and rockshelter development in the Hudson Valley's Devonian and Ordovician bedrock—from onset of reentrant formation to roof fall collapse—may average perhaps 10,000 calendar years or less. Thus, most caves or rockshelters that formed after deglaciation may have long since suffered roof fall collapses, with talus burying the original entrance to the cave or rockshelter. Although the Hudson Valley could harbor Paleoindian archaeological remains in other rockshelters or caves, such sites may well be obscured by talus and perhaps are detectable only with targeted remote sensing methods such as ground-penetrating radar. Indeed, investigators discovered Dutchess Quarry Cave 8 only after electrical resistivity survey revealed this residual cavity (Funk and Steadman 1994).

Recent reanalysis of the Sundler sites collection from Albany County hints at the potential for greater diversity in site locations and Paleoindian land use strategies in the Hudson Valley (Bradley et al. 2010). Avocational archaeologist Carl Sundler discovered the Sundler sites in the 1950s in the Albany Dunes complex, west of Albany. Covering 125 km², this late Pleistocene sand plain formed after Lake Albany drained to a lower level, perhaps during the fourteenth millennium cal BP (Cadwell and Dineen 1987; Donahue 1977) (see figure 2.3).

Ritchie (1957:86, Plates 2A, 11) briefly reported on Sundler’s discoveries on these “sand flats,” noting recovery of two fluted points and three unifacial tools. In 2008 reanalysis of the Sundler collection at the New York State Museum revealed a much larger assemblage of Paleoindian chert and jasper tools, from at least three recorded locations in the Albany Dunes complex (Bradley et al. 2010). Of the two fluted points, most notable is a complete but reworked specimen of spherulitic rhyolite, likely from a northern New Hampshire geological source (Pollock et al. 2008) (figure 2.11). This fluted point appears to be a retipped base of either an Early Paleoindian Bull Brook/West Athens Hill or Middle Paleoindian Michaud/Neponset form, suggesting Paleoindian occupation of this sand plain sometime between circa 12,700 and 11,800 cal BP.

The Sundler sites collection also includes endscrapers, sidescrapers, combination end- and sidescrapers, flake gravers, and possible pièces esquillées. These tools are mostly made of Devonian and Ordovician Normanskill cherts from the Hudson Valley but also include likely examples of Pennsylvania jasper (Bradley et al. 2010) (see figure 2.11).
Paleoindian Occupations in the Hudson Valley

Why would Paleoindians have frequented dune field settings such as Sundler? Today, remnant undisturbed portions of the Albany Dunes consist of rolling terrain, pocked with small ponds. The modern ecological communities there consist primarily of pitch pine—scrub oak barrens and pitch pine—oak forest, reflecting the sandy, well-drained character of most of this dune field landscape. Vernal ponds, found in depressions between individual dunes, are seasonally recharged by groundwater and support wetlands flora. This combination of xeric forest types and vernal pond settings in the Albany Dunes is highly unusual in New York and the broader Northeast (Barnes 2003:28–32). During the Younger Dryas, this dunefield landscape may have also harbored unique suites of plant and animal resources distinct from those found on the clayey proglacial lakebed settings that dominate the Hudson Valley bottomlands. Importantly, the Sundler sites lie in a subregion—the Mohawk-Hudson confluence—that previously held little evidence of Paleoindian occupation. Looking eastward, fluted point occupations of late Pleistocene dune fields are well known in the neighboring middle Connecticut Valley, suggesting that fluted point groups were indeed attracted to these dune field settings (Binzen 2005; Chilton et al. 2005; Curran and Dincauze 1977; Gramly 1998; Lothrop and Creemens 2010). From this standpoint, the Sundler sites suggest that in the Hudson Valley Paleoindians likely practiced a broader suite of land use strategies that we are only just beginning to recognize.

Fluted Points and Favored Landscapes

Across the Far Northeast, archaeologists have recently observed that many Paleoindian sites appear to cluster in distinctive settings, perhaps suggesting key resource areas for Paleoindian populations (Bradley et al. 2008:119; Lothrop et al. 2011). In the mid-Hudson Valley, the West Athens Hill, Kings Road, Swale, and Railroad 1 sites represent one such cluster. As noted above, in Massachusetts and Connecticut recorded Paleoindian sites cluster on late Pleistocene dune fields in the middle Connecticut Valley. Spiess et al. (this volume) report fluted point site clusters in Maine’s upper Magalloway Valley and on the Kennebec Sand Plain. Boisvert (this volume) documents fluted point site concentrations on deglacial terrain fronting the White Mountains of northern New Hampshire, with regional rhyolite sources in the vicinity. Rosenmeier et al. (this volume) and Bernard et al. (2011) describe the Debert-Belmont site cluster in Nova Scotia; during the Younger Dryas, these sites were situated on a periglacial landscape near small, reactivated glaciers. In the Yukon, recent discoveries of stratified caribou dung and still-hafted prehistoric weaponry, found melting out of ice patches (Farnell et al. 2004; Hare et al. 2004), document a long-term association between caribou prey and prehistoric hunters at these northern ice patch settings. These finds offer a seasonal caribou predation model for Paleoindian occupation of the Debert-Belmont complex and also remind us that some attributes that made certain landscapes attractive in prehistory may not be immediately evident today.

To gauge patterns of colonization and Paleoindian land use strategies at regional and continental scales, archaeologists are increasingly also turning to databases of fluted and late Paleoindian point distributions, typically assembled at the state level (Anderson et al. 2010). In New York, this effort began with Ritchie’s 1957 report, *Traces of Early Man in the Northeast*. For the next thirty-five years, the New York State Museum actively maintained a data file on fluted point distributions for New York, reported most recently by Beth Wellman (1982). Accessible today at the Paleoindian Database of the Americas (PIDBA) (http://pidba.utk.edu/main.htm), these data consist of fluted point frequencies per New York county (along with county land area in square miles) as of 1982. Although clearly in need of updating, these data offer another view on Paleoindian land use in New York.

Wellman (1982) reported counts of one or more fluted points in forty-seven of New York’s sixty-two counties. At the county level, these frequencies range from a high of forty-seven recorded for Greene County down to single specimens each for twelve New York counties. Those fifteen counties lacking recorded fluted points appear across all subregions of New York, but there is a notable absence of fluted points on the east side of the Hudson, in the contiguous counties of Rensselaer, Columbia, Dutchess, and Putnam and on the east side of the lower Hudson in the contiguous counties of Bronx, New York, and Kings. These distributional gaps led Ritchie (1957) early on to suggest that the east side of the Hudson Valley was largely uninhabited by Paleoindians (see below).
Based on a total land area for New York of 47,126 square miles (122,056 km²), the 290 fluted points yield a statewide density of 0.006 fluted points per square mile (0.0024 points per km²).

We converted the raw fluted point counts by county to density values by dividing each county’s fluted point frequency by its area in square miles. This yields densities ranging from a high of 0.073 fluted points per square mile for Greene County down to 0.001 fluted points square mile for Sullivan County in southeastern New York. Table 2.3 lists the ten counties with highest point densities, based on these raw counts and sorted by rank order.

There are, to be sure, undeniable biases in these data. For example, at some excavated sites (e.g., West Athens Hill; Funk 2004), investigators included unfinished fluted preforms in their point counts—strictly speaking, manufacturing rejects, not finished fluted points. Also, as Wellman (1982:39) notes, these site investigations themselves in effect inflated fluted point counts for a handful of counties. Thus, of the 47 points reported for Greene County, 38 derive from the West Athens Hill site and three from Kings Road. To minimize the effect of such biases, we standardized these data so that counties with investigated sites would not unduly influence geographic patterning. We did so by subtracting fluted point counts for individual sites from the respective county total and then assigning (and adding back in) a count of one fluted point for each investigated site. By this method, Greene County (with 41 points reported from two investigated sites) yielded a standardized point count of 8 (47 – 41 = 6 + 1 + 1 = 8).

With Wellman’s data standardized in this manner, fluted point frequencies per county range up to a more modest high of 17 each for Orange and Onondaga counties. Converting these raw counts to density values as before yields densities ranging up to a high of 0.068 fluted points per square mile for Richmond County (Staten Island, New York). This step also yielded a much lower ranking for Greene County.

Figure 2.12 shows the distribution of counties with the ten highest standardized densities, with stars marking their geographic centroids. Although using 1982-vintage data, these locations of peak fluted point density in eastern New York provide a useful counterpoint to recorded Paleoindian site locations. As with site distributions, seven of the ten counties with high fluted point densities intersect physiographic lowlands (Erie-Ontario, Hudson-Mohawk, Atlantic Coastal). But unlike the site distributions, two counties with high fluted point densities—Chenango and Otsego—occupy the Appalachian Plateau, and Fulton County straddles the Adirondack Highlands and Hudson-Mohawk Lowlands subprovinces.

Taken together, Wellman’s 1982 data attest to Paleoindian use of certain highland settings as well as lake plain and valley lowlands. Notably, there is no strong signal for

<table>
<thead>
<tr>
<th>County</th>
<th>Physiographic Region*</th>
<th>County Area (mi.²)</th>
<th>Fluted Point Count (raw counts)</th>
<th>Fluted Points/ mi.² (raw counts)</th>
<th>Density Rank Order (Raw counts)</th>
<th>Fluted Point Count (standardized)</th>
<th>Fluted Points/ mi.² (standardized)</th>
<th>Density Rank Order (standardized) **</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greene</td>
<td>HML and AP</td>
<td>648</td>
<td>47</td>
<td>0.073</td>
<td>1</td>
<td>8</td>
<td>0.012</td>
<td>8a</td>
</tr>
<tr>
<td>Richmond</td>
<td>ACL</td>
<td>59</td>
<td>20</td>
<td>0.034</td>
<td>2</td>
<td>4</td>
<td>0.068</td>
<td>1</td>
</tr>
<tr>
<td>Orange</td>
<td>HML</td>
<td>826</td>
<td>19</td>
<td>0.023</td>
<td>3</td>
<td>17</td>
<td>0.021</td>
<td>3</td>
</tr>
<tr>
<td>Onondaga</td>
<td>EOL and AP</td>
<td>784</td>
<td>17</td>
<td>0.022</td>
<td>4</td>
<td>17</td>
<td>0.022</td>
<td>2</td>
</tr>
<tr>
<td>Chenango</td>
<td>AP</td>
<td>897</td>
<td>16</td>
<td>0.018</td>
<td>5</td>
<td>16</td>
<td>0.018</td>
<td>4</td>
</tr>
<tr>
<td>Otsego</td>
<td>AP</td>
<td>1004</td>
<td>17</td>
<td>0.016</td>
<td>6a</td>
<td>17</td>
<td>0.017</td>
<td>5</td>
</tr>
<tr>
<td>Fulton</td>
<td>AH and HML</td>
<td>497</td>
<td>8</td>
<td>0.016</td>
<td>6b</td>
<td>8</td>
<td>0.016</td>
<td>6</td>
</tr>
<tr>
<td>Cayuga</td>
<td>EOL and AP</td>
<td>695</td>
<td>9</td>
<td>0.013</td>
<td>7a</td>
<td>9</td>
<td>0.013</td>
<td>7a</td>
</tr>
<tr>
<td>Wayne</td>
<td>EOL</td>
<td>605</td>
<td>8</td>
<td>0.013</td>
<td>7b</td>
<td>8</td>
<td>0.013</td>
<td>7b</td>
</tr>
<tr>
<td>Suffolk</td>
<td>ACL</td>
<td>911</td>
<td>11</td>
<td>0.012</td>
<td>8</td>
<td>11</td>
<td>0.012</td>
<td>8b</td>
</tr>
</tbody>
</table>

Data from Wellman (1982).

* ACL: Atlantic Coastal Lowlands; EOL, Erie Ontario Lowlands; HML, Hudson-Mohawk Lowlands; AP, Appalachian Plateau; AH, Adirondack Highlands.
**See figure 2.12.
Paleoindian use of the northern Adirondacks or the western shore of the former Champlain Sea (e.g., Essex County in the eastern Adirondacks yields a density value of only 0.004 fluted points per square mile). This is somewhat counter to our expectations, given F. Robinson’s (this volume) substantial evidence for Early through Late Paleoindian land use along the eastern shore of the Champlain Sea in Vermont. This discrepancy could simply reflect underrepresentation of fluted point counts for the Champlain Lowlands of New York in Wellman’s 1982 data.

What do the Wellman (1982) data tell us about New York landscapes that were favored by Paleoindians? In the mid-Hudson Valley proper, the density peak in Greene County reinforces the notion that Paleoindians regularly exploited that area’s outcrops of Ordovician Normanskill and Devonian cherts (see figure 2.12). For southeastern New York we might speculate that late Pleistocene plant or animal resources of the “Black Dirt” region in Orange County’s Wallkill Valley attracted colonizing and later fluted point groups. Because of its position fronting the Narrows of the late Pleistocene Lower Hudson, Richmond County (modern Staten Island) may have also harbored unique resource suites in the late Pleistocene. In central New York, peak densities in Onondaga, Cayuga, and Wayne counties may relate to terrestrial resources of the Erie-Ontario Plain. On the Appalachian Plateau, high fluted point densities in Chenango and Otsego counties may partly reflect use of the upper Susquehanna Valley as a travel corridor between eastern Pennsylvania and eastern New York.

That said, these fluted point distributional data and the implied trends for Paleoindian land use must be taken with several grains of salt. Wellman herself (1982:39) mentions other sources of bias, noting, for example, that high fluted point densities for Chenango and Otsego counties
were likely inflated by Whitney’s (1977) systematic recording of Paleoi-dians artifacts in the Upper Susquehanna/Chenango drainage. Further, the higher densities of fluted points reported by Wellman (1982) for central and eastern New York counties surely reflect Ritchie and Funk’s long-term research focus in these areas (and their reporting network of mostly avocational archaeologists). More recent studies of Paleoi-dian sites in western New York now reveal substantial late Pleistocene occupation in this part of the state (e.g., Gramly 1988, 1998; Laub 2003; Tankersley 1994, 1995; Tankersley et al. 1997) (see figure 2.5). Wellman’s 1982 data on fluted point distributions are useful for suggesting some provisional trends, but reports of recent discoveries in eastern New York (e.g., Ashton 1994; Bradley et al. 2010; Funk and Walsh 1988; Funk et al. 2003; Jamison 1996; Lake 2003; Levine 1989; Rush et al. 2003; Schackne 2005) emphasize the need to update this information.

Schackne’s 2005 study of Paleoi-dian site and point distributions in the mid-Hudson/Wallkill valleys exemplifies new insights from recent point discoveries. Importantly, her study area includes counties on the east side of the Hudson River—previously terra incognita for Paleoi-dian occupation. Prior to this study, no sites or isolated finds had been documented on the east bank of the middle Hudson, leading Ritchie (1957:11) and Dinauze and Jacobson (2001:122) to view this reach of the Hudson River not as a corridor but as a barrier that prevented Paleoi-dians from inhabiting the east side of the valley. Schackne (2005) reports new discoveries by Ted Filli and others of fluted and late Paleoi-dian bifaces at five locales in Columbia County. These data suggest significant Paleoi-dian occupation on the east side of the Hudson valley, a finding predicted by Funk (2004:115).

For her larger mid-Hudson/Wallkill valley data set, Schackne (2005) sees a potential association between Paleoi-dian occupations and lakebed deposits or relic shorelines of the terminal (Fort Ann) low stage of Lake Albany. She notes that Paleoi-dians were perhaps keying on ecotonal settings at these lakebed deposits. Her findings reinforce the need to synthesize new locational data on Paleoi-dian sites and isolated finds and to consider environmental factors beyond chert outcrops to better understand late Pleistocene settlement in the New York region.

With this in mind, we have restarted the New York State Museum fluted point survey as the New York Paleoindian Database Project (NYPID) (Lothrop 2009). Our first goal is comprehensive recording of locations and attributes of Paleoi-dian bifaces across New York. Like PIDBA, a web page will help to solicit information, provide access to data for researchers, and disseminate new findings (www.nysm.nysed.gov/nypid/index.html). The collective efforts of avocational and professional archaeologists will help to refine our understanding of variation in Paleoi-dian bifaces and land use strategies through time across New York.

Toolstone and Paleoindian Mobility

For more than fifty years, northeastern archaeologists have debated the implications of toolstone variation in Paleoindian assemblages. With only rare exceptions (Moeller 1980), for nearly all analyzed sites in the glacial Northeast cortical surfaces on stone tools and flaking debris point to acquisition from primary outcrop sources (Ellis 1989, 2008; Lothrop 1989; Petersen 2004; Spiess 2002; Spiess et al. 1998:239). This contrasts with locations farther south, such as the Mid-Atlantic Coastal Plain, where Paleoindian groups had to rely on secondary cobble materials as the only available toolstone (Custer et al. 1983).

In turn, most researchers see the raw material profiles from these Paleoindian sites as evidence for direct procurement of the most common toolstone varieties (as opposed to acquisition by exchange or other indirect means) (Ellis 2008, 2011). Along these lines, Meltzer (1989) finds no persuasive evidence for systematic exchange of large quantities of cherts among eastern Paleoindian groups, consistent with the notion that these peoples acquired most toolstone by direct procurement.

Where toolstone profiles at northeastern Paleoindian sites consist of more than one raw material type, we suggest that the majority and first-tier minority lithic types most likely represent direct procurement. Second-, third-, or fourth-tier minority raw materials could variously reflect (1) direct procurement, (2) indirect “acquisition” due to shifts in band membership via mating networks, (3) deliberate exchange, or (4) some combination of these (Ellis 2011; Lothrop 1989; Petersen 2004).

In the glaciated Northeast, early and middle Paleoindian sites are often located at distances of 200–300 miles from presumed geological sources of artifact toolstone, leading...
Paleoindian Occupations in the Hudson Valley

that the presence of probable eastern Pennsylvania jasper as a minority raw material at some Hudson Valley sites signified a progressive northward shift through time of annual ranges. In this scenario, Paleoindian groups inhabiting eastern Pennsylvania first explored the Hudson Valley on an intermittent or seasonal basis and later transitioned to annual ranges more focused on eastern New York. Although Funk (1976:224–225, 2004) remained unconvinced, we see this scenario as still persuasive.

Gramly (1988:267–270, Figure 1) compared likely source locations of Ordovician and Devonian toolstone to Early Paleoindian site proveniences in New York and northern Pennsylvania and hypothesized “band territories” for early Paleoindians extending (1) from eastern Ohio to western New York; (2) from central New York to central Pennsylvania; and (3) from the eastern Ontario Plain to the lower Hudson Valley. This last region is based on the distribution of Normanskill chert on Paleoindian sites extending along the length of the Hudson Valley and up the Mohawk to the Ontario Plain. Bradley and Boudreau (2006) note the presence of probable Normanskill chert in fluted point assemblages in eastern Massachusetts and suggest annual ranges for Early-Middle Paleoindian groups extending from the Hudson Valley east to the near-Atlantic coast.

Table 2.4 qualitatively summarizes provisional Early and Middle Paleoindian evidence for (1) major chert sources exploited within New York, (2) extraregional cherts imported to New York, and (3) New York cherts exported to other regions. For cases where fluted point groups likely imported toolstone into the New York region, much of the
to the prevailing interpretation of extensive annual mobility that we favor (e.g., Bradley and Boudreau 2006; Burke 2006; Ellis 1989, 2008, 2011; Goodyear 1989; Gramly 1988; Lothrop 1989; Petersen 2004). Typically, absence or scarcity of cobble cortex on tool surfaces also indicates that, where raw materials are found south of their geological sources, this cannot be explained by glacial transport. Gardner (1989, 2002) draws a distinction between Paleoindian mobility in the glacial northeast and in the unglaciated Southeast, south of Pennsylvania. Biomes in these southern late Pleistocene landscapes were fundamentally different and supported settlement strategies with more limited residential mobility.

Some researchers suggest that Paleoindians of the Far Northeast procured toolstone by logistically organized task groups, meaning that raw material profiles for individual sites may overestimate annual ranges of residential groups (Spiess 2002; Spiess and Wilson 1989). The wide range of tool classes documented at quarry reduction–related sites like West Athens Hill, Kings Road, and Swale, indicating occupations by entire residential units, suggests to us that, at least for early Paleoindians in eastern New York, toolstone procurement was likely embedded in larger seasonal patterns of residential mobility. Ellis (2011) argues that this pattern of embedded rather than logistical procurement of toolstone applied to early Paleoindians in both the eastern Great Lakes and Far Northeast.

Witthoft (1952) and Ritchie (1957) were the first researchers to ponder how to interpret imported toolstone on New York Paleoindian sites. Ritchie (1957:11) suggested that the presence of probable eastern Pennsylvania jasper as a minority raw material at some Hudson Valley sites signified a progressive northward shift through time of annual ranges. In this scenario, Paleoindian groups inhabiting eastern Pennsylvania first explored the Hudson Valley on an intermittent or seasonal basis and later transitioned to annual ranges more focused on eastern New York. Although Funk (1976:224–225, 2004) remained unconvinced, we see this scenario as still persuasive.

Table 2.4 Transport of Paleoindian Toolstone into and from the New York Region

<table>
<thead>
<tr>
<th>Region (Province)*</th>
<th>Imported Toolstone (probable source/region)</th>
<th>Regional Toolstone</th>
<th>Exported Toolstone and Destination Region</th>
<th>Primary Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern New York (HML)</td>
<td>Jasper (eastern PA)</td>
<td>Normanskill, Devonian</td>
<td>Normanskill (Far Northeast and mid-Atlantic; see table 2.5)</td>
<td>Bradley and Boudreau 2006; Funk 2004; Gramly 1988, 1998; Spiess et al. 1998</td>
</tr>
</tbody>
</table>

*EOL, Erie Ontario Lowlands; AP, Appalachian Plateau; HML, Hudson-Mohawk Lowlands
movement seems to be on a southwest-to-northeast axis. This includes Ohio cherts imported eastward via the Ohio Valley and jaspers carried from eastern Pennsylvania into the upper Susquehanna and Hudson valleys.

Table 2.5 lists the reported presence of Normanskill chert artifacts at fluted point sites across the Far Northeast and mid-Atlantic regions. These data suggest that Normanskill chert was transported up to 400 km from its Hudson Valley source outcrops: north and east to sites in the Connecticut and Androscoggin valleys and near-coastal Atlantic areas; north and south along the Hudson-Champlain corridor; and west and south along the Susquehanna and Delaware drainages. These reported identifications of Normanskill chert largely rely on macroscopic criteria, but recent sourcing analyses by Burke and colleagues confirm transport of this chert circa 250 km east from the Hudson Valley to the Bull Brook site, where it is the most common lithic raw material (Robinson et al. 2009:426–427). Likewise, petrographic analysis indicates transport of Normanskill chert 325 km west to the Kilmer site in Steuben County, western New York (Tankersley et al. 1996). Though more comprehensive geological sourcing is needed to confirm this apparent pattern, these provisional data suggest that Paleoindians transported Normanskill chert artifacts from the Hudson Valley to many destinations on the late Pleistocene landscape, both within and beyond the Far Northeast. This interpretation highlights the strategic role of the Hudson Valley in the late Pleistocene, not only as an interregional toolstone source but also as a portal for Paleoindian residential movements into the Far Northeast.

For a handful of eastern New York sites, we can compare relative dating and raw material profiles to detect possible changes in toolstone use and mobility over time. Especially useful in this regard are Funk’s (2004:Tables 42, 43) frequency data on imported toolstone for Hudson Valley sites (based on visual classification). We isolated a single minority raw material—Pennsylvania jasper—and calculated its percentage of all toolstone for five sites (table 2.6). Those sites with Kings Road/Whipple point forms (Twin Fields, Kings Road, Swale) show higher percentages of jasper, ranging from 8.07 to 44.13 percent. By contrast, presumably later sites with mostly Bull Brook/West Athens Hill bifaces (West Athens Hill areas A and B, Corditaipe) yielded far fewer tools of jasper, ranging from 0.68 to 3.11 percent.

This proportional decline in Pennsylvania jasper, from presumed older site occupations (represented by Kings Road/Whipple points) to later encampments (Bull Brook/West Athens Hill bifaces), could signal reduced access through time to sources of this eastern Pennsylvania toolstone. As Ritchie (1957:11) suggested, this could reflect earlier colonizing visits from eastern Pennsylvania into the Hudson Valley, followed later by northward range shift for Paleoindian groups into eastern New York and beyond, with less frequent return forays to eastern Pennsylvania.

PALEOINDIAN TECHNOLOGIES

Archaeologists have traditionally focused on the nonperishable component of Paleoindian technology—flaked stone tools and debris—but rare discoveries reveal some organic elements of late Pleistocene material culture. Discoveries at the Sheriden Cave site in northwestern Ohio (Tankersley 2004:54–59) and at Clovis sites in Florida and the Southwest provide a window into a potentially wide range of bone and ivory artifacts (Bradley et al. 2010:114–132).

With two possible exceptions, such discoveries are virtually unknown for Paleoindian sites in the glaciated Northeast. Kellogg (2003:114–115) reports the recovery of a possible worked antler fragment from the Neal Garrison site in York County, Maine. This specimen displays a possible barb remnant and could represent an atlatl hook, similar to another candidate observed by Spiess in the Bull Brook collection. In western New York, excavations at the Hiscock site have recovered possible tools of mastodon bone and ivory (Laub et al. 1996; Tomenchuk 2003), although Haynes (2002:127–128) expresses concern about the cultural status of some specimens. The Hiscock site has also yielded possible evidence of textile or basketry that may associate with late Pleistocene human activities at the site (Adovasio et al. 2003).

Our current knowledge of Early-Middle Paleoindian stone technology in New York stems from artifact samples recovered at a few quarry reduction–related sites (on or near toolstone outcrops) and from other residential sites removed from toolstone sources. Regardless of distance from source, eastern New York fluted point sites have yielded biface and uniface classes of formal and expedient tools (Funk 2004; Funk and Wellman 1984; Funk et al. 2009).
### Investigated Paleoindian Sites with Reported Artifacts of Normanskill Group Cherts

<table>
<thead>
<tr>
<th>Site</th>
<th>County/State</th>
<th>Distance from Hudson Valley Outcrops to Site (km)</th>
<th>Direction of Movement from Hudson Valley</th>
<th>Normanskill Chert: Proportion of Sample*</th>
<th>Components/Point Forms**</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dam</td>
<td>Kennebec County, ME</td>
<td>375</td>
<td>northeast</td>
<td>minor</td>
<td>EP/BB-WAH</td>
<td>Spiess et al. 1998</td>
</tr>
<tr>
<td>Michaud</td>
<td>Androscoggin County, ME</td>
<td>350</td>
<td>northeast</td>
<td>minor</td>
<td>MP/M-N</td>
<td>Spiess et al. 1998</td>
</tr>
<tr>
<td>Hedden</td>
<td>York County, ME</td>
<td>350</td>
<td>northeast</td>
<td>minor</td>
<td>EP or MP</td>
<td>Spiess et al. 1998</td>
</tr>
<tr>
<td>Wapanucket 8</td>
<td>Plymouth County, MA</td>
<td>225</td>
<td>east</td>
<td>minor</td>
<td>EP/BB-WAH, MP/M-N</td>
<td>Bradley and Boudreau 2008</td>
</tr>
<tr>
<td>Neponset</td>
<td>Norfolk County, MA</td>
<td>225</td>
<td>east</td>
<td>minor</td>
<td>MP/M-N</td>
<td>Spiess et al. 1998</td>
</tr>
<tr>
<td>Hidden Creek</td>
<td>New London County, CT</td>
<td>150</td>
<td>southeast</td>
<td>minor</td>
<td>MP/C-N</td>
<td>Spiess et al. 1998</td>
</tr>
<tr>
<td>Shattuck Farm</td>
<td>Essex County, MA</td>
<td>225</td>
<td>east</td>
<td>minor</td>
<td>MP/Crowfield-related</td>
<td>Spiess et al. 1998</td>
</tr>
<tr>
<td>Vail</td>
<td>Oxford County, ME</td>
<td>400</td>
<td>northeast</td>
<td>major</td>
<td>EP/Vail-Debert</td>
<td>Spiess et al. 1998; Gramly, pers. comm., 2010</td>
</tr>
<tr>
<td>Jackson-Gore</td>
<td>Windsor County, VT</td>
<td>200</td>
<td>northeast</td>
<td>minor</td>
<td>MP/M-N</td>
<td>Crock and Robinson 2009</td>
</tr>
<tr>
<td>DEDIC</td>
<td>Franklin County, MA</td>
<td>100</td>
<td>east</td>
<td>minor</td>
<td>EP/KR-W</td>
<td>Gramly 1998</td>
</tr>
<tr>
<td>Liebman</td>
<td>Windham County, CT</td>
<td>100</td>
<td>southeast</td>
<td>major</td>
<td>MP/M-N</td>
<td>Spiess et al. 1998</td>
</tr>
<tr>
<td>Reagen</td>
<td>Grand Isle, VT</td>
<td>300</td>
<td>north</td>
<td>minor</td>
<td>MP/Crowfield, C-N LP/Ste. Anne/Varney</td>
<td>Robinson 2009</td>
</tr>
<tr>
<td>Fairfax Sandblows</td>
<td>Grand Isle, VT</td>
<td>275</td>
<td>north</td>
<td>minor</td>
<td>MP/M-N</td>
<td>Robinson and Crock 2008</td>
</tr>
<tr>
<td>Mahan</td>
<td>Chittenden, VT</td>
<td>250</td>
<td>north</td>
<td>minor</td>
<td>EP/BB-WAH</td>
<td>Jess Robinson, pers. comm., 2010</td>
</tr>
<tr>
<td>Site</td>
<td>County/State</td>
<td>Distance from Hudson Valley Outcrops to Site (km)</td>
<td>Direction of Movement from Hudson Valley</td>
<td>Normanskill Chert: Proportion of Sample*</td>
<td>Components/Point Forms**</td>
<td>Source</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------</td>
<td>--------------------------------------------------</td>
<td>-----------------------------------------</td>
<td>-----------------------------------------</td>
<td>--------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Kings Road/Swale</td>
<td>Greene County, NY</td>
<td>&lt;1</td>
<td>na</td>
<td>major</td>
<td>EP/KR-W</td>
<td>Funk 2004</td>
</tr>
<tr>
<td>West Athens Hill</td>
<td>Greene County, NY</td>
<td>0</td>
<td>na</td>
<td>major</td>
<td>EP/KR-W and BB-WAH</td>
<td>Funk 2004</td>
</tr>
<tr>
<td>Railroad</td>
<td>Greene County, NY</td>
<td>&lt;1</td>
<td>na</td>
<td>major</td>
<td>EP or MP?</td>
<td>Funk 1976</td>
</tr>
<tr>
<td>Twin Fields</td>
<td>Ulster County, NY</td>
<td>100</td>
<td>south</td>
<td>major</td>
<td>EP/KR-W</td>
<td>Funk 2004</td>
</tr>
<tr>
<td>Port Mobil</td>
<td>Richmond County, NY</td>
<td>200</td>
<td>south</td>
<td>minor</td>
<td>EP/KR-W</td>
<td>Funk 2004</td>
</tr>
<tr>
<td>Potts</td>
<td>Oswego County, NY</td>
<td>250</td>
<td>northwest</td>
<td>minor</td>
<td>EP/Gainey</td>
<td>Lothrop 1989</td>
</tr>
<tr>
<td>Toad Harbor</td>
<td>Oswego County, NY</td>
<td>250</td>
<td>northwest</td>
<td>minor</td>
<td>EP/Gainey or Butler?</td>
<td>Bradley, unpublished files</td>
</tr>
<tr>
<td>Beaver Lodge</td>
<td>Delaware County, NY</td>
<td>150</td>
<td>southwest</td>
<td>major</td>
<td>EP or MP/Fluted</td>
<td>Rudler 2006</td>
</tr>
<tr>
<td>Pocono Lake</td>
<td>Monroe County, PA</td>
<td>200</td>
<td>southwest</td>
<td>minor</td>
<td>MP/Barnes?</td>
<td>Carr and Adovasio 2002; Fogelman and Lantz 2006</td>
</tr>
<tr>
<td>Plenge</td>
<td>Warren County, NJ</td>
<td>200</td>
<td>southwest</td>
<td>minor</td>
<td>EP/“Clovis”?</td>
<td>Kraft 1973</td>
</tr>
<tr>
<td>Poirier</td>
<td>Northampton County, PA</td>
<td>225</td>
<td>southwest</td>
<td>minor</td>
<td>EP/“Clovis”</td>
<td>Fogelman and Poirier 1990; Carr and Adovasio 2002</td>
</tr>
<tr>
<td>Kilmer</td>
<td>Steuben County, NY</td>
<td>325</td>
<td>west</td>
<td>minor</td>
<td>EP/Gainey</td>
<td>Tankersley et al. 1996</td>
</tr>
<tr>
<td>36Su25</td>
<td>Bradford County, PA</td>
<td>275</td>
<td>southwest</td>
<td>minor</td>
<td>EP or MP/Fluted</td>
<td>Lothrop et al. 2008</td>
</tr>
<tr>
<td>Warrior Spring</td>
<td>Lycoming County, PA</td>
<td>300</td>
<td>southwest</td>
<td>minor</td>
<td>EP/“Clovis”</td>
<td>Fogelman 1988; Carr and Adovasio 2002</td>
</tr>
<tr>
<td>Saginaw</td>
<td>York County, PA</td>
<td>400</td>
<td>southwest</td>
<td>minor</td>
<td>EP/“Clovis” and Cumberland</td>
<td>Gramly 2009; Fogelman and Lantz 2006</td>
</tr>
<tr>
<td>Higgins</td>
<td>Anne Arundel County, MD</td>
<td>450</td>
<td>southwest</td>
<td>minor</td>
<td>EP or MP/Fluted</td>
<td>Ebright 1989, 1992</td>
</tr>
</tbody>
</table>

*major, most common raw material; minor, minority raw material.

**EP, Early Paleoindian; MP, Middle Paleoindian; LP, Late Paleoindian; KR-W, Kings Road/Whipple point component; BB-WAH, Bull Brook/West Athens Hill point component; M-N, Michaud/Neponset point component; C-N, Cormier/Nicholas point component.
Paleoindian Occupations in the Hudson Valley

33

Conversely, miniature fluted points made on channel flakes, beveled bifaces, backed bifaces, and hafted perforators are present at Parkhill sites but absent at Gainey sites. Beveled and backed bifaces are recorded for Crowfield sites, but points on channel flakes and hafted perforators are not.

In the New York region, we are just beginning to identify less common tool forms which, along with fluted bifaces, may be markers for Paleoindian occupations. Narrow endscrapers and hafted perforators, for example, have been noted (Lothrop 1988; Lothrop and Gramly 1984). Moreover, we are uncertain as to what extent morphological tool types correlate with the point sequences defined for the eastern Great Lakes and Far Northeast. Analysis and reporting of systematically recovered collections will ultimately place us on firmer ground.

Paleoindian sites in New York and the Far Northeast have a role in larger debates about the organizational nature of late Pleistocene technology in North America and how this technology was mediated by mobility strategies, toolstone procurement, and other factors. For North America, Parry and Kelly (1987) have argued that Paleoindian practices of standardized core reduction and reliance on portable biface cores enabled high residential mobility. Kelly and Todd (1988) further suggest that reliance on a portable biface technology allowed Paleoindians to maximize the utility of their transported stone (although some researchers dispute elements of this model, e.g., Bamforth [2002]; Prasciunas [2007]). Some researchers have proposed similar models of Paleoindian technology for the Far Northeast.

Table 2.6. Frequency of Jasper Tools Found at Selected Fluted Point Sites in the Hudson-Mohawk Lowlands

<table>
<thead>
<tr>
<th>Site</th>
<th>Primary Component*</th>
<th>Total Tool Count</th>
<th>Jasper Tool Count</th>
<th>% Jasper of Total Tool Count</th>
<th>Rank Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swale</td>
<td>KR-W</td>
<td>247</td>
<td>109</td>
<td>44.13</td>
<td>1</td>
</tr>
<tr>
<td>Twin Fields</td>
<td>KR-W</td>
<td>121</td>
<td>15</td>
<td>12.39</td>
<td>2</td>
</tr>
<tr>
<td>Kings Road</td>
<td>KR-W</td>
<td>384</td>
<td>31</td>
<td>8.07</td>
<td>3</td>
</tr>
<tr>
<td>Corditaipe</td>
<td>BB-WAH</td>
<td>161</td>
<td>5</td>
<td>3.11</td>
<td>4</td>
</tr>
<tr>
<td>West Athens Hill, areas A and B</td>
<td>BB-WAH</td>
<td>1308</td>
<td>9</td>
<td>0.68</td>
<td>5</td>
</tr>
<tr>
<td>West Athens Hill, area C</td>
<td>BB-WAH</td>
<td>1153</td>
<td>1</td>
<td>0.08</td>
<td>6</td>
</tr>
</tbody>
</table>

From Funk (2004:Tables 42, 43).

*KR-W, Kings Road/Whipple point component; BB-WAH, Bull Brook/West Athens Hill point component.

2003; Gramly and Lothrop 1984; Lothrop 1988). At a general level, these morphological artifact types are similar to those found at sites across the Far Northeast (Spiess et al. 1998) and in the eastern Great Lakes (Ellis and Deller 1997; Gramly 1988). Biface types include finished fluted points, failed preforms, possible “backed” bifaces, and, rarely, large platter-like bifaces. Other formal tools consist of hafted and hand-held unifaces with distal and lateral working edges (end- and sidescrapers). Unhafted expedient tools, made on higher-grade toolstone and with likely short use lives, include flake gravers and utilized flakes. Expedient implements of rough stone may also be present in small numbers (e.g., Gramly and Lothrop 1984). At some sites pieces esquillees are recorded, although not commonly, and the functions of these bipolar artifacts remain uncertain (Lothrop and Gramly 1982; Shott 1989, 1999).

Ellis and Deller (1988) have recorded rare as well as more common Paleoindian tool forms in southwestern Ontario. They argue that the distinctive morphologies on several of the less common tool forms (e.g., narrow and offset endscrapers, hafted perforators, backed bifaces, backed and snapped tools) suggest functional specificity—a persuasive working hypothesis, testable with use wear and residue studies. Functional issues aside, Ellis and Deller (1997:Table 5) demonstrate that several of these rare tool forms are diagnostic of Paleoindian occupation in southwestern Ontario and in some cases are markers for individual phases represented by the Gainey-Barnes-Crowfield point sequence. For example, pieces esquillees are present on Gainey sites but not on later Barnes (Parkhill) and Crowfield phase occupations. Conversely, miniature fluted points made on channel flakes, beveled bifaces, backed bifaces, and hafted perforators are present at Parkhill sites but absent at Gainey sites. Beveled and backed bifaces are recorded for Crowfield sites, but points on channel flakes and hafted perforators are not.

In the New York region, we are just beginning to identify less common tool forms which, along with fluted bifaces, may be markers for Paleoindian occupations. Narrow endscrapers and hafted perforators, for example, have been noted (Lothrop 1988; Lothrop and Gramly 1984). Moreover, we are uncertain as to what extent morphological tool types correlate with the point sequences defined for the eastern Great Lakes and Far Northeast. Analysis and reporting of systematically recovered collections will ultimately place us on firmer ground.

Paleoindian sites in New York and the Far Northeast have a role in larger debates about the organizational nature of late Pleistocene technology in North America and how this technology was mediated by mobility strategies, toolstone procurement, and other factors. For North America, Parry and Kelly (1987) have argued that Paleoindian practices of standardized core reduction and reliance on portable biface cores enabled high residential mobility. Kelly and Todd (1988) further suggest that reliance on a portable biface technology allowed Paleoindians to maximize the utility of their transported stone (although some researchers dispute elements of this model, e.g., Bamforth [2002]; Prasciunas [2007]). Some researchers have proposed similar models of Paleoindian technology for the Far Northeast.
and mid-Atlantic regions, suggesting a reliance on biface cores to support high residential mobility (e.g., MacDonald 1968; Parry 1989; Verrey 1986).

Viewed through the prism of eastern North America, Goodyear (1989) argued that the Paleoindian practice of high mobility created logistical and situational risks—that is, not having the necessary tools (or toolstone to make tools) at disparate task locations. In this context, he argued that the Paleoindian emphasis on high-quality toolstone provided the solution, permitting Paleoindians to create portable, flexible technologies in which tools could be recycled or reworked into new tool forms as situations demanded.

Organizational studies of fluted point assemblages in the eastern Great Lakes have considered evidence for fluted point stone technology as products of advance planning (e.g., Deller and Ellis 1992; Ellis 2008; Lothrop 1989). These analyses suggest that Early-Middle Paleoindians adhered to a highly segmented reduction sequence to produce standardized tool blanks and preforms for specific morphological tool types. At quarry-related sites, Paleoindians performed early- through late-stage reduction, in part to minimize the weight of the transported toolkit. Departing these quarry-related sites, Paleoindians took away stocks of finished tools, standardized tool blanks, and biface preforms, thereby ensuring sufficient numbers of stone tools and tool blanks of appropriate form for later use until the next lithic source visit. This planned production of the transported toolkit at the lithic source, including finished as well as unfinished tools and blanks, likely provided the flexibility for future tool-using activities.

What role did large bifaces play in Paleoindian stone technology? These artifacts—sometimes referred to as “platter-like bifaces”—are found rarely on sites in New York and the broader region (e.g., Gramly and Lothrop 1984; Figure 5c; Spiess 1990:68–72). This large biface form is also distinguished by very high width-to-thickness ratios of 10:1 or greater and, where discovered, may be diagnostic of early Paleoindian occupations in the Far Northeast.

Counter to the traditional technological model, however, organizational analyses of some eastern Great Lakes sites suggest that, after departing toolstone sources, Paleoindians did not rely on these large portable bifaces as primary sources for tool blanks. Rather, remnant blank attributes show that early Paleoindians made most formal tools on blanks generated from tabular or block cores at the lithic source, carrying them away from quarry-related sites near lithic sources (Deller and Ellis 1992; Ellis 1984; Lothrop 1989). At Potts only expedient, short use life tools like flake gravers and utilized flakes were produced, primarily from bifaces during on-site reduction of preforms to finished fluted points (Lothrop 1989). Experimental research supports these findings, showing that biface cores are not the most efficient producers of flake tool blanks (Prasciunas 2007).

Recent studies of early Paleoindian assemblages in the Hudson Valley support some elements of this basic model. Funk (2004) shows how Paleoindians at West Athens Hill reduced bifaces from early-stage forms to fluted points and preforms. Bradley et al. (2007) document a similar reduction sequence for bifaces at Kings Road and Swale and a separate sequence whereby Paleoindians systematically reduced angular or blocky cores, yielding thick, expanding, and sometimes bladelike flakes for unifacial tool blanks.

At the same time, these studies remind us of the potential for regional variability in organizational aspects of this fluted point technology. For example, a 2010 preliminary reanalysis of the Twin Fields collection (Eisenberg 1978) shows that flake gravers there were manufactured on both blanks from blocky or tabular or cores and on flakes from bifaces. Further, these graver bits sometimes appear on tools with sidescraper working edges (see figure 2.10, top row). Such observations highlight potential for interregional variation in these late Pleistocene technologies and reinforce the need for comparable analyses of Paleoindian sites to detect technological variation across space and time.

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Early Paleoindians in eastern New York may have also used complementary strategies such as utilitarian or “secular” caching (sensu Deller et al. 2009) to ensure availability of usable stone tools between visits to lithic sources. Upwards of twenty caches of Clovis stone tools have been recorded in the Midwest and West (Beck and Jones 2010). Meltzer (2002:38–39, 2004:128) argues that such caching of stone artifacts was important for Clovis groups colonizing new regions where toolstone sources were not yet known. Alternatively, Haynes (2002:261–262) and Storck and Tomenchuk (1990) propose that the stone tool caches perhaps served to even out the patchy distribution of toolstone
Paleoindian Occupations in the Hudson Valley

Paleoindian Occupations in the Hudson Valley

35

Waguespack and Surovell 2003) or generalist foragers (Byers and Ugan 2005; Cannon and Meltzer 2004; Dinfuze 1993; Walker and Driskell 2007). For decades, the view of Paleoindians as specialized hunters has supported the interpretation that human overkill led to end-Pleistocene extinctions of megafauna (e.g., Martin 1967, 1984; Surovell and Waguespack 2009).

Collins (2007) suggests that in the southern High Plains there is generally accepted evidence for Folsom as a specialized bison-hunting subsistence base, but faunal evidence for earlier Clovis occupations at several sites documents a diverse subsistence base which, along with hunting of mammoth, bison, and horse, included other large-to-small mammals, reptiles, birds, fish, and amphibians as prey. He suggests that the earliest Paleoindians on the southern High Plains were indeed generalist foragers, more akin in this regard to mid-Holocene Archaic groups than to Folsom bison hunters.

Closer to home, Gingerich (2011) reviews evidence for Paleoindian subsistence in the upper Delaware Valley at the Shawnee Minisink site and concludes that there is a compelling case for consumption of berries and nuts, and perhaps fish, at this site. He cautions, however, that in isolation these data are insufficient to conclude that early Paleoindians in the upper Delaware Valley were generalist foragers (Gingerich 2011:141).

Clearly, future debates on this matter need to avoid monolithic characterizations and to recognize the potential for variability in Paleoindian subsistence strategies at different spatial scales (Cannon and Meltzer 2010), across time, and seasonally. For example, subsistence practices at Shawnee Minisink circa 12,900 cal BP may have differed significantly from those of Early Paleoindians who perhaps only a few generations later colonized the very different Younger Dryas landscapes of eastern New York and the Far Northeast.

Direct subsistence data for Early and Middle Paleoindian sites in New York and the broader Northeast remain limited (Spiess et al. 1998). Much discussion has focused on possible hunting of large herd animals, especially caribou. Based on climatic and vegetational shifts in the late Pleistocene, Newby et al. (2005) propose that during the Younger Dryas ecological and vegetational changes fostered habitats favorable to caribou in the Far Northeast. A handful of...
sites in southern Ontario and elsewhere have yielded faunal remains of this species, as well as cervid (Robinson et al. 2009; Storck and Spiess 1994). Gramly (1982, 1984, 2010) provides a strong circumstantial case for hunting of herb animals (presumed caribou) at the Vail site in northwestern Maine. Other proxy evidence for caribou procurement (as well as other mammalian species) derives from residue analysis of fluted points at the Nobles Pond site in eastern Ohio (Seeman et al. 2008). As Storck and Spiess (1994:136) note, across space and time, and seasonally, Paleoindians could have engaged in a range of strategies for caribou hunting, from focused to opportunistic.

Faunal evidence for other mammalian prey species in the Northeast (perhaps not subsistence related) includes remains of beaver, arctic fox, and arctic hare (Storck and Spiess 1994). Dincauze and Jacobson (2001) speculate about the importance of migratory birds for Paleoindians in the Maritimes far northeast. To date, the only possible evidence for avian exploitation is the reported recovery of turkey feather fibers from a rock cluster feature attributed to the fluted point component at the Higgins site, located on the Western Shore of Maryland (Ebright 1989, 1992). Unconfirmed reports of fish remains at Shawnee Minisink (Dent 2007; Gingerich 2011) are consistent with fossil evidence for fish populations colonizing ponds and streams in northern New Jersey from Atlantic refugia, beginning circa 14,500 cal BP (Daniels and Peteet 1998; Peteet et al. 1993). Unconfirmed reports of fish remains at Shawnee Minisink (Dent 2007; Gingerich 2011) are consistent with fossil evidence for fish populations colonizing ponds and streams in northern New Jersey from Atlantic refugia, beginning circa 14,500 cal BP (Daniels and Peteet 1998; Peteet et al. 1993). Without archaeological evidence for a human presence at 14,000 cal BP (when they suggest overkill hunting of mastodons begins), their extinction argument is difficult for us to accept.

Western New York has also produced abundant evidence of late Pleistocene megafauna. Genesee County likely records the second-highest concentration of fossil mastodons in New York, due in part to long-term investigations at the Hiscock paleontological and archaeological site (Laub 2002, 2003; Laub et al. 1988). Excavations at Hiscock have recovered mastodon most commonly, as well as stag moose, caribou, and giant beaver. Geochemical analyses suggest that mastodons were attracted to this site because of its salt spring vents (Ponomarenko and Telka 2003). Hiscock also bears evidence of human use and probable human-mastodon interaction. Late Pleisto-
Paleoindian Occupations in the Hudson Valley

37

Until recently, the work of William Ritchie, Robert Funk, and their associates has been the primary basis for our understanding of Paleoindians in New York State. However, over the past twenty years several factors have begun to alter our interpretations of the Pleistocene-Holocene transition in northeastern North America and how human colonization and settlement fit into that complex set of environmental changes.

A primary factor has been the recent discovery and increased reporting of new Paleoindian sites and isolated finds across New York and the Far Northeast. This, in turn, has shifted our focus away from viewing individual sites in isolation toward more comprehensive studies of sites and isolated finds, helping to reveal both landscape use and other adaptive behaviors.

Concurrent with building a more robust archaeological database, a veritable revolution has occurred in our understanding of the region's environmental context. This includes more precise dating for ice retreat, the formation and draining of glacial lakes and the Champlain Sea, and other large-scale events which, literally, reshaped the New York landscape, setting the stage for human colonization. Little of this information was available to Ritchie and Funk, and thanks to our earth scientist colleagues we now see that many of these events occurred much closer in time to the arrival of the first human colonizers than was previously thought.

Adding to our understanding of the late Pleistocene landscape, major advances in the study of pollen and plant macrofossils have made it possible to reconstruct plant communities and even biomes in a way not possible before now. As well, many of these studies have come together to give us an increasingly fine grained understanding of the Younger Dryas climatic reversal (12,900–11,600 cal BP), with even glimpses into its subregional variability in terms of both temperature and moisture and the resulting effects on tree and plant and faunal communities. Taken together, this progressively more detailed record of the late Pleistocene environment provides a far better foundation on which the archaeological data from the period can be modeled for both New York and the broader region.

Another significant change in Paleoindian studies has been a move toward interpreting the archaeological data from New York in these broader regional contexts. As both the archaeological and environmental records have become more robust, so has our ability to define more precise geographic, temporal, and technological frameworks.

From a statewide perspective, we see that New York's Paleoindian data do not easily fall into neat geographic categories. However, in a context of regional patterns many of the more puzzling issues fall away. The New York region is actually split between two, and perhaps three, distinct geographic and cultural regions: to the east, the Far Northeast region includes the Mohawk/Hudson and Champlain...
lowlands of New York; to the west, the eastern Great Lakes region incorporates the Erie-Ontario Lowlands. It may be that during Paleoindian occupations the Southern Tier of the Appalachian Plateau (including the upper Susquehanna and Delaware drainages) actually bore stronger cultural connections with the mid-Atlantic region to the south. At present, it seems safe to say that what we now call eastern New York State served as the late Pleistocene gateway to the Far Northeast and that all the major corridors that provided access to and from lands farther east ran through it. As our data sets grow stronger and regional collaborations (embodied by this volume) strengthen, our understanding of these late Pleistocene cultural dynamics will certainly improve.

Returning to the eastern New York focus of this chapter, to us this review highlights the potential for variation in Paleoindian adaptations and their material remains. In an earlier review of northeastern Paleoindian research, Ellis (1994) remarked on what he saw as a too frequent lack of concern with variability through time and space, leading to homogenized interpretations of late Pleistocene lifeways. He stressed the need to “actively seek out variability in the archaeological record and carefully delimit the scope of our generalizations” (1994:416). This extended to methods of investigation and analysis, including the need to (1) explore different kinds of sites, (2) identify variability in artifact assemblages through space and time, (3) refine both relative and absolute dating chronologies, and (4) collaborate more closely with earth scientists. In eastern New York, we have certainly made strides of late, but Ellis’s comments remain relevant today, and we do well to heed them as we move forward.

ACKNOWLEDGMENTS
We wish to thank a number of individuals who contributed to this research. First and foremost, we extend our thanks to Claude Chapdelaine for inviting us to present an earlier version of this research in a session he organized for the 2009 Association of Québec Archaeology meetings. Thanks also for his editorial efforts to bring all of these session papers to publication in a timely fashion. Several individuals provided us with access to important Paleoindian site collections from the Hudson Valley and vicinity, including Tom Weinman, Joe Diamond, Fran McCashion, and Jay Ciccone. Many other archaeologists freely shared data and insights, including Dick Boisvert, Jeff Boudreau, Adrian Burke, Ray Decker, Joe Diamond, Chris Ellis, Ted Filli, Gary Fogelman, Mike Gramly, Gary Haynes, Jack Holland, Dick Laub, Jess Robinson, Patterson Schackne, Art Spiess, Fred Stevens, Ken Tankersley, Stan Vanderlaan, Nina Versaggi, and Tom Weinman. Several earth scientist colleagues, in particular Bob Feranec, Andy Kozlowski, Ed Landing, Norton Miller, Paige Newby, John Rayburn, and Chuck Ver Straeten, offered their key perspectives on the natural history of New York. At the New York State Museum, John Hart and Penny Drooker ensured institutional support for this research. The museum’s archaeology collections staff (Andrea Lain, Ralph Rataul, Molly Scofield, Jim Walsh, Susan Winchell-Sweeney, and Meredith Younge) and volunteers (Charlene Capillino, John Hammer, and Brittni Laterza) assisted us with study of collections. A final thanks to Claude Chapdelaine and reviewers Chris Ellis and Kurt Carr for editorial comments. We dedicate this chapter to the late Robert E. Funk and the late James B. Petersen; their own Paleoindian research provided critical foundations on which to build.

REFERENCES


Ellis, Christopher. 1984. Paleoindian Lithic Technological Struc-
ture and Organization in the Lower Great Lakes Area: A First Approximation. Ph.D. diss., Department of Archaeology, Simon Fraser University, Burnaby, British Columbia.


Goodyear, Albert. 1989. A Hypothesis for the Use of Crypto-
Gingerich, Joseph A. M. 2007. Picking Up the Pieces: New Paleo-
Archaeological Investigations in the Upper Susque-
———. 2004. An Ice Age Quarry-Workshop: The West Athens Hill
Gardner, William M. 1989. An Examination of Culture Change
Funk, Robert E., B. Wellman, H. R. Decker, and W. F. Ehlers


Kozlowski, Andrew, and Donald Pair. 2007. The New York Cross-
the Buffalo Society of Natural Sciences 33. Buffalo, New York.


Newby, Paige, and James Bradley. 2007. Post-Glacial Landscape


Rudler, Michael. 2006. Beaver Lodge Site Examination (SUBi-2298, NYSM #11302). In Addendum Cultural Resource
Reconnaissance Survey and Site Examinations, PIN 9066-91.121, NY Route 17 Access, Towns of Deposit and Hancock, Delaware County. Report ed. Timothy D. Knapp, 96–120. Submitted to the New York State Museum State Education Department.


———. 2004. Controls, History, Outbursts, and Im-
The impact of large Late-Quaternary proglacial lakes in North America is discussed, including references to the Quaternary Period in The United States and large late-Quaternary proglacial lakes in North America. The contribution of these lakes to the formation of the Hudson Shelf Valley is highlighted.

References:


CHAPTER III

Maritime Mountaineers

Paleoindian Settlement Patterns on the West Coast of New England

John G. Crock and Francis W. Robinson IV

This chapter provides a brief description of the majority of the recorded Paleoindian sites and well-documented fluted point finds in Vermont. The intent is to provide an overview of the cultural affiliation, settlement type, content, and location of sites and finds for the purposes of understanding human colonization and early settlement in the region. The sources of this information include the Vermont Archaeological Inventory (VAI) maintained by the Vermont Division for Historic Preservation (VDHP), unpublished technical reports, our own research, in addition to published articles and books. Summaries of several sites are formally published here for the first time.

One of the unfortunate features of the Vermont Paleoindian site inventory is an almost complete lack of radiometrically dated sites. With the exception of one dated site marking the beginning of the Early Archaic period, all the sites presented herein are attributed to the Early, Middle, or Late Paleoindian periods based on relative dates derived from comparative stone tool morphology. Projectile points are used exclusively to avoid more tentative attributions. Bradley et al.’s (2008) Paleoindian projectile point chronology for the Far Northeast region is used to assign sites to temporal subperiods. Their excellent work, anchored by numerous dated sites in the Northeast, provides locally relevant relative dates for projectile point forms once only comparable to point types identified in western North America and the Great Lakes region (e.g., Deller and Ellis 1992; Ellis and Deller 1997).

When the first Paleoindian sites in Vermont were discovered they were, by necessity, interpreted through the lens of historic precedents in the western United States (Ritchie 1953, 1957, 1969). Although comparisons across North American assemblages still pertain to some degree, regional data, particularly including the refined typology proposed by Bradley and others (2008), are sufficient to allow a meaningful treatment of Paleoindian settlement within a geographically restricted area. This chapter represents the first real update of the inventory of Paleoindian sites in Vermont since Loring’s (1980) seminal paper exploring the association between Paleoindian sites and the Champlain Sea. We have (thankfully) made significant progress in many areas since the publication of Loring’s paper thirty years ago.

First, as discussed in detail in F. Robinson’s chapter 10, the inception and duration of the Champlain Sea have been revised significantly to include a substantial or perhaps even complete overlap with the dates of Paleoindian presence.
in Vermont (e.g., Cronin et al. 2008; Rayburn et al. 2005, 2007; Richard and Occhietti 2005; Ridge 2003; Ridge et al. 1999; Rodrigues 1988). This body of work substantiates Ritchie’s originally proposed (1957, 1969) and Loring’s (1980) presumed association between Paleoindian populations and the inland ocean. In parallel, several sites in the Far Northeast have been radiocarbon-dated, and those dates, properly calibrated, provide a more rigorous typology for Paleoindian stone tools in the region (Bradley et al. 2008). Paleoenvironmental reconstructions for New England also have shown that the landscape was not the barren tundra once thought but rather well forested (e.g., Newby et al. 2005). This work enables an updated view of the natural environment in which Paleoindians lived, one that was more diverse and more productive than once thought.

Second, several Paleoindian sites also have been systematically excavated by professionals, providing archaeological context and associated tools and materials to expand our knowledge of Paleoindian sites beyond spot finds of fluted points. Within the past two decades, two Early Paleoindian and at least four Late Paleoindian sites in Vermont have been identified as a result of systematic studies within professional, regulatory contexts. This increases by 400 percent the number of Late Paleoindian sites known prior to 1990, when it was thought that, barring the enigma of Reagen, Vermont was largely uninhabited during this period. This systematic work also has generated highly valuable artifact associations and distributions as well as accurate locational information, thus adding critical settlement pattern data to the previously known Paleoindian site inventory.

Third, the identification of raw material sources has improved dramatically as a result of both technological advances and increased communication between researchers in the region. These data are essential to the reconstruction of interregional travel and interaction, moving from speculation to more accurate and quantifiable assessments. For example, many artifacts once thought to have been made of a local (Colchester, Vermont) red “jasper” at the time Loring (1980) published his work are presently interpreted as more likely attributable to source locations at Munsungun Lake in northern Maine. Through the 1970s and 1980s, fine-grained red material found in Vermont assemblages was believed to be from a Jasper quarry source in Colchester, primarily because the source seemed so close at hand (Lavin and Prothero 1987; Robinson and Crock 2008; Thomas and Robinson 1980). Other than anecdotal reports of some Woodland period scraping tools being made from this material, however, there is little evidence of Colchester jasper being used by Native American groups from any recognized precontact period. More recently, the Munsungun chert quarry has been geologically examined (Pollock 1987; Pollock et al. 1999) and archaeologically explored (Bonnichsen 1982) and is now recognized as perhaps the most heavily utilized chert source in northern New England during the Early Paleoindian period (Pollock et al. 1999; Spiess et al. 1998). A similar increase in knowledge has occurred for rhyolite quarried in New Hampshire. Though a quarry for the material at Mount Jasper in Berlin has been known for over a century (Gramly 1977, 1980, 1984; Gramly and Cox 1976; Pollock et al. 2008), only recently was the material determined to be the source of the spherulitic rhyolite common in Paleoindian assemblages (Boisvert 1992; Pollock et al. 2008; Spiess et al. 1998). More recently, Boisvert (1998) discovered similar rhyolite exposures in Jefferson, New Hampshire, which also appear to have been utilized by Paleoindian groups. Although Mount Jasper rhyolite and the Jefferson rhyolite are similar and are likely of a similar geological age, there are demonstrable petrographic differences and a significant geographic distance between them (Pollock et al. 2008). Material from one or both of these sources appears in both Early and Late Paleoindian contexts in Vermont.

Beyond those sites reported herein, several other recorded sites likely date to Paleoindian periods based on fluted points in collections and reports of fluted point recoveries. For the purposes of this chapter, however, spot finds without clearly defined, verified provenience are not discussed, including several Vermont fluted points with less specific provenience reported by Loring (1980). In addition, there are numerous sites in the VAI listed as Paleoindian which, upon closer scrutiny, have not yielded artifacts that unequivocally can be assigned to Paleoindian periods. For example, there are recorded sites for which tentative associations have been made based on tool types such as spurred scrapers, the presence of certain exotic raw materials that correlate well with early sites in Vermont, or sites’ environmental settings (e.g., high terraces on the edges of major river valleys). Although these sites may likely date
to one or another Paleoindian subperiod, they remain less than certain attributions. Still other sites listed as dating to the Paleoindian period in the VAI are not included here because their temporal assignment could not be supported by our own firsthand examination of the artifacts. These include several sites, for example, where basally thinned triangular points are cited as temporally diagnostic of the Paleoindian periods. Most of these forms likely date to more recent eras, including instances where Levanna triangles with basal thinning are misinterpreted as fluted points by site reporters.

A total of twenty-five sites/finds in Vermont are included here as unequivocally attributable to the Early, Middle, or Late Paleoindian periods based on the presence of specific projectile point types confirmed by our inspection or for which illustrations and reliable, verified provenience information exist (figure 3.1).

Figure 3.1. Map of Vermont showing the location of Paleoindian sites and spot finds discussed in the chapter and the estimated Champlain Sea paleoshoreline at its maximum. Sites and finds are numbered in order of mention in the text: 1, Mahan; 2, Reynolds; 3, Bishop; 4, Mad River; 5, Leicester Flats; 6, Bristol Pond; 7, Jackson-Gore; 8, Reagen; 9, Fairfax Sandblows; 10, Hinsdale; 11–12, Little Otter Creek; 13, Lake Salem; 14, VT-AD-679; 15, Auclair; 16, VT-CH-230; 17, Paquette 2; 18, South Hero; 19, Mazza; 20, Arbor Gardens; 21, Arnold Brook; 22, Otter Creek 2; 23, Winooski Redevelopment; 24, Bessette II; 25, VT-OR-89 (base map source: Vermont Center for Geographic Information).
remarkable ability of Paleoindians to respond to profound environmental changes in relatively short order, as does their adaptation later on to the water body's transition to a freshwater lake.

**Mahan site (VT-CH-197)**

The Mahan site is the largest known Paleoindian site in Vermont and also the most extensively excavated. The site is located in Williston on a peninsula of land which, based on its elevation, once may have extended into an embayment along the eastern shore of the Champlain Sea (see figure 3.1, site 1). The site is situated on a gentle slope on the south side of a knoll at an average elevation of about 125 m (410 ft). The site area overlooks Allen Brook, which is now a tributary of the Winooski River but when the site was occupied likely emptied directly into the sea. The Mahan site was first identified by the University of Vermont Consulting Archaeology Program (UVM CAP) during a regulatory survey conducted for the proposed Chitten-den County Circumferential Highway (CCCH) (Thomas 2002; Thomas et al. 1998). Shovel test pit and test unit sampling and block excavation were conducted during three phases of fieldwork at the site.

Based on surface finds and positive test pits, the site covers an estimated 18,144 m² (1.8 ha), with the majority of artifacts recovered from an approximately 5,940 m² (0.6 ha) core area (Thomas et al. 1998). Altogether, a total of 359 m³ ultimately were excavated and 5,846 artifacts were recovered (Thomas 2002). The artifact inventory includes 122 stone tools, with one mended fluted projectile point, made of local Vermont "Cheshire" gray quartzite (figure 3.2e) and a small tang of another projectile point that appears to be made of chert from the Hudson Valley. The complete point falls into the Bull Brook / West Athens Hill group on the basis of its general size, fluting, and shape and thus the site likely dates to 12,900–12,400 cal BP. A recent inspection of the unfinished tools in the assemblage has also identified at least three fluted or basally thinned preforms made from Cheshire quartzite (figure 3.3). Though fluted preforms have been identified at other sites, they are a notable component of the Mahan site assemblage and help document how knappers worked the quartzite by thinning the central portion of the tool early in the reduction process, well in advance of final thinning and blade preparation.
Other than the complete but mended fluted point and the tang of another point made from probable Hudson Valley chert, the tool inventory shows little evidence of the final stages of fluted point manufacture at the site (e.g., channel flakes, late-stage preforms, or points broken in manufacture, but see figure 3.2 for the few several fragmentary examples). Similar to some other Paleoindian sites, however, a high percentage (79 percent; \( n = 43 \)) of the tools recovered are scrapers of one or another type, most of which were manufactured from exotic cherts. Both end- \(( n = 37 \) and sidescraper \(( n = 6 \) types are represented, in addition to utilized flakes of chert and quartzite, also likely used for scraping tasks (figure 3.4). At least two of the endscrapers are “spurred.” Several of the tools categorized as utilized exhibit modified notches and have been termed “notched oblique scrapers” and viewed as potentially diagnostic of the Paleoindian period (Robinson et al. 2004). Scraping tools, well-documented as part of the Paleoindian toolkit at other sites in New England, suggest a likelihood of wood-, bone-, or hide-processing activities at the site (Thomas 2002). Given the site’s likely proximity to the Champlain Sea, these tasks may have been done to support fishing and marine mammal hunting or related processing activities, which also may explain the apparently limited stone projectile point inventory. Although there is evidence that the site was reoccupied, minimally during the Late Archaic period, the broad distribution of tools and debitage made from exotic raw materials suggests that the Paleoindian occupation was extensive.

The lack of nucleated loci and the wide but generally low-density distribution of tools and debitage (ca. 0.35 tools/m² and a mean density of 21 flakes/m²) led Thomas to suggest that the site was occupied during the summer months as a base camp for one or two bands (Thomas 2002; Thomas et al. 1998). Seasonal population aggregations have been suggested by the distribution of materials

3.2. Bull Brook/West Athens Hill fluted projectile points and projectile point fragments from Vermont sites attributable to the Early Paleoindian period: a–b, one quartzite and one chert base from the Leicester Flats site (VT-AD-127); c, chert base and midsection from the Reynolds site (VT-CH-9210); d, complete Mount Jasper/ Jefferson rhyolite point from the Bishop site (VT-CH-818) (photo by Peter Mills, courtesy of William Haviland); e, complete quartzite point from the Mahan site (VT-CH-197).
Maritime Mountaineers

53

Figure 3.4). Nearly half of the chert tools are macroscopically consistent with chert derived from the Munsungun Lake formation in north-central Maine (Thomas 2002, based on inspection by Pollock). Other cherts represented in the Mahan site tool inventory possibly originated in the Normanskill Formation that outcrops in the Hudson Valley to the southwest (Brumbach and Weinstein 1999; Hammer 1976; Wray 1948). The yellow-brown jasper likely derives from two potential source areas in southeastern and central Pennsylvania.

At exceptionally large New England Paleoindian period sites, such as Bull Brook (B. Robinson et al. 2009). Unlike the situation at Bull Brook, however, the Mahan site artifact distribution is not well organized into smaller loci but rather evenly spread out, at least as currently understood. This characteristic is one of the main pieces of evidence that led Thomas to suggest that the site represents a summer base camp occupied by one or two bands, perhaps twenty-five to forty people, for an extended period. Occupation during the warmer months also correlates well with a seasonal exploitation of Champlain Sea resources (F. Robinson, this volume).

As at other sites in Vermont and the broader Far Northeast region, the Mahan tool assemblage features a significant percentage of exotic lithic raw materials, though local gray quartzite and black Champlain Valley chert (Robinson 2009) were the primary materials used for making projectile points. At least six varieties of exotic, nonlocal chert and yellowish brown jasper were also used, predominantly in the manufacture of the numerous recovered scrapers (see figure 3.4). Nearly half of the chert tools are macroscopically consistent with chert derived from the Munsungun Lake formation in north-central Maine (Thomas 2002, based on inspection by Pollock). Other cherts represented in the Mahan site tool inventory possibly originated in the Normanskill Formation that outcrops in the Hudson Valley to the southwest (Brumbach and Weinstein 1999; Hammer 1976; Wray 1948). The yellow-brown jasper likely derives from two potential source areas in southeastern and central Pennsylvania.

Reynolds site (VT-CH-9210)

The base/midsection portion of a fluted point was recovered during a surface collection in Williston by UVM CAP conducted for the CCCH project (Thomas and Doherty 1985). The site is located on a sandy outwash terrace on the south side of the Winooski River Valley (see figure 3.1, site 2), near an unnamed tributary at an elevation of approximately 107 m (350 ft). One worked quartz fragment was also recovered from the site but not in close enough
proximity to be associated with the projectile point. The point is made of chert, possibly a weathered Champlain Valley variety. Based on its lanceolate form, flaking, and basal concavity, the point fragment can be assigned to the Bull Brook/West Athens Hill group of Early Paleoindian forms (see figure 3.2c). At the time of occupation, the site was roughly 150 m east of the Champlain Sea shoreline, on the south side of a small point of land (see F. Robinson, this volume).

**Bishop site (VT-CH-818)**

A complete fluted point was recovered in Williston by Randy Bishop from a sand and gravel pit on the north side of a hill overlooking the Winooski Valley to the north (see figure 3.1, site 3). The site lies at an approximate elevation of 145 m (475 ft) amsl. The point is likely manufactured from Mount Jasper/Jefferson rhyolite and, based on its size, lanceolate shape, and basal concavity, represents a Bull Brook/West Athens Hill form (see figure 3.2d). Accordingly, the point and site it represents likely date to 12,900–12,400 cal BP. At the time of occupation, the site would have been roughly 500 m from the Champlain Sea shoreline (see F. Robinson, this volume), near the head of a tributary stream and the Winooski Valley drainage.

**Mad River site (F.S. 7 WA/VT-WA-39)**

A fluted point said to be recovered in Moretown during the construction of a “small building northwest of a barn” (VAI site files) was first reported by Fowler (1954) and later included in Loring’s (1980) inventory of fluted points from Vermont. Fowler described the point as being “from a ridge, 1.5 miles south of the town, southeast of Swamp Brook” (VAI site files) (see figure 3.1, site 4). Based on Fowler’s illustration (1954:5, no. 4), the “black flint” point is attributable to the Early Paleoindian period and resembles a Bull Brook/West Athens Hill form. The site location, though not precisely known, likely falls on an upper terrace “ridge” in the town of Waitsfield, on the east side of the Mad River.
Maritime Mountaineers

was collected by Dave Mumford from the northeast side of the pond, near the base of the Hogback Mountain portion of the Green Mountains. The find location, designated VT-AD-160 in the VAI files, lies at approximately 183 m (600 ft) amsl. Based on an illustration in the VAI files, the Mumford point fragment is attributable to the Early Paleoindian period and can be generally categorized as related to Bull Brook/West Athens Hill forms. At this time, the find location was likely much closer to the edge of the lake, since lake levels have gradually receded since the end of the Pleistocene. Frink (2004:23) estimates that "Paleo Lake Bristol" had an elevation of approximately 159 m (520 ft), roughly 12 m (40 ft) higher than its present level. Importantly, the site lies immediately adjacent to the main source zone for Vermont gray quartzite, also featured at the Early Paleoindian period Mahan site in Williston, attesting to the early use of this local material and a possible main source area for its wider distribution.

LEICESTER FLATS SITE (VT-AD-127)
The Leicester Flats site is located in Salisbury on the north side of the Leicester River, a tributary of Otter Creek that drains Lake Dunmore approximately 800 m to the east (see figure 3.1, site 5). The site lies approximately 61 m below the elevation of the upland lake, at approximately 107 m amsl (350 ft). The site is multicomponent, with virtually all precontact Native American periods represented. Two fluted projectile point bases in the Petersen family collection from the site are attributable to the Early Paleoindian period (F. Robinson et al. 2009). Both point bases, one of local gray quartzite and the other of Champlain Valley chert, exhibit fluting and basal morphology that most closely align with the Bull Brook/West Athens Hill typological group (see figure 3.2a, b). As a result, the earliest occupation at this multicomponent site can be dated to ca. 12,900–12,400 cal BP.

BRISTOL POND SITES (VT-AD-11/VT-AD-160)
The Bristol Pond area in Bristol, Vermont, contains several multicomponent Native American archaeological sites frequented by artifact collectors but never systematically studied. Based on the size and number of reported collections alone, the sites surrounding Bristol Pond, formerly Lake Winona, are some of the most intensively collected sites in Vermont (see figure 3.1, site 6). Fortunately, several collections made from the Bristol Pond area have been fairly well documented. At least three collections, and likely others, contain fluted points attributable to the Paleoindian periods.

A gray quartzite base and midsection, fluted on one side,
Connecticut River in Vermont. The Jackson-Gore site was discovered by UVM CAP in 1999 during the course of a broader phase I survey of the Okemo Mountain Resort’s Jackson-Gore ski area expansion. The site consists of two loci separated by approximately 96 m (314 ft). Locus 1, the larger of the two, is situated in the interior portion of the level terrace; a smaller activity area designated Locus 2 is closer to the terrace edge above Branch Brook. As a result of phased archaeological survey, testing, and mitigation at the site, a cumulative total of 49.5 m² has been excavated within Locus 1 and 8 m² has been excavated within Locus 2.

The tool assemblage at Locus 1 includes several fluted Champlain Valley chert projectile point fragments, among them a longitudinal fragment of a fluted point and a rough fluted point or late-stage preform that was articulated from two fragments. Two gray chert fragments also recovered in situ from two separate test units were articulated to form a complete fluted projectile point (figure 3.5). This articulated Jackson-Gore point represents the only Early or Middle Paleoindian period projectile point in Vermont recovered during a professional excavation from intact soils, in this case below a historically disturbed plow zone. The point formed by the two fragments can be assigned to the Michaud/Neponset group based on its moderately deep basal concavity, prominent basal ears, and elongated channel flake scars. Based on this affiliation, the site can be dated to circa 12,200–11,600 cal BP. Charcoal recovered from a feature stain in the vicinity of the point, which was recovered from beneath the upper plow-disturbed horizon at the site, unfortunately returned a date of only 5630 ± 40 BP (Beta-244965) which, calibrated at a two sigma error range, falls between 6490 and 6320 BP. The date is therefore considered contaminated, perhaps as a result of root activity.

The second, smaller site locus lies at the head of a swale closer to the edge of the terrace. A total of 8 m² of excavation here revealed a lithic scatter of nonlocal red chert debitage, possibly Munsungun chert. Two utilized flakes also were recovered from this smaller activity area, which may represent a hunting lookout.

The combined Locus 1 and Locus 2 site assemblage contains a diverse sample of lithic raw materials. Within the sample of lithic debitage recovered (n = 2,682), the most common material is a gray chert of unknown origin that may derive from the Hudson Valley (46 percent). This is followed by a red chert (26 percent) that is macroscopically similar to Munsungun chert from northern Maine. No chemical analysis had been conducted on these artifacts, however, so this attribution remains tentative. As represented in the projectile points, black chert, likely from the Champlain Valley, is well represented in the flakes and fragments recovered (21 percent). Local Vermont quartzite is present at the site as well, but not in significant quantities (3 percent), as are other unidentified cherts (2 percent). The inventory is rounded out by even smaller samples of a greenish chert macroscopically similar to Hudson Valley material (1 percent), a yellow-brown chert, macroscopically similar to Pennsylvania jasper (0.5 percent), quartz (0.5 percent), and a felsite, possibly from Mount Ascutney in Vermont.

The size of both the tools and the debitage recovered from the Jackson-Gore site suggests that tool stone supplies were limited and the group was in transit between source areas or other seasonal locales. The wide range of materials represented and their proportional breakdown could be indicative of direct acquisition during wide-ranging seasonal rounds or, more plausibly, a combination of direct acquisition and exchange. For example, the three most dominant materials—gray chert, red chert, and black chert from the Champlain Valley—may represent materials acquired from local Vermont sources, whereas the less-prevalent
materials such as the green chert and yellow-brown chert may represent material acquired via exchange with other groups.

The site’s location certainly attests to travel between ecological zones/regions, over the Green Mountains and between the Champlain Sea and Connecticut River valley. The site’s altitude also may be an indication of the season the site was occupied, or perhaps when it was not occupied. Deep snows in the higher elevations of the Green Mountains likely would have made travel through the mountain pass more difficult; on the other hand, deep snows may have assisted hunters. Ironically, the Jackson-Gore site is about 5 km (3.1 mi) east of the Mount Holly mammoth find spot (Agassiz 1850), one of the few recorded locations in Vermont where remains of Pleistocene megafauna have been recovered.

There is a second site on the property, also believed to date to the Paleoindian period (VT-WN-273) on the basis of the presence of red chert similar to that recovered from one of the Jackson-Gore site loci. It is located approximately 645 m (2,118 ft) north of the Jackson-Gore site on a narrow, boulder-strewn, glacial kame terrace at a slightly higher elevation of 335 m (1,100 ft) amsl.

**Reagen site (VT-FR-3)**
The Reagen site in East Highgate is the best known of Vermont’s Paleoindian sites. It is one of the first early human occupations recognized in the Far Northeast and the first in Vermont reported in the archaeological literature (Ritchie 1953; Wormington 1957). We describe this site only briefly here, since it is discussed extensively elsewhere (Robinson 2008, 2009, and F. Robinson, this volume). The Reagen site is situated on the southern side of an unnamed hill on the eastern side of the Missisquoi River valley at an elevation of approximately 76 m (250 ft) (see figure 3.1, site 8). At the time the site was first occupied, it was located at or near where the Missisquoi River emptied into the Champlain Sea, likely in general proximity to an estuarine environment. For the purposes of this chapter, the Reagen site produced 23 bifaces that were determined by Robinson (2008, 2009) to be diagnostic of multiple Paleoindian occupations during the Middle and Late Paleoindian periods, circa 12,200–10,000 cal BP. These include the Crowfield \((n = 3)\), Cormier/Nicholas \((n = 14)\), and Ste. Anne/Varney \((n = 6)\) subperiods (figure 3.6) described below and four more that may be attributable to the Agate Basin subperiod, though we have serious reservations about the appropriateness of that taxonomic category.

The Reagen site continued to be occupied throughout the latter Paleoindian periods for several reasons, principally its proximity to the resources of the Champlain Sea, at least initially. One other notable attraction of the site, or at least of the general area, may have been that this locale was likely the source of the enigmatic Reagen chert, prominently represented in the Reagen assemblage but completely absent from other regional Paleoindian assemblages, at least as understood thus far (Robinson 2008, 2009). Ongoing research should better elucidate this aspect of the site.
point fragments in the Fisher collection at the University of Vermont are made from Mount Jasper/Jefferson rhyolite, derived from quarries in and around Berlin or Jefferson, New Hampshire (Boisvert 1992; Pollock et al. 2008; Spiess et al. 1998). In addition, as Loring (1980) noted, all of these artifacts are quite ventifacted, or “sand blasted,” from prolonged exposure to eolian processes. This abrasive action has resulted in excessive polish and has obscured the crystal structure of the material somewhat. This postdepositional process is also common in the Paleoindian Reagan artifact assemblage, which also was recovered from a sandy Champlain Sea margin context.

Four of the projectile points have a general tapered, triangular or “rocket”-like shape, with fluid lines trending from the widest point at the basal ears to the tip (figure 3.7a–d). Others in the collection may be representative of the same style, though one is quite small and is likely the result of reworking or expediency and another is represented only by an eared base (figure 3.7e–f). Those that were not apparently heavily reworked are still smaller than the average provided by Bradley et al. (2008) for the Michaud/Neponset points, though their measurements relative to each other are strikingly similar (figure 3.7g–i).

The particular stylistic variation these points exhibit is not common in the New England region, as far as we are aware. The projectile points depicted in the bottom row of figure 3.7 appear more like the “typical” Michaud/Neponset form, with close similarity to projectile points recovered from the Michaud site in Maine (Spiess and Wilson 1987) and a site near Lake Mégantic in Quebec (Chapdelaine 2004, 2007). Three of the five projectile points or point fragments from the Manley collection that are under consideration here macroscopically appear to be made from Munsungun chert, including one of mottled red and green chert (figure 3.7a), a variation of the material noted in other Paleoindian assemblages (e.g., Spiller Farm; Hamilton and Pollock 1996). Petersen, in his brief analysis of the points in the late 1990s, also suggested that the material was Munsungun chert. Therefore, although no petrographic or chemical sourcing was conducted on the artifacts in question, we feel...
Maritime Mountaineers

In addition to the Early Paleoindian period Hinsdale site, two other sites within the Little Otter Creek drainage have yielded Paleoindian sites/finds. As with the Hinsdale site find, these were first reported by Loring (1980). One spot find (VT-AD-82) is located in New Haven, on the west side of a north-south trending ridge that separates the Little Otter Creek drainage on the east and the Mud Creek drainage, which is a tributary of Little Otter Creek (see figure 3.1, site 11). The point is made of red chert, most likely Munsungun chert, and is well made and complete but for missing basal ears (figure 3.8d). The find spot, at an approximate elevation of 101 m (330 ft), was identified by landowner Earle Bessette and later GPS-defined by F. Robinson. Based on the point’s flaking, thinness, elongated flute scars, and concave and slightly flared base, it can be placed in the Michaud/Neponset group and thus dated to circa 12,200–11,600 cal BP.

Another fluted point find from the same area can be associated with recorded site VT-AD-167. Located

**Hinsdale site (VT-AD-195)**

This site was first reported by Loring (1980:29, Figure 5) based on an inspection of a collection from the Hinsdale family farm in Ferrisburgh, which includes a fluted point made from a dark brown chert. The site is situated on the south side of Fields Hill at an elevation of approximately 79 m (260 ft) near a tributary of Little Otter Creek (figure 3.1, site 10). Based on a photograph of the artifact taken by Loring and archived at the VDHP (figure 3.8c), the point appears to have a tip that was reworked after an overshot fluting attempt. Based on the slightly flared base and full-length fluting (which likely overshot), the point most closely resembles Michaud-Neponset forms and therefore dates to circa 12,200–11,600 cal BP.

**Little Otter Creek sites (VT-AD-82/VT-AD-167)**

In addition to the Early Paleoindian period Hinsdale site, two other sites within the Little Otter Creek drainage have yielded Paleoindian sites/finds. As with the Hinsdale site find, these were first reported by Loring (1980). One spot find (VT-AD-82) is located in New Haven, on the west side of a north-south trending ridge that separates the Little Otter Creek drainage on the east and the Mud Creek drainage, which is a tributary of Little Otter Creek, on the west (see figure 3.1, site 11). The point is made of red chert, most likely Munsungun chert, and is well made and complete but for missing basal ears (figure 3.8d). The find spot, at an approximate elevation of 101 m (330 ft), was identified by landowner Earle Bessette and later GPS-defined by F. Robinson. Based on the point’s flaking, thinness, elongated flute scars, and concave and slightly flared base, it can be placed in the Michaud-Neponset group and thus dated to circa 12,200–11,600 cal BP.

Another fluted point find from the same area can be associated with recorded site VT-AD-167. Located
approximately 555 m (1,821 ft) to the south of VT-AD-82, this area has yielded quartzite debitage in addition to a fluted point fragment from an elevation of approximately 91 m (300 ft), also collected by landowner Earl Bessette. This location was also recently mapped by F. Robinson (figure 3.1, site 12). The midsection and tip point fragment exhibits what would have been a full-length flute and appears to be slightly waisted (figure 3.8d). Thus, it too is tentatively attributable to the Michaud/Neponset point type and to a date range of 12,200–11,600 cal BP. The second Bessette point is manufactured from a dark gray rhyolite with white banding (figure 3.8b). The source of this material is not known.

These two site locations are related to bedrock ridge outcrops above and on the margins of secondary stream valleys. In each case, the sites were likely hunting camps, positioned to intercept animals along game trails or to gain lines of sight across the shallow valleys nearby.

LAKE SALEM SITE (VT-OL-57)
The Lake Salem site is a find spot on the northeastern shoreline of Lake Salem in Orleans from which a fluted point was recovered. This location is to the south of Lake Memphremagog, the largest lake in northeastern Vermont (see figure 3.1, site 13). The small point, which is likely chert, was described as a “rich brown color” (possibly Onondaga chert from western New York). Based on its size, shape, eared base, and pronounced basal concavity, it most closely resembles Michaud/Neponset type points. The point was recovered by Emily Wheeler and Celie Dagesse from what was likely a fill deposit. Fill in the area where the point was found reportedly originated near the outlet of the Clyde River at the southern end of Lake Salem (VAI site files). The find spot and likely original location of the projectile point lies at an approximate elevation of 91 m (300 ft) amsl. The site location is significant in that it is on a potential east-west corridor between the Champlain Sea and the upper Connecticut Valley. Like sites identified by Chapdelaine at Lake Mégantic in Quebec (Chapdelaine 2007), the site location falls in an intermediate position relative to the Champlain Sea and major north-south drainages.

SITE VT-AD-679
The VT-AD-679 site is located on the west side of the Lemon Fair River, upstream from the Route 74 bridge in the town of Shoreham at an approximate elevation of 49 m (160 ft) (see figure 3.1, site 14). Artifacts were noted eroding from the terrace above the west bank of the river. The
base of a fluted point was recovered within a larger concentration of artifacts by Geoff Mandel of UVM CAP while portaging a kayak (figure 3.8a). The site was first recorded as a result of collector information and a site inspection by the USDA NRCS. The artifact is made of an undetermined chert, now weathered to a pale, tannish brown color. Based on the fluting and its slightly eared base, the artifact resembles Michaud/Neponset forms, and therefore at least one occupation at what is likely a large, multicomponent site dates to the Middle Paleoindian period.

**Auclair site (VT-CH-3)**

The Auclair site is a multicomponent site located in Shelburne on a knoll on the east side of Muddy Brook, just downstream from the outlet of Shelburne Pond (Petersen et al. 1984) (see figure 3.1, site 15). Muddy Brook flows northward before draining into the Winooski River. The site is situated above the stream at an approximate elevation of 104 m (340 ft). Like Bristol Pond, Shelburne Pond was larger during the late Pleistocene and early Holocene, so the site may have been closer to the pond’s paleoshoreline at the time of occupation.

A fluted point base is included in the artifact collection of Ken Varney housed at the UVM Anthropology Department. Based on its morphology, the point, manufactured from an unidentified gray chert (figure 3.9, left), falls into the Crowfield-related group of projectile points and therefore dates the earliest occupation at this site to sometime near the end of the Middle Paleoindian period.

**Bristol Pond sites (VT-AD-11/VT-AD-160)**

As discussed in the Early Paleoindian section, the Bristol Pond area in Bristol, Vermont, contains several multicomponent Native American sites frequented by artifact collectors but not studied systematically. Sites on the western side of Bristol Pond or Lake Winona have produced several fluted points that have been documented, one of which falls into the Middle Paleoindian period based on its morphology. The point, collected by Langdon Smith and attributed to the VT-AD-11 area and an approximate elevation of 152 m (500 ft) amsl, is exquisitely manufactured (figure 3.9, right). It is made of black and gray banded chert, the source of which is not definitively known but which resembles the Norway Bluff variety of Munsungun chert. It exhibits a slightly flared base, a moderate but well-formed basal concavity, and one recognizable unflaring basal ear (other is missing). On both faces a complex pattern of overlapping and side-by-side channel flake scars is evident. Cumulatively, the general pumpkin-seed-like shape and side-by-side fluting patterns suggest a Crowfield-related type. As with the Early Paleoindian point recovered from the other side of the lake (discussed above), the rough location of the site would have been nearer the lakeshore at the time of occupation and proximal to quartzite quarry resources.

**VT-CH-230, Locus 3**

Site VT-CH-230 is a large site identified in Essex by UVM CAP during studies undertaken in advance of the CCCH. The site included a Late Paleoindian component in addition to the remains of three Early Archaic period extractive camps. Locus 3 at VT-CH-230 was situated at the north end of a large, low bedrock ridge on the east side of Indian Brook in Essex at an elevation of approximately 146 m (480 ft) amsl (see figure 3.1, site 16). Its location provided relatively good drainage compared to the wet areas that likely bordered the brook. Depending on the woodland...
vegetation, the ridge may have also provided some sight advantage for big-game hunting. Roughly 30 percent of the site was excavated before it was destroyed by highway construction.

The entire artifact assemblage consists of a projectile point base; the tip of a second point; four flake tools that were used to scrape, shave, and process a soft substance, perhaps sinew; 146 chert flakes produced when several tools were made; and one piece of burned bone. Twelve quartz flakes are most likely related to a later Early Archaic occupation. The projectile point base is narrow and contracting and resembles those of the Cormier/Nicholas group of points. As a result, the tool fragment and related occupation are attributable to the Middle Paleoindian period. The locus of the site where the point base was found covered a maximum area of 80 m² (860 ft²), with most artifacts concentrated in an even smaller area.

The site lies adjacent to the Indian Brook drainage, a tributary of the Winooski River. In addition to concentrating plant and animal resources, at the time of occupation this small stream likely served as a travel corridor between the retreating Champlain Sea and upland areas. Two types of chert are present both as debitage and as finished tools, roughly in equal proportions. Black chert at the site likely was obtained locally from the Champlain Valley. The second type is very similar to lustrous, gray-green chert derived from quarries of the Normanskill Formation in the central Hudson River Valley. Other loci at the Indian Brook site are attributable to the Early Archaic period, showing continuity of use of this portion of the secondary stream corridor.

PAQUETTE 2 SITE (VT-CH-190)
The Paquette 2 site is located in Colchester on an outwash terrace between two unnamed tributaries of the Mallets Bay portion of Lake Champlain (see figure 3.1, site 17). The site lies at an approximate elevation of 61 m (200 ft). A midsection of a projectile point was recovered by UVM CAP during the CCCH project during a surface collection of a plowed field. Based on its pentagonal shape and contraction of its lateral margins toward the base, the point fragment resembles several projectile point fragments in the Reagen site collection. This tool may have been broken during an attempt to flute it or may have been a nonfluted form broken during the final stages of production (figure 3.10, right). Based on the point’s form, this site can be assigned to the Cormier/Nicholas group of Middle Paleoindian period projectile points and, therefore, the occupation at Paquette 2 is likely to have occurred sometime circa 12,200–11,600 cal BP.

SOUTH HERO CRYSTAL QUARTZ POINT
A collector recovered a crystal quartz fluted point from a location on South Hero Island (see figure 3.1, site 18) in Grand Isle County in the 1930s. A sketch of the artifact was first published by Haviland (1969). Loring (1980) also references the artifact, and Haviland and Power later published a photograph of the find (1994:29). The point was reportedly recovered from recently deposited fill. It is relatively small with a wide midsection (figure 3.10, left) and may be weakly fluted with a relatively deep basal concavity, similar to Cormier/Nicholas forms attributable to the Middle Paleoindian period.

The uncertain provenience of the point makes it difficult to speculate about its original context. Assuming, however, that the fill likely came from somewhere on South Hero or in Grand Isle County, the point may represent a site that once was located on an island or peninsula in the Champlain Sea. South Hero happens to have the highest elevation of these islands, with hills that exceed 76 m (250 ft) and numerous sand and gravel quarries where the projectile point base was recovered.
tal artifacts, of which 67 (8.9 percent) were lithic tools or tool fragments. Laboratory refits resulted in a total of 58 articulated tools or tool fragments. The remaining artifacts (91.1 percent) include lithic debitage of various materials (Robinson and Crock 2006). Among the tools recovered are three projectile point bases that are definitively Late Paleoindian in age based on their morphology and flaking pattern (figure 3.11e–g). The three bases and one other possible base (figure 3.11d) all exhibit the basal portion of lanceolate forms, gracile cross sections, basal grinding, and a transverse parallel or parallel oblique flaking pattern. Based on these characteristics, the point fragments are attributed to the Ste. Anne / Varney group, dating the site to the Late Paleoindian period. Identical flaking patterns also are exhibited by two bifaces made from elongated flakes, which may represent short projectile point preforms or completed knives (figure 3.11b–c).

The most complete of the projectile point bases exhibits a stem that contracts from the point below two subtle and shallow shoulders. The distal end terminates in a transverse break just above the shoulders where the blade margins begin to angle toward the tip. The proximal end is squared or flat relative to the lateral stem margins. The “stem” portion of the base is heavily ground, partially obscuring but not obliterating the flaking pattern across both surfaces of the stem and along the lateral margins. Evidence of grinding ceases, however, at the shoulders, where two consecutive sharpening flake scars are present on one shoulder edge.

Late Paleoindian Period, circa 11,600–10,800 cal BP

Mazza site (VT-CH-9179)

The Mazza site is located in Colchester on a level, sandy outwash terrace at an elevation of approximately 49 m (160 ft) amsl, between an unnamed tributary of Sunderland Brook to the east and Sunderland Brook immediately to the south (see figure 3.1, site 19). Sunderland Brook flows into the Winooski River, which in turn flows directly into the Malletts Bay portion of Lake Champlain. The site was first identified by UVM CAP in 1984 during a surface survey conducted for the CCCH project. Ten artifacts were recovered during the initial identification of the site, including a sidescraper fragment made of a nonlocal chert and a modified flake with two graver “spurs” (Dillon et al. 1986). The exotic material and presence of the spurred tool provided early but inconclusive evidence of a Paleoindian occupation (Thomas et al. 1985). In 2002 a redesign of a proposed highway interchange expanded impacts to include the edge of the terrace above the Sunderland Brook tributary.

Testing in an area roughly 40 m (131 ft) west of where artifacts previously had been surface-collected revealed another, more significant locus of the site. Over the three phases of archaeological investigation in this portion of the site, test pit (0.5 by 0.5 m ) and test unit (1.0 by 1.0 m) block excavation included a combined total of 86.5 m² (283.7 ft²), or approximately 50 percent of the small site / site locus. The cumulative excavations resulted in the recovery of 751 to-
to be a fine-grained gray to tan chert with translucent inclusions. These inclusions may instead signal that the material is a rhyolite or felsite, though it is macroscopically dissimilar to Mount Jasper rhyolite or Mount Kineo felsite from Maine. Its source remains unknown. In addition to an apparent absence of Kineo felsite, no recovered artifacts appear to be made of Munsungun chert. Lesser amounts of other materials also are represented, including local Champlain Valley unidentified gray chert ($n = 78; 10.4$ percent), quartzite ($n = 29; 3.9$ percent), quartz ($n = 11; 1.5$ percent), local Champlain Valley chert ($n = 5; 0.7$ percent), shale ($n = 1; 0.1$ percent), sedimentary stone ($n = 1; 0.1$ percent), and untyped felsite ($n = 5; 0.7$ percent), one flake of which closely resembles a material informally referred to as Mount Ascutney felsite. The remaining artifacts ($n = 38; 5$ percent) are classed as untyped materials, which collectively include several coarse materials possibly collected near the site area.

We analyzed all artifacts macroscopically for material type with the aid of comparative lithic collections. Additionally, colleagues independently corroborated several material type attributions, particularly the Mount Jasper rhyolite examples (e.g., R. Boisvert, personal communication, 2003). Nevertheless, though we are fairly confident in the categorization of material types, they must remain tentative in lieu of chemical, elemental, or other fine-grained analysis.

After the excavation of the Mazza site had concluded, UVM CAP fortuitously examined a Late Paleoindian lanceolate projectile point from the collection of Richard Gonyeau (Robinson and Crock 2006). This point, likely made of Munsungun chert, exhibits the same stem-to-shoulder-to-blade morphology as the previously described base from the Mazza site (figure 3.11a). The projectile point was surface-collected by Mr. Gonyeau’s father, likely on his fields near the Colchester/Milton border, where Richard Gonyeau still lives. These fields are relatively close to the
Maritime Mountaineers

explored. It is difficult to infer a season of use for this site, given the poor preservation within acidic soils, deep plow disturbance, and great antiquity of the occupation. However, the tabular knife recovered from the site, possibly used for fish processing, may give some indication that the site was occupied during the warmer months (Robinson and Crock 2006).

The Arbor Gardens site is located in Colchester and situated at an elevation of approximately 61 m amsl (200 ft) on an elevated sandy terrace formed by the Champlain Sea (see figure 3.1, site 20). The site was identified by UVM CAP in the course of studies conducted in advance of a housing development. Important waterways near the Arbor Gardens site include Allen Brook, a tributary of Mallets Creek, which drains into the Mallets Bay portion of Lake Champlain, and the Lamoille River. Based on the results of three phases of fieldwork, the Arbor Gardens site is spread across an area of over 2,200 m² (23,681 ft²) and includes at least two discernable activity areas and possibly four. Most of the larger block excavation conducted at the site was completed within Activity Area 1, where the densest deposits of artifacts were encountered. Notably, Activity Area 1 is in the central portion of the landform, well away from the terrace edges overlooking Allen Brook and its tributaries. The phase 3 data recovery consisted of the block excavation of fifty-nine 1.0 by 1.0 m excavation units, or roughly 60 percent of the approximately 98 m² (1,055 ft²) Activity Area 1.

A total of 31 flaked stone tools were recovered from the three phases of excavation at the Arbor Gardens site. This total includes 34 tool fragments, several of which conjoin to form an articulated, single tool. The tool inventory includes one projectile point fragment, six bifacially flaked tools, five bifacially flaked tool fragments, four unifacially flaked tools, and 15 utilized flakes. A variety of local and exotic lithic materials are represented within this assemblage, including a single projectile point base made from gray-black chert likely originating from the Onondaga Formation in western New York or possibly another locale outside of Vermont. The tool is broken at its basal inflection, making the analysis of the flaking and overall shape of the original tool difficult to assess. Despite the fragmentary
nature of the artifact, it is morphologically comparable to
diagnostic lithic materials from the broader Northeast that
date to the Paleoindian and Archaic periods. In southeast-
ern Quebec, the La Martre and Mitis Late Paleoindian sites
contain elongated Ste. Anne/Varney-like points of a similar
dark brown chert, exhibiting expanding bases with similar
basal thinning (Dumais 2000:89). The Late Paleoindian
Rimouski site in Quebec also produced points with bases
similar to the one found at the Arbor Gardens site (Chap-

Additionally, the Varney Farm site in western Maine
produced several projectile point specimens with bases
similar to the fragment recovered from Arbor Gardens (Pe-
tersen et al. 2000). The tool inventory from the Arbor Gar-
dens site also includes 12 bifacially flaked stone tools/tool
fragments, some of which articulate to form 10 separate
tools. These 10 tools/fragments are made from a variety of
local and exotic lithic raw materials, including a weathered
Mount Jasper/Jefferson rhyolite, unidentified gray Cham-
plain Valley chert, and local gray “Cheshire” quartzite. Of
note, one tabular biface manufactured from Mount Jasper/
Jefferson rhyolite was recovered. Although both edges are
worked, only one edge of this tabular tool exhibits use wear,
perhaps as a sidescraper. Elsewhere we argue that tabular
knives such as this are diagnostic of Late Paleoindian and
Early Archaic assemblages and may have been used to pro-
cess fish or marine mammals (Robinson and Crock 2006).
For example, a similar biface was recovered from the Weirs
Beach site in New Hampshire with an associated radio-
carbon date of 9615 ± 25 BP and is “considered to have a
Plano technological affiliation” (Bolian 1980:124). Other
analogues for this biface include large tool fragments re-
covered from the Late Paleoindian Rimouski site in eastern
Quebec (Chapdelaine 1994:191).

A total of 15 utilized but not intentionally modified
flakes were recovered as well, found in distinct material-type
clusters. Cutting and scraping activities appear to have been
conducted in discrete areas by individuals each using a dif-
ferent raw material. One cluster comprises five utilized
flakes all made from a weathered greenish rhyolite, likely
Mount Kineo rhyolite, from a source near Moosehead
Lake in central Maine. A second cluster of four black chert
flakes was recovered from the southern portion block, with
one additional black chert flake recovered from the Activ-
ity Area 2. A third cluster of utilized flakes was found in
the central portion of the phase 3 excavation block and
comprises three quartzite tools. Finally, a single utilized
flake made from Mount Jasper/Jefferson rhyolite also was
recovered.

A total of 3,401 pieces of lithic debitage were recovered
during all three phases of excavation at the Arbor Gardens
site. Almost 25 percent of the total lithic debitage is exotic
to Vermont; the remaining 75 percent is likely from local
sources, though some of the black chert recovered may be
exotic as well. Of the total, 64 percent of the debitage is
Champlain Valley black chert; 17.8 percent is Mount Jas-
per/Jefferson rhyolite from New Hampshire; 10.2 percent is
local Cheshire quartzite; 7.0 percent is Mount Kineo felsite
from the Moosehead Lake region of Maine; and 1.0 percent
is quartz, probably of local origin.

The small mean size of the debitage recovered (<1 cm,
80.7 percent) indicates late-stage lithic reduction (1–2 cm,
0.8 percent; >3 cm, 0.5 percent). This extraordinary num-
ber of small, likely tertiary reduction flakes suggests that
the main activities taking place at the site were late-stage
lithic reduction.

The Gonyeau collection point discussed above was re-
portedly recovered less than a kilometer northwest of the
Arbor Gardens site in Milton from fields that also have
yielded evidence of multiple Native American occupations
up through the Woodland period both in collections by
avocational investigators and through professional CRM
projects.

ARNOLD BROOK SITE (VT-RU-572)
The Arnold Brook site is located immediately adjacent
to Arnold Brook in Brandon, Rutland County, and was
identified during archaeological studies conducted by
UVM CAP for a transmission line project (F. Robinson et al. 2009). The site lies on a low, level, wooded terrace
at approximately 137 m (450 ft) amsl within a broad val-
ley landform that is slightly elevated above the expansive
Brandon Swamp to the west (see figure 3.1, site 21). The
land rises significantly to the north to the crest of a large
hill. Another large wetland lies approximately 145 m north-
east of the site. In total, 39.25 m² was excavated during the
cumulative phased excavations within the core portion of
the site (F. Robinson et al. 2009). These excavations re-
Hunting activities are also represented by the lanceolate point base and another nondiagnostic projectile point tip. Beyond these activities, however, the tool assemblage is remarkably homogenous and is characterized by the large number of unifacial tools, most of which are minimally reduced and quite coarse. Although the precise functions of these tools are currently unknown and their working edges vary somewhat in formation, angle, and evidence of use, among other factors, their generally robust and coarse nature suggests that they would have been best suited for processing a hard substance. Likewise, the large size of some of these tools and their relative abundance at the site suggest that this processing activity was fairly intensive. Because of these factors and the site's location within a biotically productive wetland/stream setting, it is suggested that wood acquisition and processing were the primary activities undertaken there.

Interestingly, tentative analogues for this type of site have been identified for the subsequent Early Archaic period in Vermont. Recent palynological studies suggest that, rather than the barren tundra or sparsely forested spruce parkland once proposed for this area, the site was occupied during a time when forests were characterized by an abundance of pine (*Pinus*), significant percentages of spruce (*Picea*), and evidence of hemlock (*Tsuga*), fir (*Abies*), birch (*Betula*), and oak (*Quercus*) (Anderson 1988; Anderson et al. 2007; Cronin et al. 2008). Of course, the developing wetland settings within Brandon Swamp, along the Otter Creek, and within the localized area of Arnold Brook may have been a powerful attraction to Native American groups within the area (Nicholas 1987, 1988) and may have been areas that fostered the growth of newly resident deciduous tree species.

Although the Otter Creek 2 site, less than 2.5 km (1.55 mi) to the northwest, and the Winooski Redevelopment site (both discussed below) are arguably more tied to the resources and transportation corridor along the main stems of major rivers, the location and assemblage at the Arnold Brook site speaks to the potential abundance and exploitation of plant resources along secondary streams during the Late Paleoindian period.

**Otter Creek 2 (VT-RU-13)**

The Otter Creek 2 site is located on a low rise/knoll on the east side of Otter Creek in Brandon Swamp at an elevation...
of roughly 116 m (380 ft) (see figure 3.1, site 22). Extensive private collections have been made here (VAI site files), and limited systematic work was conducted at the site by Ritchie (1979). Although the site is better known for its extensive Late Archaic, Laurentian tradition occupation, Ritchie recovered several projectile points representing earlier occupations within his designated Zone 3 horizon at the site (which also yielded Late Archaic tools). Among these are three “fragmentary points or knives of possible Plano style” (1979:6). Ritchie cites the “collateral or parallel ribbon flaking technique” (1979:6) as diagnostic, differentiating these tools from the other projectile points recovered. Based on the flaking illustrated (1979:Plate 2, 7–9) and described, these points can likely be assigned to the Ste-Anne/Varney group. Of interest, the site also may have had an earlier, Early Paleoindian occupation, as suggested by a probable fluted point in the Sandy Fellon collection from the site (artifact VT-RU-13:300, illustrated by Loring, in VAI site files). The long-term use of this particular swamp island, beginning as early as the Late Paleoindian period and perhaps earlier, testifies to the long-term productivity of the Brandon Swamp portion of the Otter Creek drainage as well as the early importance of the limited, well-drained landforms available for habitation. Though it is unclear where the Otter Creek channel was located in relation to the site during its earliest occupation, the site demonstrates the presence of people along the main stem of a major river between the sea/lake and the western foothills of the Green Mountains.

**Winooski Redevelopment Site (VT-CH-900)**

The Winooski Falls site is a multicomponent site located on the north side of the Winooski River, just above the falls in Winooski, Chittenden County, at an elevation of approximately 51 m (168 ft) amsl (see figure 3.1, site 23). The site was identified as part of a regulatory study undertaken in 2002 for the Winooski Redevelopment project by the Archaeology Consulting Team (Frink 2002).

A parallel-flaked, basally thinned quartzite projectile point base and midsection was recovered from 46–59 cm below the ground surface within a buried historic plow zone that also contained historic artifacts (figure 3.12, right). The artifact is not waterworn and does not exhibit any other characteristics that would suggest it was redeposited by fluvial or other processes; therefore, the site location is considered accurate. Moreover, despite its position adjacent to the Winooski River, a cursory examination of the specific site locale suggests that it was not regularly subject to flooding until the recent historic past when the river was narrowed at that point and a dam was constructed. Thus, the point’s intermixture with more recent artifacts is not altogether anomalous. Based on the projectile point’s narrow blade, flaking, and basal treatment, it is related to Ste. Anne/Varney type tools and is therefore attributable to the Late Paleoindian period. The location of the site near the modern channel of the Winooski River indicates that by Late Paleoindian times habitable landforms existed along lower elevations of major river valleys in locations that would have been inundated by the Champlain Sea in previous Paleoindian subperiods.

**Bristol Pond Sites (VT-AD-11/VT-AD-160)**

As discussed in the Early and Middle Paleoindian sections, the Bristol Pond area contains several multicomponent Native American sites frequented by artifact collectors. In addition to producing fluted points attributable to earlier Paleoindian periods, an area on the western side of Bristol Pond or Lake Winona at or in the vicinity of site VT-AD-11 also has yielded at least one tool that can be attributed to the Late Paleoindian period. A square-based, parallel-sided, and parallel-flaked projectile point fragment made of weathered Kineo felsite was collected by Langdon Smith (figure 3.12, middle). Though Mount Kineo rhyolite does appear at the Reagen site in a form attributable to a slightly earlier Paleoindian subperiod (Cormier/Nicholas), the use of this material is more clearly associated with Late Paleoindian occupations in some portions of the Northeast such as at Lake Mégantic (Chapdelaine 2007). This point helps round out what appears to have been a repeated occupation of the Bristol Pond/Lake Winona area throughout Paleoindian times. This body of water offered a concentration of natural resources and close proximity to quartzite sources, in addition to proximity to upland valley corridors through the Green Mountains, leading to its margins being occupied and reoccupied during Paleoindian times and, later on, throughout the entire precontact era.
DISCUSSION

Recent advances in our understanding of Paleoindian settlement in what is now Vermont can mainly be attributed to the cumulative results of regulatory archaeology over the past decade. Though the information gained from accumulating spot finds remains invaluable to our reconstructions of early human history in Far Northeast, there is no substitute for sites systematically studied in their primary context. When the range of site settings can be evaluated alongside associated artifact assemblages, the results are particularly revealing for the reconstruction of both the timing and direction of human entry into what is now Vermont and subsequent trends in settlement and site function. Issues regarding the directionality of both settlement and interregional communication can be made on the basis of exotic lithic materials represented in finished projectile points attributable to Paleoindian periods and the proportions of exotic materials recovered from systematically studied Paleoindian sites (figure 3.13). These data indicate that, from the outset, Paleoindians in Vermont were linked geographically and socially to groups to the east and the west. Based on a high incidence of exotic materials originating in Maine and New Hampshire, however, Vermont Paleoindians appear to have been closely connected to points east throughout the Paleoindian periods.

Early Paleoindians on the West Coast of New England

The presence of chert originating from Munsungun Lake in Maine in Early Paleoindian sites in Vermont supports a possible east-to-west colonization model. Paleoindians possibly followed the Champlain Sea outlet inland, up what later became the St. Lawrence Valley and into the inland portion of the sea. A “coastal” model of migration also is supported by the majority of sites and tools attributable to the Early Paleoindian period that have been found, not only near the margins of the Champlain Sea, but also in the northern portion of the valley, closest to the outlet. Having stated this, we do not wish to accentuate initial colonization or pioneer models, where the information is
Crock and Robinson

70

necessarily impressionistic and the “first sites” will likely never be identified, or accurately identified as such. Without question, however, the Mahan site is clearly associated with the margins of the Champlain Sea, and the Reynolds and Bishop spot finds nearby also are associated with sandy, higher-elevation features on the margins of the sea, near the then mouth of the Winooski River in the northern part of Vermont (see figure 3.1 and location of Bull Brook/West Athens Hill–related sites). Of note, the mean elevation of the six Early Paleoindian sites/finds summarized above is 144 m (472 ft) amsl, well above the rough estimate of the Champlain Sea maximum (ca. 100 m [330 ft] amsl).

The range of materials represented at the Mahan site and by the Bull Brook/West Athens Hill type finds as a group, notably Mount Jasper/Jefferson rhyolite in the form of the Bishop site point and the presence of what appears to be Munsungun chert at the Mahan site, speaks to a close relationship with people and places to the east. In particular, routes to or from Munsungun Lake may have been most efficient via the Champlain Sea outlet or via an overland route through the Green Mountains and into the Connecticut Valley, then through the White Mountains, past Mount Jasper, and into the upper Androscoggin drainage. Though other materials at Mahan such as probable Pennsylvania jasper, Hudson Valley chert, and Onondaga chert also indicate a broad sphere of interaction and travel that includes the areas to the west and south of the Champlain Sea, there seems to be a stronger connection with the east, at least as emerging from the raw material proportions within the presently available data set.

From the outset, there appears to have been a familiarity with local material sources as well. Access to these materials would have been relatively easy, with cherts potentially available in exposures near the sea, or in ledges or cobbles exposed elsewhere in the valley, although Hathaway Formation cherts would not have been available until at least the latter portion of the Late Paleoindian period (Robinson 2008, 2009). Cheshire quartzite such as that used to manufacture the fluted point and preforms at the Mahan site would have been easily acquired as well, from glacially distributed boulders or in quarries on the western flanks of the Green Mountains in the Bristol/Monkton area. Vermont quartzite also has been found in Paleoindian contexts outside of Vermont, notably in the form of fluted points at the Whipple site in New Hampshire (Curran 1984) and scrapers at Paleoindian sites in Maine (Spiess et al. 1998). It is particularly interesting that some of the fluted point spot finds attributable to the Early Paleoindian period, such as those from the Leicester Flats site, are located near the headwaters of the Otter Creek drainage, which not only provides a general corridor between the sea and upland areas including postglacial Lake Dunmore but also includes areas noted for quartzite exposures. The fluted point found in the Mad River valley also indicates that the Champlain Sea-to-uplands route may have continued through the Green Mountains, perhaps via the upper New Haven River through the Appalachian Gap, which connects the Otter Creek drainage with the Mad River valley (modern VT Rte. 17).

As noted in our introduction, there is a general lack of recorded Paleoindian sites on the Vermont side of the upper...
We have even stronger evidence of people living near the Champlain Sea by the Middle Paleoindian period, with the Reagen and Fairfax Sandblows sites situated at the outlets of two of Vermont’s largest rivers, the Missisquoi and the Lamoille, respectively. The recent research on the Reagen collection by Robinson (2009) also indicates that Reagen may have had the added attraction of being at or near a chert exposure. The clear maritime focus evidenced by the location of these sites, and some tools included in the Reagen collection (Robinson et al. 2004), is coupled with evidence that people not only traveled overland though mountain passes but also spent at least some time in the higher elevations. The Jackson-Gore site in Ludlow in the heart of the Green Mountains is the most upland Paleoindian site in Vermont and, along with the Israel River complex in the White Mountains of New Hampshire (Boisvert 1998, 1999), one of only a few in such settings known regionally. The spot finds near Little Otter Creek and Bristol Pond show that, during the final centuries of the Champlain Sea, east-west routes through the Green Mountains, apparently pioneered during the Early Paleoindian period, still pertained. It is certainly worth considering what snow and ice coverage was like at higher elevations during this time and whether temperatures were cool enough to maintain snow pack year round or if peaks and higher elevation valleys were seasonally free of snow and ice. In either case, it is probable that the majority of travel through the Green Mountains to the Connecticut River valley during Early and Middle Paleoindian times occurred during the warmer months of the year. Hunting animals like caribou or moose (or less likely mammoth) in the uplands would have been easier in deep snow, but human travel would have been more difficult.

Interestingly, annual settlement cycles at this time may have run counter to reconstructions for later prehistory. Instead of a settlement pattern where people focused on lakeside and lower valley locales during the spring and summer and moved into upland hunting grounds in the fall and winter, during the Early and Middle Paleoindian periods cooler temperatures brought on by the Younger Dryas may have inverted this pattern. Instead, because of the warmer temperatures associated with the Champlain Sea environ-
ment, people may have been drawn to the coastline year round and ventured into the uplands only during the summer months when conditions were more favorable for overland travel. Unfortunately, the site sample is very small, not to mention a total lack of seasonality data in the form of floral or faunal remains. Based on the available site sample, however, non-navigable stream corridors, arguably more difficult to follow in deep snow, appear to have been equally or more important than major valleys for travel away from the sea shore and into (and through) upland areas.

The Little Otter Creek and Hinsdale site finds, like those known from the Otter Creek drainage later, indicate movement inland from the sea for hunting, as implied by the projectile points recovered. Interestingly, the two fluted points from Little Otter Creek were found near north-south trending ridges. Not only would these ridge lines have formed natural corridors for game and overland travel by people, they also were slightly higher than surrounding terrain and therefore were likely drier as well. Other sites including VT-CH-190 and VT-CH-230 also show a use of secondary streams and drainage divide areas during the Middle Paleoindian period, indicating that these areas likely supported plant and animal communities important to people and had dried out enough to support at least short-term habitation. Finds from Bristol Pond show that this upland water body, like the Leicester River/Lake Dunmore area, was a destination, as it would be for millennia afterward. In an analogous setting, the Auclair site near Shelburne Pond helps highlight the importance of postglacial lake environments which, early on, attracted natural communities of plants, game, and at least seasonal habitation by Native people. Of note, although the sites and spot finds attributable to the Middle Paleoindian period include one of the highest-elevation sites in New England and the Maritimes, the mean elevation for the eleven sites/finds discussed above is 120 m (393 ft), or 24 m (79 ft) lower than the mean elevation for the smaller sample of Early Paleoindian sites/finds.

Late Paleoindian Period: Wetland and Riverine Adaptations

Over the course of the Late Paleoindian period the Champlain Sea had receded to a level more or less equivalent to modern lake levels, leaving an increasingly freshwater Lake Champlain in its place at or near the conclusion of the period. Formerly inundated areas hosted new ponds and wetlands that provided consistent resources. Forests became more varied with the addition of deciduous trees. Overall, Native Americans living in Vermont during the Late Paleoindian period witnessed some of the most dramatic environmental changes in the human history of the region. The margins of former estuaries of the Champlain Sea were still attractive, as evidenced by sites like Mazza and Arbor Gardens. These sites are located on similar outwash terraces above tributary streams which, by the Late Paleoindian period, took more meandering routes through newly exposed terrain instead of emptying directly into the sea as they had before. People began to inhabit lowlands, including formerly inundated areas. The mean elevation of the eight Late Paleoindian sites and finds discussed above is 95 m (312 ft), or 25 m (82 ft) below the mean elevation of Middle Paleoindian period sites and 49 m (163 ft) below the mean elevation of the Early Paleoindian sites. Remnants of the Champlain Sea or pockets of glacial ice in the form of ponds and kettles likely developed into concentrations of plant and animal resources. The Gonyeau projectile point comes from a location not only near the headwaters of a secondary stream that once drained directly into the sea but also near a probable postglacial, post-sea kettle pond. The area ringing this former pond (now wetland) was returned to for millennia, as evidenced by several multicomponent sites along its margins. The Arnold Brook site in Brandon also provides material evidence in the form of specialized tools that indicate that people had adapted to the newly available plant and tree resources and continued to utilize secondary stream corridors for specialized extraction.

Perhaps the most important new development in the Late Paleoindian period, however, is the settlement along main stems of major rivers (see figure 3.1 and location of Ste. Anne/Varney–related sites). By the Late Paleoindian period, rivers ran slower and warmer as a result of climatic change. The location of several sites both at lower elevations and immediately adjacent to major river channels in Vermont and elsewhere in the Champlain Basin indicates that, by this time, fishing began to be productive, not to mention that riverine travel likely was more feasible as a result of the rivers’ reduced velocity. The advent of riverine adaptations is suggested by sites such as the Winooski Redevelopment site, the Bessette II site along the Mis-
sisquoi, and the Lower Saranac Prehistoric site across the lake (Hartgen Archaeological Associates 1991), as well as the Otter Creek 2 site on Otter Creek in Brandon. In addition to helping reconstruct Late Paleoindian settlement and adaptation, these sites also highlight the potential of lower river valleys for preserving as-yet-unidentified sites from this poorly known period.

Clearly, one of the most interesting aspects of Vermont’s Late Paleoindian site inventory is the high proportion of New Hampshire rhyolite in the lithic assemblage from the Mazza site, as well as the appearance, for the first time, of Kineo felsite from the Moosehead Lake region of Maine. Whereas the likely presence of materials such as Onondaga chert is evidence of a broad sphere of interaction or travel, the presence of New Hampshire rhyolite and Kineo felsite indicates a continued strong connection with eastern regions. Following a millennium of settlement in the region, these materials also highlight what must have been a well-entrenched cognitive landscape, with the meaning and cosmological significance of place and the etiological origin of materials and source areas transmitted from east to west along with the raw materials. Mount Jasper/Jeffer son and Mount Kineo sources are each impressive physically, visible from a distance, and associated with major waterways. By the Late Paleoindian period, these lithic sources were likely indistinguishable from the creation stories that explained their existence. We know less about Vermont materials moving in the opposite direction, but the same phenomenon likely occurred as well, with materials like Cheshire quartzite embedded with meaning, including geographic reference and the history of the Champlain Sea and Green Mountains landscape.

ACKNOWLEDGMENTS

We thank Claude Chapdelaine for the invitation to participate in the conference and volume and for his helpful comments (and patience). We also thank Stephen Loring for his pioneering work with Paleoindian artifacts in Vermont collections. Thanks also to Jim Bradley, Dick Boisvert, R. Scott Dillon, Andrew Fletcher, William Haviland, Geoff Mandel, Giovanna Peebles, Art Spiess, Peter Thomas, and Joshua Toney for assistance, direct and indirect, with the preparation of this chapter. We also pay respects to the late James Petersen for inspiring us to pursue any and all aspects of Northeastern archaeology and archaeology in general.

REFERENCES


———. 2004. Des chasseurs de la fin de l’âge glaciaire dans la


———. 2002. Projectile Points from the Sheguiandah Site. In The Sheguiandah Site: Archaeological, Geological, and Paleo-
Crock and Robinson


Thomas, Peter, Nanny Carder, and Robert Florentin. 1996. A Changing World: 8,000 Years of Native American Settlement along the Missisquoi River in Highgate, Vermont.


The Paleoindian Period in New Hampshire

Richard A. Boisvert

Summarizing archaeological data from an arbitrarily defined space is always a risky proposition. Rarely is such a summary viewed as adequate or even valid. The effort is even more unreliable if data from within the selected area are known or believed to be uneven. Presenting a summary of Paleoindian data in New Hampshire is fraught with all of these liabilities. The area of the state is quite arbitrary from an ecological or cultural historical perspective, circumscribing only one major watershed, the Merrimack (and not even all of that), the east half of the Connecticut, the upper reaches of the Saco, the middle reaches of the Androscoggin, and a collection of minor streams that feed into a very small maritime zone. The White Mountains are perhaps the only environmental zone completely within the state. Systematic archaeological survey of the state does not exist. Sites have been found, but chance discovery accounts for about half of the sites recorded, and only one site (Thorne) was found as a product of a survey carried out specifically to find a Paleoindian site; the others were found as part of CRM surveys in advance of development. Paleoindian assemblages are overwhelmingly dominated by lithics, with scant representation of faunal or floral materials. When present faunal or floral archaeological materials are immensely informative and serve to remind us that the preserved data are profoundly biased. Finally, the number of sites that may be analyzed are painfully few in number, with sixteen partially excavated sites and eight reasonably well documented isolated finds of Paleoindian artifacts (figure 4.1). Among this total a third are from sites with Archaic or Woodland components, and their analyses are somewhat confounded with mixed assemblages. A summary of Paleoindian sites in New Hampshire is therefore constrained by several limiting circumstances.

Whether or not New Hampshire has a large or representative body of Paleoindian sites, it is still important and necessary to move forward with interpretations of the available data. These sites cannot be understood in isolation, and the larger questions regarding the Paleoindian period require a synthesis of all available data. Understanding the larger questions of origins, intergroup relationships, change over time, and ultimate closure of the Paleoindian period and culture can only be derived from interpretations of the patterns and differences among these sites. That they are imperfect is relevant only insofar as we are concerned with the absolute certainty of our conclusions.
Richard A. Boisvert

developed her interpretations from the perspective of the Whipple site (Curran 1984, 1987), since it was the only well-published Paleoindian site in the state. Drawing from her own research and supplementing it with unpublished data shared by other researchers, she offered a broad summary of Paleoindian data in New Hampshire and sketched likely research issues.

The Whipple site was identified in the mid-1970s and immediately recognized as a rich and important Paleoindian site. This significance proved to be a two-edged sword, encouraging on the one hand commitment of significant resources from state and federal agencies, educational institutions, and the local community and unfortunately on the other hand looting by relic hunters. Field research documented three subareas or loci, two of which were Paleoindian encampments. The site is situated on the shoulder of a broad slope overlooking a sharp bend of the Ashuelot River and a former kettle pond that had been breached by the meandering of the river. A large assemblage of distinctive Paleoindian points and other tools were documented, both from the formal excavations and from collections made by local residents. Curran hypothesized a close relationship with the other well-known southern New England Paleoindian sites, stating, "The similarity, technologically and lithologically, of the Bull Brook and Whipple site materials [Curran 1984; Grimes et al. 1984] suggests that closely related groups occupied both 'ends' of the habitat scale and adjusted their exploitative strategies accordingly" (1987:304).

At that time there were only four other sites with excavated Paleoindian components in the state, most of which received publication a few years later: the Thorne site (Boisvert 2005) in Effingham, the Thornton's Ferry site (unpublished except for Curran's 1994 comments), the Hume site (Boisvert and Bennett 2004) in Merrimack, and the George's Mills site in Sunapee (Sargent 1982, 1990). Curran also incorporated data from the Weirs Beach site in Laconia (Bolian 1977, 1980) since it likely represented the transition from the Late Paleoindian to the Early Archaic. Of these sites only the Thornton's Ferry site consisted of an excavated component with a fluted point. In addition to these sites there were also a handful of individual finds of fluted points: a surface find on Ossipee Lake (Sargent and Ledoux 1973), isolated finds deep in the Smyth and Neville sites at Amoskeag Falls in Manchester (Curran 1994:43–45),

1995 is an appropriate year to divide the research on the Paleoindian period in New Hampshire, for it was at this point that the first of the sites in the Israel River Complex (Bouras and Bock 1997) were discovered. This marked the beginning of a rapid accumulation of new sites, and by 2003 the total number of excavated Paleoindian sites had more than doubled to a modest total of fifteen. Mary Lou Curran had produced a summary of Paleoindian research in New Hampshire the prior year (Curran 1994) and of necessity

HISTORY OF RESEARCH
and a vaguely reported discovery made in 1888 by an artist in North Conway at a locale known as “The Intervale” (Sargent and Ledoux 1973:67).

Curran and colleagues (Spiess et al. 1985) concluded that we had only very basic data for the state, limited to confirmation of the presence of caribou and beaver hunters at small camps and estimated 10,000–11,000 14C years ago. She identified the need to resolve the internal chronology of the Paleoindian period, sorting out the variation in projectile point stylistics (which she saw as relevant to chronological issues) and lithic sourcing. The status of Paleoindian studies for New Hampshire by 1995 was at a basic presence/absence level with the expectation that much more was available to be learned. So meager was the database for Paleoindian sites in the state that Whipple was the only site that had produced more than one fluted point or triangular spurred endscraper.

The discovery of a fluted point base at the first of the Israel River Complex sites in Jefferson in the fall of 1995 prompted a series of investigations by the New Hampshire Division of Historical Resources through the State Conservation and Rescue Archaeology Program (SCRAP), which brought forward a series of Paleoindian sites and associated research. At the onset three sites were identified (Boisvert 1997, 1998a): Jefferson I, which contributed a pair of fluted point bases; Jefferson II, which developed into a large, multilocus campsite that was eventually purchased for preservation by the Archaeological Conservancy; and Jefferson III, a large multilocus site that may span nearly the entire breadth of the Paleoindian period (Boisvert 1998b, 1999a). Three seasons of field schools at the Jefferson sites contributed to an elevated public awareness of archaeological resources in the community, and a chance find by a landowner led to the discovery of two additional sites: Jefferson IV, a small, probable short-term hunting camp (Boisvert and Puseman 2002); and the nearby Jefferson V site, which contained lithic workshops and a lithic extraction locale. Field investigations at the Israel River Complex continued through 2004, and analysis of the sites is ongoing.

Significant advances were also made in other regions of the state. A CRM survey for a gas transmission line resulted in the discovery of a small Paleoindian site in Colebrook (Bunker and Potter 1999; Bunker et al. 1997). This site was revisited in 2006 as a SCRAP field school and significant additional data were obtained, including a greatly expanded lithic assemblage related to fluted point manufacture (Boisvert 2008). Another Paleoindian site, known as Stone’s Throw, was found through a CRM survey in Tamworth adjacent to a lithic quarry (Ives and Leveillee 2005). This was a small component identified on the basis of a channel flake and Mount Jasper rhylolite debitage.

The Potter site in Randolph was discovered in 2003 and has been under annual investigation and the subject of three field schools. The site is large, in excess of three acres (1.2 ha), with at least eight areas of artifact concentrations. Comprehensive use wear analyses have revealed that woodworking was an important activity in at least two of the concentrations (Boisvert and Shoberg 2007; Rockwell 2010), and half of the concentrations exhibit evidence of multiple activities suggestive of household encampments. The site contains both Michaud/Neponset and Bull Brook/West Athens Hill style points and likely represents a repeated occupation over an undetermined, but substantial, time span within the Paleoindian period.

The most recently added Paleoindian site is the Jefferson VI site, found near the Jefferson IV and V sites in the summer of 2010. Initial survey recorded a small amount of debitage, a channel flake, endscraper, and biface fragment, and further survey and testing in 2011 has produced fluted point fragments and debitage made from exotic raw materials.

The increasing interest in Paleoindian research has also brought forward information on several isolated finds, some of which were made decades earlier, such as the Lowe biface found in 1947 in the Corrigan gravel pit in Randolph (Boisvert 1999a:163–164); an indeterminate style fluted point from Manchester and a Kings Road/Whipple style fluted point from nearby Auburn (Evans 1996), both recovered in the mid-twentieth century; and a Vail/Debert style point from New Boston (Boisvert 1994). Undoubtedly a review of museum and private collections would identify additional Paleoindian points whose general provenience might be found to be reasonably secure.

**LITHIC SOURCING, GEOGRAPHIC SETTING, AND TYPES OF PALEOINDIAN SITES**

Concurrent with site identification has been a significantly enhanced ability to identify the geological sources of lithics...
found on Paleoindian sites. This research has been lead by Stephen Pollock, geologist at the University of Southern Maine. The first contribution (Pollock et al. 1996) was to clearly associate the Mount Jasper spherulitic rhyolite with Paleoindian assemblages at the Neponset site in Massachusetts and others in Maine. This had the logical consequence of recognizing Mount Jasper in Berlin, New Hampshire, as a Paleoindian site in its own right and facilitating identification of Paleoindian components on other sites. Pollock also clarified distinctions between two similar yet geographically distinct spherulitic rhyolites, Mount Jasper rhyolite from Berlin and the Jefferson rhyolite found naturally occurring at some of the Israel River Complex sites 25 km away in Jefferson (Boisvert and Pollock 2009; Pollock et al. 2007, 2008). This capability has expanded the range of research avenues and allows for finer-grained contextual analyses. Additionally, recognition of other raw materials from various known sources has benefited interpretation of Paleo-

### Table 4.1. Paleoindian Sites and Isolated Finds in New Hampshire

<table>
<thead>
<tr>
<th>Site</th>
<th>Site Type</th>
<th>Approximate Size (m²)</th>
<th>Setting</th>
<th>Soil</th>
<th>Early Paleo</th>
<th>Middle Paleo</th>
<th>Late Paleo</th>
<th>? Paleo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colebrook</td>
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<td>25</td>
<td>riverine</td>
<td>alluvial</td>
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<td>Mt Jasper</td>
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<td>&gt;100,000</td>
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<td>till</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
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<td>2500</td>
<td>upland</td>
<td>till</td>
<td>X</td>
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<td>upland</td>
<td>till</td>
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<td>X</td>
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<td>upland</td>
<td>till</td>
<td>X</td>
<td>X</td>
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</tr>
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<td>750</td>
<td>upland</td>
<td>till</td>
<td>X</td>
<td>X</td>
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<td>till</td>
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<td>upland</td>
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</table>

The current database for New Hampshire Paleoindian sites currently stands at sixteen sites, not including Jefferson VI (table 4.1), plus half that many reasonably specific reports of isolated fluted points and one distinctive Paleoindian biface. The geographic and temporal spread of these sites is broad, covering a large part of the state, with gaps notably in the central portion of the Connecticut River drainage and the seacoast and adjacent hinterlands. This general lack of sites is viewed as a reflection of lesser survey effort and chance. Paleoindian sites are not recorded in the White Mountains, but few prehistoric sites of any age are reported there, and the lack of sites is also a likely result of the same factors. Systematic reconnaissance is needed to resolve this deficiency.

A few key site types emerge from this body of data: quarry-lithic extraction sites, lithic workshops, small-scale
The Paleoindian Period in New Hampshire
81

Northeast, but many questions about Paleoindian behavior at the site itself are unanswered. The rhyolite dike that was mined prehistorically is one of at least nine known dikes in the vicinity (Billings and Fowler-Billings 1975), so the potential remains that other less prominent sources may yet be identified and other related sites may be preserved.

Understanding the lithic assemblage at the initial discovery of the Israel River Complex was confounded by the recovery of abundant small pieces of what appeared to be Mount Jasper rhyolite. Because they are small and useless as a toolstone, their presence ran counter to any normative explanation of lithic acquisition and use. Within short order it became clear that the rhyolite was native to the locality and represented a different, though superficially identical, material. Analysis of a large field stone that exhibited the contact of the rhyolite dike with the local bedrock revealed that the rhyolite in Jefferson was comagmatic to the Mount Jasper dike. Thus the Jefferson rhyolite represented a different source. The topography of the Israel River Complex is far gentler than that of Mount Jasper, and the rhyolite sources are covered by glacial till. Specific dikes have not been identified, although considerable survey effort has been expended to locate them. Areas of extensive and intensive stone tool manufacture, usually in context with other functionally specific activity areas, have been identified on several areas within the complex, similar to workshop areas found at Mount Jasper. In addition, all of the sites within the Israel River Complex are Paleoindian, with no evidence for later occupations. Lithic workshops have been identified at the Jefferson II, Jefferson III, and Jefferson V sites along with substantial blocks of glacial till with adhering rhyolite, or large cobbles composed completely of rhyolite. These three sites include lithic extraction among their demonstrable functions even though specific quarry pits or exploited boulders have not been identified. Thus the sites in Jefferson represent the inverse of the situation at Mount Jasper, where we know precisely where the raw material is found but many questions about Paleoindian artifacts.

Prehistoric extraction and twelve millennia of occupation and use of the site could have thoroughly disturbed any Paleoindian components. As mentioned above, confirmation of the site as Paleoindian is based on recovery of abundant diagnostic tools made from this material at sites across the Far Northeast. It is not possible to address questions of how intensely the site was used, whether or not it also served as a long-term, multifunction encampment, or if it hosted groups from multiple bands whose annual rounds intersected at the site. Consequently, it is a key site for understanding Paleoindian movement throughout the

hunter-forager transient camps, and aggregated base camps. Kill sites, though logically predicted have not been identified, nor have any ritual or burial sites been found. These site types are not necessarily mutually exclusive, and identification as to site function (or more properly functions at a site) is dictated by lithic data, which obviously introduces an interpretive bias. Furthermore, it is essential that we distinguish between actual large-scale aggregated base camps that supported multiple contemporaneous encampments and palimpsests of small-scale hunter-forager camps whose time span might range over many generations. Fine-grained data recovery and detailed analysis are essential in order to parse these distinctions. Finally, some sites may never be adequately categorized because of problems of site preservation or simply because of limited sampling in the field.

Mount Jasper is the premier quarry site in the state. The site had been known and recognized as a toolstone source for Native American populations since the nineteenth century (Haynes 1888), and it seems probable that the lustrous and colorful nature of the rhyolite prompted the name of the topographic feature. Near the Androscoggin River and close to east-west corridors that link the Connecticut and Androscoggin drainages, it is positioned well for access to much of the Northeast. Investigations on the summit near the mine and at the foot of the mountain clearly demonstrated the extractive nature of the site and the multiple associated lithic workshops (Gramly 1984; Gramly and Cox 1976) and eventually led to the listing of the site on the National Register of Historic Places (Boisvert 1992). Paleoindian components have not been documented at the site, although a few endscrapers and gravers attributed to the site have been on display at the community public library.

Prehistoric extraction and twelve millennia of occupation and use of the site could have thoroughly disturbed any Paleoindian components. As mentioned above, confirmation of the site as Paleoindian is based on recovery of abundant diagnostic tools made from this material at sites across the Far Northeast. It is not possible to address questions of how intensely the site was used, whether or not it also served as a long-term, multifunction encampment, or if it hosted groups from multiple bands whose annual rounds intersected at the site. Consequently, it is a key site for understanding Paleoindian movement throughout the

Rhyolites were not the only raw material available to Paleoindians in New Hampshire. A massive exposure of a black, cryptocrystalline, silica-rich rock is found on the north slope of the Ossipee Mountains in Tamworth. This material is widely distributed in New Hampshire and is
generally known as Ossipee hornfels, although a recent geochemical analysis indicates that it should be more accurately identified as an andesite (Gauthier and Burke 2011). Debitage and crude bifaces of this material have been found at the Thorne site, approximately 15 km southeast of the source. A highly weathered biface fragment and a small amount ofdebitage have also been found at the Potter site, some 60 km north of the source. Therefore there is evidence that the source had been used since Paleoindian times. More important is the small Paleoindian Stone’s Throw site (Ives and Leveillee 2005).

The Stone’s Throw site is small and identified as Paleoindian on the basis of a channel flake and biface fragment made of Mount Jasper rhyolite. Incorporated within the assemblage is an abundance of Ossipee hornfels/andesite suggestive of a Paleoindian usage of that source, which is adjacent to the site. Radiocarbon dates from the site, however, are uncomfortably late—8870 ± 40 and 8840 ± 80 14C yr BP (Ives and Leveillee 2005:23–24)—and may reflect a subsequent Early Archaic occupation. The Stone’s Throw site offers a tantalizing association of Paleoindian raw material use and movement, but it remains difficult to integrate into the broader spectrum of known Paleoindian sites in the state.

Small camps created by hunters and foragers should be recognizably different from lithic workshop sites not only by their reduced physical size and small artifact inventory but on the basis of a restricted tool inventory, higher ratio of tools todebitage, and debitage that reflects later-stage rather than earlier-stage chipped stone tool manufacture. There are several examples of transient camps among the New Hampshire site assemblage. It is tempting to consider all of them to be short-term hunting camps, but the pernicious effects of differential preservation result in preservation of projectile points and the lithic debris from their repair and replacement whereas direct evidence of foraging is typically not preserved.

The Colebrook site (figure 4.2) stands as a short-term domestic site with a knapping station. A narrow range of tool production activity occurred in a small space of approximately 25 m², as evidenced by a near total lack of tool fragments, a modest amount ofdebitage (1,200 flakes), the tip of a point broken in the process of fluting, and some 73 channel flake fragments (Boisvert 2008). This assemblage, in context with small hearths and post or stake molds, indicates the presence of a small encampment where hunters were finishing the manufacture of projectile points, presumably in anticipation of a hunt in their near future.

The Jefferson I site sustained only limited testing, and interpretations are therefore based on scant data, but it too appears to be a small-scale occupation where a pair of fluted point bases (one of which is clearly of the Michaud/Neponset variety) are accompanied by a pair of scrapers, four channel flakes, eight marginally retouched flakes, and just over 300 pieces ofdebitage. The site is relatively compact and, without any forest cover, would have had a commanding view over the Israel River valley, well suiting it as a hunter’s camp and lookout.

The Jefferson IV site, located 0.8 km away, has a similar profile. Here the inventory consists of a complete Bull Brook/West Athens Hill point, a basal section of a Cormier/Nicholas point, and three unifaces accompanied by just over 200 flakes. The site is small in size and located on the landscape at an unmistakable vantage point overlooking the Israel River valley. In addition, cross-over immuno-electrophoresis (CIEP) analysis indicated the presence of cervid protein on a Munsungun chert flake (Puseman 2000). The flake is interpreted as resulting from rejuvenation of a butchering tool, consistent with activity at a hunting camp (Boisvert and Puseman 2002).
The Thorne site in Effingham may also qualify as a hunting camp, having the similar profile of small size and restricted breadth of tool forms: a nonfluted point base, a biface, three biface fragments, a hammerstone, and nearly 250 flakes. The point base conforms well to the Agate Basin–related points found at Cliche-Rancourt (Chapdelaine 2007:88) in Quebec as well as to various isolated finds in Maine and Massachusetts (Bradley et al. 2008:154).

Last, what appears to be another small transient camp, known as the Tenant Swamp site (Goodby 2009, 2010), was found in late 2009 on a CRM survey in Keene.

Small-size hunting camps should be common among northeastern Paleoindian sites, and these seem to meet expectations. Smaller sites are more difficult to discover, and sites with less dense artifact distributions even more difficult to recognize. Consequently, even this modest inventory of four sites among the sixteen would appear to meet our expectations, at least within the context of such a small sample size.

Base camps are a well-known, though often poorly defined, category. For the purpose of this discussion, base camps are essentially sites where various family bands would have aggregated and occupied the landscape for a substantial length of time, at least well beyond the supposed few nights of a transient hunting-foraging encampment, and where a wide variety of functions were executed. Among the New Hampshire Paleoindian sites these activities might include not only subsistence activities but also tool manufacture (lithic and nonlithic), hide processing, and other processing of animal remains taken on the hunt, such as bone and antler. Less tangible but certainly congruent with larger groupings of family bands would be social intercourse, exchange (of both goods and information), and ceremonial activities. The best examples of a base camp in the Northeast would be the Bull Brook site (Jordan 1960; Robinson et al. 2009) in northeastern Massachusetts and the Vail site (Gramly 1982) in western Maine. Ostensibly it would seem that identifying base camps would be comparatively easy, but there is the challenge of distinguishing between sequentially reoccupied sites with concentrated and overlapping activity areas and large sites with multiple simultaneous occupations.

The Whipple site in southwestern New Hampshire is a good example of a Paleoindian base camp. It rests on a high slope overlooking a remnant kettle pond and a sharp bend in the Ashuelot River (figure 4.3). Curran's research identified at least two intensely occupied areas of the site, and recent CRM investigations by John Milner Associates identified another associated locus (Duranleau et al., n.d.). The Whipple site is viewed as a key site for the New Hampshire Paleoindian period. Not only did it present a large and varied material culture assemblage, it yielded radiocarbon dates and identifiable faunal remains. Even with the passage of over three decades, no other site has been as productive in such a broad manner. Curran (1987) interpreted the site through the lens of optimal foraging theory, a long-established perspective that attempts to explain how foraging populations most efficiently and effectively exploit their environments. She used this theoretical perspective to estimate the size and location of Paleoindian sites in the Northeast and argued that her model was generally useful in explaining the location and nature of her comparative set of sites (Vail, Debert, Bull Brook, Templeton, and Wapack 8). Although optimal foraging theory has had firm critics (Martin 1983; Pierce and Ollason 1987), it is still generally accepted within the broader perspective of behavioral ecology (Bird and O’Connell 2006) and continues to be an attractive approach for the understanding of Paleoindian hunter-gatherer culture in this region.

The other strong candidate for a Paleoindian base camp
is the Potter site at the other end of the state from Whipple. It is located in thick secondary growth forest and has been defined by rigorous placement of nearly 800 shovel test pits on a 4 m grid over the site area (figure 4.4). The site has produced eight defined subareas, three of which appear to be corollaries to the “hotspots” at Bull Brook and Whipple, and others may yet prove to be equivalent. The Potter site has some significant similarities to Whipple. Most readily apparent is its position overlooking a remnant of a glacial pond (figure 4.5). The broad topography of the site setting reveals that stagnant glacial ice trapped behind a moraine created a large kettle pond that would have covered well over 10 acres (4 ha). This water body eventually breached the impounding moraine and drained through a comparatively narrow gorge and entered the Moose River just to the south. Contemporary beaver have dammed the flow through the ancient kettle pond, flooding the remnant wetlands. This constellation of topographic features is extremely similar to the setting of the Whipple site, and both sites appear to be focused on the nearby drained kettle ponds/wetlands.

The Israel River Complex contains five defined sites (figure 4.6) and one recently discovered site of unknown size and function. It is arguable that the complex is either one large dispersed site or a series of at least six smaller sites that contain from one to at least six concentrations of artifacts each. Strong evidence for base camps is present at the Jefferson II and Jefferson III sites. Recent research at the Jefferson II site by Yvonne Benney Basque (2010) identified artifact distribution patterns within a 42 m² excavated block. Here she observed a distinct separation of tool types, with scrapers and edge-modified flakes present in proximity to hearthlike features distinct from a biface production area with a concentration of biface fragments, basal fragments of fluted points, and channel flakes. A smaller 9 m² block was excavated 50 m from this block, and its contents include a full range of tool types, replicating the inventory of the larger block excavation. Excavations at the Jefferson II site were prompted by a concern that it would be the location of residential construction, but purchase of the site by the Archaeological Conservancy (Crisell 1998) relieved this concern and field excavations were suspended. Consequently, we have a persuasive, though incomplete, body of data that indicates that the Jefferson II site was a base camp. The site also incorporates a prominent lookout with a commanding view of the whole Israel River valley, which likely served as an additional feature for the site. Diagnostic fluted point base fragments include Vail/Debert and Kings Road/Whipple points in the larger block

4.4. Potter site shovel test pits, Randolph.

4.5. Potter site and terrain, Randolph, with ponds and Moose River flowing east toward the Androscoggin River.
The Paleoindian Period in New Hampshire

85


4.7. Thornton’s Ferry and Hume sites and terrain adjacent to a drained kettle pond, now wetland, Merrimack.

and Michaud/Neponset points in the smaller block at this site (Boisvert 2001; Bradley et al. 2008). It appears, then, that this site experienced a comparatively lengthy span of occupation.

The Jefferson III site was investigated over four seasons from 1996 through 1999, but the large expanse of the site, in excess of 100,000 m² with at least six loci, makes it difficult to categorize. Kings Road/Whipple and Michaud/Neponset point styles are represented at this site, and they appear to not be present at the same loci. One of the concentrations appears to have been an area where triangular endscrapers were used intensively (Hill 1999) in close proximity to the manufacture of Kings Road/Whipple points (which were initially identified as Gainey style points [Boisvert 1999b]). Confidence in the designation as a base camp is less secure for the Jefferson III site because of the limited extent of excavations (two blocks of 12 m² and 16 m²), but the comparatively wide range of tools and density of debitage support a base camp interpretation of the site.

The Israel River Complex overlooks the former Glacial Lake Israel (Lougee 1930; Thompson 1999, 2000), which formed and drained prior to the arrival of the residents of the Israel River Complex sites (Dorion 2000, 2002). Jefferson II was approximately 200 m from the former lake shore, and the earlier Paleoindian component of Jefferson III was situated on a well-appointed vantage point approximately a kilometer away. The wetland association is reinforced at Jefferson III by the recovery of a water lily seed from a small pit feature (Boisvert 2002).

This trend toward association with wetlands is followed by each of the other proposed base camp sites, with Potter adjacent to a large drained kettle pond and a similar setting for the Whipple site. In addition, three other sites in the “unknown” site type category are in close proximity to wetlands: the Thornton’s Ferry site with its Bull Brook/West Athens Hill style point, and the adjacent Late Paleoindian Hume site (figure 4.7). Both are adjacent to a drained kettle pond, now wetland, in Merrimack. The area of documented Paleoindian occupation on both sites was limited to only a few square meters. The situation is similar at the Thorne site in Effingham (figure 4.8), where a single Agate Basin–related point and a small sample of debitage and nondescript bifaces were recovered on a broad glacial outwash plain adjacent to a perenni ally watered wetland.

There is an evident association of Paleoindian sites with wetlands, especially former kettle ponds, in New Hampshire. This had been predicted and observed over thirty years ago. For Curran (1987:310), one of the key aspects of Whipple in terms of settlement patterning was its proximity to water. She speculated that given the environmental
association between Paleoindian sites and the margins of wetlands and water bodies is a product of actual subsistence and settlement preference or a reflection of site formation variables. As additional data have accumulated with an evident increase in sites located in these settings, the attraction to a causative association has become stronger. But the body of data is still small, and until a sufficiently reliable sample of sites can be obtained explanatory models for site distribution will remain speculative. However, in the absence of any competing explanations, it does appear that there is a strong relationship between late Pleistocene wetlands (which may have survived until the present day) and Paleoindian sites.

A consideration of Paleoindian upland sites does provide an additional perspective on site distribution patterns. Of all the sites, only the Israel River Complex sites, the Potter site, and the Mount Jasper lithic source are situated on till soils. With the exception of the Potter site, these sites are directly associated with lithic resources. Even though Mount Jasper overlooks the confluence of the Dead and Androscoggin rivers, it was occupied expressly for its lithic economic potential, and the proximity to these rivers is coincidental. The Jefferson sites possess examples of unmodified rhyolite either as large blocks (up to 65 kg), such as at the Jefferson V site, or as boulders from bedrock that exhibit rhyolite dike contacts, such as at the Jefferson II site. Information from landowners whose property lies between these two sites records the presence of similar boulders with rhyolite in stone walls bordering their agricultural fields. This supports the interpretation that the selection of these locations by Paleoindians was guided, at least in part, by access to these lithic resources. The Potter site stands somewhat in contrast to this pattern, being located on a well-drained till soil and not on or near a known lithic source. Other factors, potentially the proximity to the former kettle pond/wetland and placement in a comparatively narrow segment of an important east-west corridor, may explain its presence there.

What emerges from this review of Paleoindian site settings in New Hampshire is interplay between sites positioned so as to exploit resources on or very near wetlands unless they are drawn to a critical resource whose location is completely independent of hydrology, such as lithic sources. Interestingly, the larger and more intensely occupied the
site (Whipple, Potter), the clearer the association with wetlands, and in particular with kettle ponds. Additional sites that have not been intensively investigated may also share this distinction, such as the Thornton’s Ferry site. Again, it needs to be emphasized that these observations are based on a small sample size, barely one site per century during the Paleoindian period, with uneven levels of archaeological investigation and with major gaps in geographic distribution within the state. Consequently, these are observations on the distribution of sites on the landscape, which should in no way be construed as a settlement pattern.

**CHRONOLOGY AND POINT STYLES**

Although the location of Paleoindian sites on the landscape is difficult to resolve, the chronology is far more problematic. Radiocarbon dates have been reported on six Paleoindian components in New Hampshire. Three of these sites returned dates that are too young to be consistent with the accepted dating of Paleoindian sites. As referenced above, the Stone’s Throw site produced a pair of dates at approximately 10,000 cal BP, which would be approximately 1,000 years too late to be reasonably associated with fluted points. If the identification of the channel flake from that site is set aside, the dates would be viewed as acceptable as Late Paleoindian. Even younger ages were obtained from the Jefferson II and III sites. Dates of 8590 ± 60 ¹⁴C yr BP (9580 cal BP) and 8090 ± 90 ¹⁴C yr BP (8900 cal BP) were obtained from the A Block at Jefferson II (Boisvert 2000:6–7) and interpreted as the result of mixing of young charcoal into older cultural deposits by natural disturbance. Similarly, a date of 7930 ¹⁴C yr BP (8800 cal BP) from a small feature at the Jefferson III site was interpreted as being clearly too young.

The Whipple site (Curran 1994:30, Table 1) has produced a large number of dated samples (fourteen), but the range in ages is extremely wide, stretching from 7400 to 11,600 ¹⁴C yr BP, which would represent a range in calendar years from approximately 8,250 to 13,800 years ago. Even excluding the oldest and youngest dates, the confidence intervals for the dates are ±500–700 years. Consequently, the average dates reported by Curran of 10,250–10,360 ¹⁴C yr BP (12,000–12,250 cal BP) must be viewed with reservation. The radiocarbon dates do support a Paleoindian age, but not with any precision within that range. In contrast, the Colebrook site does have a pair of radiocarbon assays that do appear to date the site rather precisely. Bunker et al. (1997:21) reported a conventional radiocarbon date of 10,290 ± 170 ¹⁴C yr BP (12,080 ± 350 cal BP) from a hearth feature. A debitage concentration with channel flakes less than two meters from the hearth, and at the same depth, also contained datable charcoal that produced a second radiocarbon date (Kitchel and Boisvert 2011) of 10,220 ± 40 ¹⁴C yr BP (11,940 ± 110 cal BP). This date in concert with an analysis of diagnostic channel flakes from the site (Boisvert 2008) identifies this single component locus as affiliated with the (Middle Paleoindian) Michaud/Neponset point style characterized with long fluted scars exceeding half the length of the points. Equivalent dates of 10,200 ± 620 ¹⁴C yr BP, with an extended counting to reduce the standard error from the Michaud site (Spiess and Wilson 1987:84); 10,210 ± 60 ¹⁴C yr BP from the Neponset site (11,920 ± 110 cal BP) (Ritchie 1994:105); and site 6LF21 in Templeton, Connecticut, with dates of 10,190 ± 300 ¹⁴C yr BP (11,900 ± 490 cal BP) (Moeller 1980:31) and 10,215 ± 90 ¹⁴C yr BP (11,920 ± 190 cal BP) (McWeeney 1994:157) lend confidence to this identification. The deepest component at the Weirs site produced a small lithic assemblage including a large sidescraper and a collaterally flaked biface fragment in association with a date of 9615 ± 225 ¹⁴C yr BP (10,940 ± 300 cal BP) (Bolian 1980:124). The date was eventually interpreted as Late Paleoindian rather than Early Archaic, largely because the hornfels- and chert-rich assemblage was so distinct from the overlying quartz-dominated and biface-poor Early Archaic component (Maymon and Bolian 1992:118). Thus, just over a third of the excavated sites in New Hampshire have been radiocarbon-dated, and of these only two, or at the most three, may be considered to be confidently dated. This is a much lamented situation not only for New Hampshire but the Far Northeast as a whole.

Since the chronology of Paleoindian in New Hampshire is only tenuously tethered by radiocarbon dates, it relies heavily on comparative stylistics of diagnostic artifacts, principally projectile points. Bradley et al. (2008) have assembled a synthesis of modal forms of fluted and lanceolate nonfluted points with a proposed sequential chronology with modal forms that could be coeval (table 4.2).
These two southern sites should not be construed as inferring a southern New Hampshire emphasis, for another such point has been reported much farther north, from Mexico, Maine (Bradley et al. 2008:128).

The Vail/Debert points are also considered to be Early Paleoindian by virtue of association with the eponymous sites where an abundance of early dates have been reported (Bradley et al. 2008:135). Again, the radiocarbon dates are somewhat equivocal at the Vail site, with wide ranges and substantial sigmas, and the interpretation of the Debert site dates is complex (see Rosenmeier et al., this volume), but the conclusion remains that these sites are best placed within the earlier portion of the Paleoindian period in the Northeast. In New Hampshire these points are documented on the Jefferson II and III sites (figure 4.9B–D) in the Israel River Complex as well as an isolated find in the town of New Boston (Boisvert 1994). The unusual deeply incurvate bases and comparatively restricted distribution have led some researchers to conclude that the makers of these points were a distinct social group (Bradley et al. 2008:135). Jefferson III points were found along with a comparatively high concentration of triangular endscrapers, replicating a pattern at the Vail site and suggesting the possibility of a broader pattern.

Bull Brook/West Athens Hill points have a comparatively broad distribution within the Northeast and are found across the length of New Hampshire. Curran (1994:42) illustrates such a point from the Thornton’s Ferry site and finds it comparable to specimens from both the Bull Brook and Whipple sites. Sargent and Ledoux (1973) reported a rare intact specimen from the outlet of Ossipee Lake in east-central New Hampshire. Farther north, another rare example of a complete point (figure 4.9E) was found at the Jefferson IV site (Boisvert and Puseman 2002). Recent investigations at the Potter site in 2009 have produced two fragmentary bases (figure 4.9F) and what appears to be a late-stage preform that was abandoned just prior to removal of the channel flake. These were found within an area barely larger than a square meter and within a tool concentration of more than thirty specimens, including endscrapers, sidescrapers, and retouched flakes. Significantly, the two point bases and preform were all made from Mount Jasper rhyolite, indicating that the lithic source was also used at this early date. In addition, a basal section of a point

<table>
<thead>
<tr>
<th>Period</th>
<th>Temporal Span</th>
<th>Diagnostic Points</th>
</tr>
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<tbody>
<tr>
<td>Early Paleoindian</td>
<td>-12,900–12,400 cal BP (-11,000–10,400 ¹⁴C yr BP)</td>
<td>Kings Road/Whipple Vail/Debert Bull Brook/West Athens Hill</td>
</tr>
<tr>
<td>Middle Paleoindian</td>
<td>-12,200–11,600 cal BP (-10,300–10,100 ¹⁴C yr BP)</td>
<td>Michaud/Neponset Crowfield-related Cormier/Nicholas</td>
</tr>
<tr>
<td>Late Paleoindian</td>
<td>-11,600–10,800 cal BP (-10,100–9500 ¹⁴C yr BP)</td>
<td>Agate Basin–related Ste. Anne/Varney</td>
</tr>
</tbody>
</table>

Eight varieties of points are represented and, with caution, these variants may stand as cultural markers or proxies for subperiods or for cultural phases of distinct cultural trajectories (time series) within the Paleoindian chronology of the Northeast. They cannot be assumed to be fully extended over the whole region or temporally coextensive. Geographic sampling is far too limited and the dating of the points too vulnerable to problems of association or contamination. Still, this chronology is the best available and is applied here to the New Hampshire assemblages.

The earliest points are assumed to be the Kings Road/Whipple points. They most closely resemble Gainey style points from the Upper Great Lakes region and are present at the Whipple site, where the only concentration of early radiocarbon dates has been reported within the state. As discussed above, confidence in these dates must be reserved, yet their quantity does speak to a reasonable probability of an early component there. No other later styles have been reported from the site, but a reanalysis of the assemblage in light of new data acquired since Curran’s 1994 summary would be welcome. Recent investigations at the Whipple site in relation to improvements of a power transmission line have brought to light another Whipple style point that appears to be made from Munsungun chert (figure 4.9A). If indeed this appraisal is accurate, it would indicate that the Munsungun source was accessed extremely early in the Paleoindian occupation of the Northeast. The only other Kings Road/Whipple point reported is the isolated find from Massabesic Lake in the southern part of the state.
broken in the fluting process that retained a prominent projecting striking platform was found elsewhere on the site. This specimen is virtually identical to a pair of point bases recovered from the Bull Brook site (Bradley et al. 2008:139, Figure 12A–B). It should be noted, however, that two essentially identical unfinished specimens have been documented at Cliche-Rancourt, raising the possibility that this manufacturing technique likely was utilized on both forms. Still, the Potter site, previously thought to have been used solely by makers of Michaud/Neponset points, shows strong evidence of an earlier occupation. There appears to be a continuity of habitation over time, reflected in discrete occupational loci that have both definable differences in form and raw material and similarities to other sites in terms of lithic manufacturing technology and broader aspects of morphology.

The (Middle) Paleoindian Michaud/Neponset form is the most commonly represented point form in New Hampshire. The best example (figure 4.9K) is the remarkable Intervale point (Boisvert 1998a). Its provenience is poorly known and attributed by the finder only to Intervale, a village on the periphery of North Conway. It was recovered in 1888 and donated to the Smithsonian Institution a few years later. It exhibits the diagnostic characteristics of an extremely long flute length, sequential overlapping flutes, and well-ground recurved sides terminating in a flared base with a moderately incurvate base, rendering distinctive “ears.” Point bases of this type (figure 4.9G–J) were recovered
of Clovis, but so far there is no evidence in terms of either cultural assemblages or well-dated sites. The definitive criteria for Clovis points and, more important, for the broader Clovis material culture (Bradley et al. 2010; Collins 1999) make it clear that there are no documented Clovis assemblages in the Far Northeast. Prismatic blades and, more important, blade cores and debitage from their manufacture and maintenance are lacking in New England. Clovis style performs with intentional outrépassé, or overshoot flaking, are absent. The nearest Clovis candidates would be the Shawnee Minisink and Paleo-Crossing sites in Pennsylvania and Ohio, respectively (Bradley et al. 2008:124), and though not exceptionally far away they are by no means within our region. This is not to say that there have not been applications of the term here. Unfortunately, Clovis is a term that has been casually applied in the Northeast and often inappropriately (including by me: Boisvert 2004). However, a careful reading of the data fails to identify any sites with Clovis assemblages.

This absence cannot be attributed to the presence of glacial ice blocking the landscape. All of New Hampshire was ice free at least as early as 11,500 14C yr BP (13,400 cal BP) (Ridge 2003), or more than 1,500 years before the Colebrook site was inhabited and the ice began its retreat from the southern part of the state 3,000 years before. Clovis predates or may only barely overlap the earliest defined variety of points, the Kings Road / Whipple style. Recent estimates of the parameters for the age of Clovis have narrowed the range to approximately 11,050–10,800 14C yr BP, which would calibrate to 13,250–12,800 cal BP (Waters and Stafford 2007:123). Even accepting a broader range, as advanced by Haynes (2002), there was sufficient opportunity for Clovis people to inhabit the Northeast.

Assuming that this absence of Clovis is not the result of some exceptional sampling error (it is difficult to accept that the efforts of dozens of archaeologists and hundreds of artifact collectors would have produced no Clovis points, blades, or blade cores had they been present), the answer must be an absence of that cultural expression. Whether that reflects cultural change over time before arrival of Paleoindians in the Northeast or the evolving epistemology of the archaeologists that redefines that cultural expression may be debated. Still, prior to the onset of the Younger Dryas, which coincides with the earliest documented sites,
the environment was relatively hospitable, at least by contemporary standards. The question therefore remains, why are there no Clovis sites or sites that fall within the Clovis time period in the Far Northeast?

Another, less ponderous problem is the relationship among the suite of Early Paleoindian sites. Based on projectile point similarities, Curran (1987:304) suggested contemporaneity and potential affiliation in the same subsistence system (Grimes et al. 1984) for the Bull Brook and Whipple sites. Brian Robinson et al. (2009) in a recent review of the Bull Brook site also see the two sites as being closely related. However, Bradley et al. (2008:126–131) see a distinction in the morphological variation between the points at the two sites. Recently obtained dates from bone at Bull Brook of 10,380 ± 60 and 10,410 ± 60 14C yr BP (Robinson et al. 2009:423) would indicate that the site is younger than previously estimated. Typologically, the points from Whipple appear to be distinct from the Bull Brook specimens, but a comprehensive presentation of the projectile point assemblage from Bull Brook is not yet available. Until it is, the correlation of the two sites should be suspended and consideration of a more complex interpretation of these two sites must be held open.

Perhaps the most important factor to emerge from this review of New Hampshire Paleoindian sites is the comparative importance of late Pleistocene wetlands and water bodies. Even granting the small sample size of sixteen excavated sites and eight isolated finds, the association is strong. Setting aside the Mount Jasper lithic source, nearly all of the sites are found with these associations. Whipple, Potter, Hume, and Thornton’s Ferry overlook kettle ponds; Thorne and Tenant Swamp are adjacent to deep, well-watered, year-round wetlands; Colebrook and the Weirs were effectually on riverbanks, as were the find spots for the Ossipee, Smyth, and Neville associated fluted points. The Israel River sites have upland settings, yet they clearly face down the valley slope toward what was a large and attractive wetland. The maximum distance from any one of these sites to the wetlands was barely over a kilometer. Only the Corrigan Pit, where the Lowe biface is reported to have been found, seems to lack a nearby watercourse; it sits on the drainage divide between the Israel and Moose rivers. The assertions of Curran, Dincauze, and Nicholas from more than thirty years ago that these should be productive settings seem well placed. The discovery of the Tenant Swamp site made during the preparation of this volume serves as pointed example.

ACKNOWLEDGMENTS

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REFERENCES


———. 1999b. Gainey Phase Fluted Point Manufacturing Tech-


There have been many advances in Paleoindian research in the past ten years. The geographic boundary of fluted point sites in the New England–Maritimes region (Spiess and Wilson 1987:129) has been expanded into Quebec (Chapdelaine 2007). Bull Brook has revealed much greater spatial complexity in a large Paleoindian site (Robinson et al. 2009), and the Late Paleoindian Reagan site has been fit into the chronological and environmental picture of the Far Northeast (Robinson 2009). Much work has been done in geological and chemical descriptions of the lithic material used by Paleoindians, notably by Adrian Burke (2008) and Stephen Pollock (Pollock et al. 1999; Pollock et al. 2007, 2008). A sequence of fluted point and later Paleoindian point styles (Spiess et al. 1998:235–236) has been refined with attribute seriation and loosely attached to a radiocarbon chronology (Bradley et al. 2008). Calibrated date equivalents based on the radiocarbon chronology have allowed correlation of the Paleoindian cultural sequence with regional environmental changes based on pollen cores (Newby et al. 2005). This correlation highlights cultural continuity with slow environmental change over nearly 1,000 calendar years during the cold Younger Dryas climate episode, followed by rapid cultural and environmental change in the Far Northeast at the Younger Dryas/Holocene transition.

Recent Paleoindian site discoveries have been made in New Hampshire (Boisvert 1998, 1999), Vermont (Robinson and Crock 2006, 2007), Massachusetts (Binzen 2005), Connecticut (Jones 1997), Nova Scotia (Davis 1991, 2005), and now Quebec. Archaeological survey in Maine, mostly mandated CRM or government-funded archaeological survey, has resulted in the addition of many Paleoindian sites to the Maine archaeological survey records (Spiess and Newby 2002; Spiess and Trautman 2003) in the past thirty years. Between 1980 and 1998, fifty-one sites with fluted point or general Paleoindian age components were found, along with twenty-two sites with Late Paleoindian components. Between 1999 and 2009, another twenty sites with Paleoindian components and six sites with Late Paleoindian components have been discovered. Some of these sites are published (Spiess and Newby 2002; Spiess et al. 1998:203–206, map and table; Bradley et al. 2008 for references), but many are known only in file reports or Maine Historic Preservation Commission survey records.

Discovery of many Paleoindian sites in the past decades has allowed us to recognize geographic clusters or groups
of sites (figure 5.1) based solely on geographic proximity (Bradley et al. 2008:119). Paleoindian sites in the region are generally “single component” and are probably therefore of short-term occupation (Spiess 1984). What then are the geographic clusters of Paleoindian sites? Do all of the sites in a geographic cluster represent the same short-term reuse of an area, with only one point style? The range of style variation among sites in geographic clusters is the subject of this chapter.

If we examine these geographic clusters of sites for the forms of fluted points on them, we can, in an inexact way, see the range of time that each geographic area was useful to the Paleoindians. Looking at the lithic raw materials allows us to examine the range and variation in Paleoindian movement to and from each place. We list some of the probable geographic clusters of sites below and examine two of them (Vail cluster and Michaud cluster) in detail. First, however, we review the sequence of Paleoindian point forms and paleoenvironmental context.

### FAR NORTHEAST

#### PALEOINDIAN SEQUENCE

Looking closely at the variability in fluted point and other Paleoindian point forms in the Far Northeast, one can construct a seriation and a time sequence. The most recent iteration of the sequence is by Bradley et al. (2008). The seriation of point forms runs from larger points, measured primarily by basal width and maximum thickness, to smaller points. We are encouraged that the seriation is a true sequence of change by the fact that the modest radiocarbon record progresses from oldest to youngest (in contrast to proclamations of radiocarbon date confusion [e.g., Levine 1990]). In addition, we note a rapid change in point form that coincides with the end of the Younger Dryas event and rapid environmental change (Newby et al. 2005). The change in point form includes a “degeneration” of fluted point technique and replacement by various non-fluted Late Paleoindian styles. Thus, the sequence of forms
and chronology seem to be logical, but they could be falsified by contrary evidence such as a securely dated site with a “wrong” fluted point style.

Moreover, we are not certain that the point forms that have been named within the sequence of fluted points are “styles” with perceptible boundaries to variation, or whether the archaeological record has by chance shown us well-spaced variability on an indivisible continuum. Only the accumulation of more sites and points will test this hypothesis.

There are no Clovis points in the region (Bradley et al. 2008). Clovis points are generally the earliest fluted point type across most of North America (Haynes et al. 2007; Watters and Stafford 2007; 13,125–12,925 cal BP). Their absence probably means that the region was not populated at the time. The nearest recognizable Clovis points to our region may be at the Shawnee Minisink site in Pennsylvania (Gingerich 2007; 12,950–12,800 cal BP).

The fluted point sequence in the Far Northeast begins with the Kings Road/Whipple form (Bradley et al. 2008:126–130, estimated 12,900–12,500 cal BP). These are large, robust points with a moderately deep basal concavity and single flutes of moderate length on each face. The Vail/Debert form follows (Bradley et al. 2008:130–136), also generally large points but with a deep basal concavity. They may overlap Kings Road/Whipple points chronologically. Bull Brook/West Athens Hill style points are less robust than earlier points, the sides may be slightly divergent, and they may have small basal “ears” and moderate depth basal concavities (Bradley et al. 2008:137–141). Bull Brook has recently been radiocarbon-dated to approximately 10,400 BP (12,600 or later cal BP) (Robinson 2009:425); thus Bull Brook is not the first site in the region by many hundred years, despite some contrary published opinions (Dincauze 1993). The Michaud/Neponset form (figure 5.2) follows Bull Brook/West Athens Hill (Bradley et al. 2008:141–146; ca. 12,200–11,900 cal BP). Michaud/Neponset points are medium to long points with slightly divergent sides, long channel flakes, and prominent basal ears. The Crowfield form follows (Bradley et al. 2008:146–148) with unknown chronological overlap. Crowfield points are rare in New England but easily recognizable. They are large, thin, and have strongly divergent sides. Cormier/Nicholas points are last in the fluted point sequence, broadly equivalent to Holcombe points in the Great Lakes (Bradley et al. 2008:148–152). One radiocarbon date of 10,090 BP (ca. 11,600 cal BP) may be applicable. Cormier/Nicholas points are narrow on the base, often thin, and with “weak” fluting. Many of these points are characterized by a planoconvex cross section, with the ventral side preserving a minimally retouched flake surface from a larger flake preform.

5.2. Four points from the Michaud site
There are at least two Late Paleoindian point styles in the Far Northeast, a poorly understood Agate Basin–like group (Bradley et al. 2008:152–156) with points with sides divergent from a narrow base, and Ste. Anne/Varney points (Bradley et al. 2008:156–161) that are often parallel-flaked, long, and thin. Ste. Anne/Varney points may date as late as 10,600–10,000 cal BP, and they may represent a separate migration into the region (Dumais 2000).

There are a set of metric and nonmetric attributes for each of these point forms, with ranges of variation based on known samples (Bradley et al. 2008). We refer to these attributes for guidance in matching some points from specific sites and cite appropriate data later.

PALEOENVIRONMENTAL CONTEXT
The occupation of the Far Northeast by fluted-point-using Paleoindians is closely contemporary with the Younger Dryas chronozone. Here we summarize a recent (Newby et al. 2005) examination of regional pollen data sets at 1,000 calibrated year intervals to characterize regional vegetation cover from 14,000 to 10,000 cal BP. Within this time frame, the Younger Dryas lasted from approximately 12,900 to 11,600 cal BP. Pollen maps for earlier than 11,600 cal BP show large areas of open sedge “tundra” in northern Maine, New Brunswick, Nova Scotia, and the eastern townships of Quebec, grading to open spruce woodland in southern Maine and perhaps denser spruce-pine mixed forest in southern New England. The Younger Dryas is evident as a slight shift of spruce pollen southward and expansion of open sedge “tundra” in the Maritime provinces compared with the 14,000 cal BP conditions. In other words, the Younger Dryas represents a “pause” or slight reversal of considerable length in the postglacial vegetation trend. Rapid forest growth after 11,600 cal BP covered Maine with dense mixed forest by 11,000 cal BP, with a surviving remnant open spruce-sedge woodland in northern New Brunswick and Nova Scotia.

The Younger Dryas vegetation conditions in the Far Northeast are similar to recent broad patterns of vegetation cover on the Labrador-Quebec peninsula suitable for the development of one or more long-distance migratory herds of caribou (Newby et al. 2005:150–151). The fringe of open spruce woodland and denser woodland in southern New England may have supported smaller, locally migratory caribou herds as well as providing winter habitat for long-distance migratory herds. Faunal remains, mostly calcined bone fragments, clearly support some sort of caribou-hunting adaptation by Paleoindians using fluted points in the region (Robinson et al. 2009; Spiess et al. 1998:204–211). The caribou-hunting focus must have been seasonal in nature, again by analogy with recent environments and ethnographic accounts (Spiess 1979), although seasonality and intensity of focus on caribou may have been variable across the region.

The Atlantic shoreline during Paleoindian occupation is now offshore, under up to 65 m of water in the central Gulf of Maine. Maximum regression (land exposure) appears to have coincided with Paleoindian immigration, so the shoreline during Paleoindian occupation was rapidly transgressive (rising). Robinson (et al. 2009; Pelletier and Robinson 2005) proposed now-underwater exposed land masses such as Jeffrey’s Ledge as summer caribou refuges. However, localized ecological conditions of the shoreline, and possible Paleoindian adaptation to them such as littoral foraging or maritime hunting, are unknown so far.

To the west, the region was bounded by a series of proglacial lakes in the Champlain and Memphremagog basins (Richard and Occhietti 2005) and the Hudson River corridor and Connecticut River, associated with the retreat of glacial ice. Recent examination of varve records and accelerator radiocarbon dating indicate glacial ice retreat north of the Vermont-Quebec border by 13,700–13,400 cal BP (11,700–11,400 14C yr BP [Ridge 2003, 2004]) and formation of large glacial Lake Vermont. The final drainage of the large proglacial lakes as the ice retreated north of the St. Lawrence and flooding of the depressed upper St. Lawrence and Champlain basins to become a marine Champlain Sea occurred at roughly 11,100 ± 100 BP 14C yr BP (ca. 13,200–12,900 cal BP [Richard and Occhietti 2005]). Thus, the final drainage of proglacial lakes to the west, inception of the Younger Dryas, and initial Paleoindian settlement of the New England–Maritimes-Quebec region are roughly concurrent in time.

Because postglacial rebound occurred during the time of the Champlain Sea, Champlain Sea shorelines are now above water. Loring (1980) postulated Paleoindian occupation of the Champlain Sea shore as a maritime or littoral
adaptation, based on fluted points associated with fossil shorelines. The Reagan site in Vermont (Robinson 2009) is clearly associated with a Champlain Sea estuary (Robinson 2008). Robinson (2008) has demonstrated sequential Paleoindian use of land exposed by retreat of the Champlain Sea with postglacial rebound. The extent of Paleoindian adaptation to marine shorelines is still an open question, but the evidence from Vermont tends to support such an adaptation.

Archaeologists (Fitting 1965; Fitting et al. 1966; Funk 1972:30; MacDonald 1968:116–117; Spiess et al. 1998:227) have for decades recognized the geographic placement of regional fluted point Paleoindian sites as logical in terms of caribou hunting camps. As discussed above, the faunal data and paleovegetation reconstructions support this interpretation. Given a maritime coastal adaptation by Paleoindians using fluted points in the region, including the Quebec City area (see Pintal, this volume), the repetitive settlement patterns of Paleoindian sites as limited-term occupations on generally well drained soils (e.g., Maine; Spiess et al. 1998) must be an interior (or noncoastal) adaptation. We now focus on an examination of the phenomenon that many of these sites appear in geographic clusters.

DEFINITION AND LIST OF GEOGRAPHIC CLUSTERS

A remarkable number of Paleoindian sites in the Far Northeast, and the abutting Great Lakes region to the west, preserve intrasite patterning in the form of “concentrations” of stone tool debris separated by seeming sterile space, which we presume means contemporaneity of occupation or re-occupation at a short enough interval to avoid the garbage produced by previous inhabitants (Spiess 1984). Viewing Paleoindian site maps at the same scale (Spiess et al. 1998:Figure 13; the Bull Brook map notably now revised by Robinson et al. 2009) raises interesting questions about the scale of concentrations visible in plowed field sites such as Fisher and Parkhill versus sites that are less disturbed. In any case, each multilocus “site” covers a distance between 100 m and 400 m.

Leaving aside the meaning of that scale of variation, in this chapter we explore geographic clusters of Paleoindian sites at a slightly larger scale, the presence of several to many sites within a diameter of a few kilometers. Some concentrations of Paleoindian sites in the region focus around available, high-quality lithic material. Several Paleoindian sites (e.g., Bonnichsen 1982) in the Munsungun Lake region of northern Maine are a clear example, associated with a variety of Ordovician chert outcrops (Pollock et al. 1999). The sites in the Israel River Complex (Boisvert 1998, 1999) in Jefferson, New Hampshire, are also probably there because of stone quarrying. Part of the attractiveness of the Jefferson area to Paleoindian people in the region is bedrock outcrops of a local rhyolite and boulder till field of a closely related rhyolite (Pollock et al. 2008). But some geographic clusters of Paleoindian sites are not located near quarries, so stone quarrying was not the reason for reuse of an area in all cases.

Possible geographic clusters of fluted point Paleoindian habitation sites have been found in the northern, central, and southern parts of the region. We return to the Vail and Michaud clusters of sites, in northwestern Maine and central Maine, respectively, in greater detail after a brief review of other possible or known site clusters in the region.

The well-known Debert site near Truro, Nova Scotia (MacDonald 1968), has at least five other sites located within a few kilometers, known as Belmont, Belmont II, Hunter Road, and others (Davis 1991, 2005). These sites are known to contain fluted points or are strongly suspected to be Paleoindian sites on the basis of lithic materials and flake tools such as endscrapers. The Belmont I site (sixteen concentrations) is larger than Debert (approximately eleven concentrations), and the Belmont II and Hunter Road sites are smaller than Debert. Ongoing archaeological work and stewardship of these sites are being lead by the Confederacy of Mainland Miꞌkmaw (see Rosenmeier et al., this volume).

There are multiple habitation and habitation/workshop sites in the Israel River valley near Jefferson, New Hampshire (Boisvert 1998, 1999; Boisvert and Puseman 2002), as mentioned. At least six sites are known, including sites with Vail/Debert point forms (Jefferson II and III), Michaud/Neponset point forms (Jefferson I and III) (Bradley et al. 2008), and probable Bull Brook point forms (Richard Boisvert, personal communication, October 2009).

Two sites in Kennebunk and Wells, southwestern Maine, are separated by about 7 km and may represent an incompletely known site cluster: the Hedden site (Spiess et al.
sites of a geographic cluster are of the same form, then the cluster was created by Paleoindian activity over a period of some time depth (perhaps centuries). Therefore, whatever attracted people to the area was a factor that lasted for some time during the Younger Dryas.

THE VAIL GEOGRAPHIC CLUSTER

The Vail site geographic cluster is located in a mountain valley in northwestern Maine near the Quebec–New Hampshire border (figure 5.3). The cluster comprises three habitation sites, two nearby “kill” sites, and three smaller sites that may have been special-purpose or limited-activity areas. The largest of these sites, the habitation sites, are the Vail site (Gramly 1982), Adkins site (Gramly 1988), and Morss site (Gramly 2001). The eight sites are spread over a distance of just less than 4 km along the former Magalloway River valley, exposed by erosion under the fluctuating Aziscohos Lake impoundment. In addition, there are two other Paleoindian habitation sites, the Upper and Lower Wheeler Dam sites (Gramly 2005a, 2005b), located 8 km farther north up the valley from the Vail/Adkins/Morss group. We include the two Wheeler Dam sites in the Vail geographic cluster, making ten sites total.

Survey coverage of the devegetated Aziscohos Lake bottom has been extensive during low-water conditions (Gramly 1981, 1982, 1988, 2001, 2005a, 2005b). The many square kilometers of soil exposure allow confidence that all large and medium-size Paleoindian sites in the valley have been located. Archaeological survey has been completed around several other large lake basins within a 20 km radius of Aziscohos Lake without locating more fluted point Paleoindian sites. Thus, we are reasonably certain that the Vail geographic cluster is unique within that radius and substantially completely identified. Gramly (1988:10–11) refers to these sites as the “Magalloway Valley Paleoindian Complex,” in the sense of a limited time and geographic area cultural unit—specifically, “a brief period of New England culture prehistory, likely a single phase as evidenced by the similarity of projectile points from all components.” In fact, we disagree with the interpretation of the range of variability in the points from these sites, as we describe below.

As mentioned above, there are limited-purpose sites
Interpreted as kill sites in the Vail geographic cluster (Gramly 1984). Vail Kill Site 1 (site 81.1b) is located about 280 m west-northwest of the Vail site. It is obviously associated with the Vail habitation site, demonstrated by refits of at least a half-dozen fluted point tips from the kill site with bases recovered from the habitation site. This pair of uniquely related sites provides a geographic scale baseline of Paleoindian camp location from kill site (0.3 km). Kill Site 2 (site 81.13), represented by two fluted points and no debitage, is 650 m northwest of the Vail site.

As mentioned, there are three smaller sites that are neither kill sites (containing fluted points exclusively) nor larger habitation sites—the Wight, Cox, and Big Brook sites (Gramly 2005b)—but none of the three produced a “diagnostic” fluted point fragment. The Wight site yielded five large biface and flake tools, including a backed sidescraper, ovate biface tip, and pièce esquillée (wedge). The Wight site is only 100 m from Kill Site 2 and about 700 m from the Vail site. Gramly (2005b:75) thinks that the broken large biface tip might match a biface base from the Vail site, and that the Wight site is a processing or butchery locality. The Cox site (Gramly 2005b:68) is a site of two small activity loci yielding a total of 40 artifacts, including an awl, channel flakes, a biface fragment, and biface reduction flakes. It is located between the Vail and Adkins sites. The Big Brook site is located on the opposite side of the valley from the Morss site. Six tools from the site—two biface preforms, a large sidescraper/cutter combination tool, an ovate biface knife, and two retouched flake tools—are made from a range of Munsungun cherts similar to those found at the Morss site (Gramly 2005b:68).

The diversity of site types in the geographic cluster may also include a cache (from an unknown location, no site number assigned) similar to western North American Clovis caches in the sense of having large flaked bifaces and little else (figure 5.4). A summer resident found two of these large biface knives on the Aziscohos Lake shoreline, many decades ago, presumably together without other artifacts. One of the specimens is extant, the other lost.

Fluted points have been recovered from all but the three smaller sites (Wight, Cox, and Big Brook). The points from the Vail site are deeply indented on the base and very large. The channel flakes do not extend more than halfway down the point, and basal ears are absent. This distinctive
fluted point form is also seen at the Debert site (Bradley et al. 2008) and can be differentiated from presumably later styles, as discussed above.

Points from the Upper and Lower Wheeler Dam sites, 8 km farther up the lake, are both deeply indented, Vail/Debert points (figure 5.5). The Adkins site is only about a kilometer from Vail. There are two fluted point bases from this site. One has a medium-depth basal indentation, and one has slight basal ears. If these points are contemporary with the Vail points, then they are at the edge of variation of the Vail/Debert modal point form. The Adkins point attributes (medium basal depth, slight ears) best match the attributes of the Bull Brook/West Athens Hill form.

The Morss site, 2.3 km northeast of the Vail site, has a couple of broken points and one reworked point. The reworked point base exhibits two moderate ears (figure 5.6). This point seems to fall within the Michaud/Neponset point form. One preform from the Morss site has a fluting scar that travels the length of the point, another attribute characteristic of the Michaud/Neponset form and not the Vail/Debert form.

Kill Site 2 has yielded two fluted points (Gramly 1984) (figure 5.7). One has a slight basal ear and channel flake...
scars that travel the length of the point, attributes of the Michaud/Neponset point form. The other is a distal half, but it too exhibits channel flake scars that travel nearly the length of the point (Gramly 1984:119). Again, this point is probably a Michaud/Neponset point form. Even though Kill Site 2 is only 650 m from the Vail site, the point forms match those from the Morss site, 2.1 km away.

In contrast to the Vail geographic cluster, no kill sites (localized, fluted point concentrations) have been located in the airport vicinity. However, one of the Michaud geographic cluster sites is a hilltop site with obvious advantages for observing the surrounding countryside in a minimally scarred area.

In summary, both Vail/Debert and Michaud/Neponset points are definitely present on sites in the Vail geographic cluster. Bull Brook points may be present at one site. The three closest habitation sites, Vail, Adkins, and Morss, exhibit different point forms. The other sites with Vail/Debert points are the Wheeler Dam sites, 8 km farther up the valley. Kill Site 2 has Michaud/Neponset type points, as does the Morss site. If Kill Site 2 and the Morss sites are related, then the distance between them (2.1 km southwest from Morss to Kill Site 2) provides another distance between kill and habitation site for temporally related sites. If Bradley et al. (2008) are correct about the radiocarbon dates assigned to these point styles, the Magalloway River valley remained an attractive place for Paleoindian groups for centuries, from perhaps 10,500–10,200 $^{14}$C yr, or as much as 12,600–11,900 cal years, more or less coincident with much of the Younger Dryas climate event.

## THE MICHAUD (AUBURN AIRPORT) GEOGRAPHIC CLUSTER

Turning our attention to the Auburn Airport located in central Maine, the Michaud site was discovered there about twenty-five years ago. A great deal of professional archaeological survey in the area, all in advance of development, located six habitation sites and one isolated artifact find spot. One other site was found by a collector and surface-collected in advance of sand and gravel quarry operations (figure 5.8). This is the first published report of some of these sites. Omitting the single artifact find spot, each of the seven sites is a habitation, camp, or work site with two or more concentrations of stone tools. The extent of professional survey in the Auburn Airport vicinity has produced a sense of archaeological site distribution similar to the exposure of sites on the eroded floor of Aziscohos Lake, around the Vail site. We know where sites are and where they are not in large areas around the airport.

In contrast to the Vail geographic cluster, no kill sites (localized, fluted point concentrations) have been located in the airport vicinity. However, one of the Michaud geographic cluster sites is a hilltop site with obvious advantages for observing the surrounding countryside in a minimally scarred area.
Spiess, Cowie, and Bartone

Jasper rhyolite. There seems to be much less use of Champlain/Hudson valley cherts at the Lamoreau site than at the Michaud site.

Cowie and Bartone and colleagues (Bartone et al. 2007; Brigham et al. 2009; Gammon and Bartone 2007) are responsible for discovering three other sites at the airport and in an associated industrial park and recording one found by a collector in a sand blowout. The LaMontagne site is on a geographic landform similar to that at the Lamoreau site near the south bank of Moose Brook. One fluted point base has been recovered (figure 5.10). The point lacks a basal ear on the one preserved lateral edge and has straight sides, a moderately deep base, and a moderate to long channel flake scar. In addition, there are relatively long channel flake fragments from the site. The point from the LaMontagne site falls within the attribute range of the Bull Brook/West Athens Hill form. The raw materials from this site are mostly Munsungun cherts, but there is Pennsylvania jasper as well.

The Taxiway site was found next to the northern airport runway during testing for construction of a new aircraft taxiway (figure 5.11). This site has six or more concentrations of stone tools, depending on how we count them. The one recognizable fluted point is a Michaud/Neponset point with a large basal ear on the right side and long channel flake scars. The raw materials from this site are mostly Munsungun cherts, but there is Pennsylvania jasper as well.

Located across Moose Brook from the Michaud site is the Lamoreau site (Spiess and Wilson 1987:125–128; two subsequent seasons of work unpublished). So far there are no finished or broken/discarded fluted points from this site. There is one broken preform and one miniature point (figure 5.9). Despite the absence of finished fluted point bases, there are many channel flake fragments, some of which refit into long channel flake (made of Israel River rhyolite). There is also a ground tip from a fluted point preform. Ground tips and long channel flakes are markers for the Michaud/Neponset point form. The lithics are dominated by Munsungun chert and Israel River/Mount Jasper rhyolite. There seems to be much less use of Champlain/Hudson valley cherts at the Lamoreau site than at the Michaud site.

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flakes (figure 5.12, center). The dominant raw material at the Taxiway site is Mount Jasper/Israel River rhyolite, with Munsungun chert being a close second in frequency. Crystal quartz is also common. And there are some odd cherts, including a brick-red material that we have rarely seen in other Paleoindian sites in Maine.

Overlooking the airport is a bedrock hill with the flashing airport beacon on top. Here there is a Paleoindian site with two stone tool concentrations (Beacon Hill site). This was probably an overlook and workshop site, with visibility for miles around. A discarded, reworked fluted point from the Beacon Hill site is clearly a Michaud/Neponset point
Mount Jasper/Israel River rhyolite is by far the most common raw material, with Munsungun chert being a distant second in frequency.

A site was found in a sand blowout about a kilometer west of the airport by a Mr. Keogh, who had the presence of mind to collect all the lithic material on the surface (Keogh site) and report the site during the Taxiway site excavation. The collection includes one broken or reworked Michaud/Neponset point base made of beautiful Munsungun chert (figure 5.14), a range of other cherts, and Mount Jasper/Israel River rhyolite.

The Cormier site, located on the sandy slope of a hill about a kilometer northwest of the airport, was excavated by Richard Will and colleagues (Moore and Will 1998). The points from the site (figure 5.15) are one holotype of the Cormier/Nicholas point form, which is stylistically equivalent to the points from the Holcombe site in the Great Lakes. The artifacts at the Cormier site are dominated by Mount Jasper/Israel river rhyolite. Munsungun chert (figure 5.13).
is the second most common raw material, but less than 20 percent in frequency. There are other cherts, including a couple of pieces of Champlain or Hudson Valley chert. There are three larger reworked chert points in the Cormier assemblage that are larger and thicker than the rest of the points from the site, with remnant long channel flakes. All the points are made of Mount Jasper/Israel river rhyolite, with the exception of these three larger points. We suspect that they were scavenged from the Michaud and related sites around the airport and used by the later Cormier site inhabitants.

In summary, the lithic material from the Michaud, or Auburn Airport, geographic cluster is dominated by Munsungun chert and Mount Jasper/Israel River rhyolite. One or the other of these two materials is more common and obviously the most recent lithic resupply, but it varies from site to site. Additionally, there are lesser amounts of Hudson Valley or Champlain Valley chert and minor other materials including crystal quartz, indicating that these people were not just going north to Munsungun and southwest to Jefferson, New Hampshire. Thus, we see that use of one local geographic area was not part of a regular round of visits to these quarry locations. The sequence of visiting the quarries varied from site to site, a conclusion we reached when examining lithic variation among artifact concentrations within the Michaud site (Spiess and Wilson 1989).

Most of the sites around the Auburn Airport have Michaud/Neponset points, except the Cormier site about a kilometer farther up the Moose Brook drainage. It is probable that the LaMontagne site point is a Bull Brook/West Athens Hill form. Like the Vail site area, the Auburn Airport geographic area was attractive for a span of time that overlapped the manufacture of two or three Paleoindian point forms, a chronological span of a couple of centuries to as much as 500 calendar years.

**DISCUSSION**

We have learned that the Vail and Michaud geographic clusters of Paleoindian sites were formed by reuse of each area over hundreds of years. It is also probable that use of these...
two clusters overlapped in time, during the manufacture of Bull Brook/West Athens Hill and Michaud/Neponset point forms. The use of the Vail cluster apparently began and ended earlier than at the Michaud geographic cluster. Use of the Michaud cluster extended into the time of manufacture of Cormier/Nicholas points at the end of the Younger Dryas. We have also learned that the lithic materials brought to the sites in the Michaud cluster are variable from site to site, although two materials dominate (Munsungun chert from the north and Israel River/Mount Jasper rhyolite from the southwest). Thus, the multiple sites in the Vail and Michaud geographic groups do not reflect simple repetition of the same behavior over a short period of time. We will have to look more closely at the site location and environmental reconstructions to figure out why.

We suspect that each area remained a useful seasonal geographic focus for caribou hunting over centuries during the Younger Dryas. We also suspect that very localized changes in vegetation cover over a time scale of decades caused people to shift their camping or working locations on the scale of hundreds of meters with each geographic area reuse. Whereas the multiple concentrations or activity loci in what we call one Paleoindian archaeological site represent very limited or contemporaneous occupation, the multiple sites in geographic clusters represent measurably longer time scales.

REFERENCES


Fitting, James E., Jerry DeVisscher, and Edward J. Wahla. 1966. The Paleo-Indian Occupation of the Holombe Beach. An-


