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EDITOR'S NOTE

Elizabeth A. Little

The papers in this issue by Chris Medaglia, Betty Little and Margaret Schoeninger, by Ken Feder, and by Peter Pagoulatos, were originally presented at a symposium, Southern New England Archaeology and Ethnohistory: The Late Woodland and Contact Periods, organized by Peter Pagoulatos at the 1989 Northeastern Anthropological Association meeting in Montreal. The papers by John Pretola, Ricardo Elia and Alan Leveillee, were presented at the 50th Anniversary Meeting of the Massachusetts Archaeological Society, in 1989 at Bridgewater.

Like other activities in a volunteer organization such as ours, the Bulletin is the product of the efforts of a number of people in addition to the editor. Proof readers and advisors to the editor in special fields are normally anonymous. However, I should like here to thank the following people who have provided advice in the editing of the Bulletin since 1987: Wendy Cook, Mary Lou Curran, Dena Dincauze, Marie Etelson, Kathryn Fairbanks, Helen Healy, Barbara Luedtke, Tom Lux, William Moody, Pierre Morenon and Robert Oldale.
LATE WOODLAND DIET ON NANTUCKET ISLAND:
A STUDY USING STABLE ISOTOPE RATIOS

Christian C. Medaglia, Elizabeth A. Little and Margaret J. Schoeninger

INTRODUCTION

A long-standing question in New England archaeology concerns the presence or absence of maize in the diet of the Late Woodland Period. The question arises due to the apparent absence of maize from most archaeological sites while it appears to have played a major role in subsistence in the historic record. This paradox merits further exploration for several reasons. The role which maize, America's principal cultigen, played in the development of many native cultures cannot be overemphasized. Secondly, the settlement patterns of hunters, fishermen and foragers are different from those based on maize agriculture, and our perceptions of prehistoric inhabitants of Nantucket Island are molded by our assumptions concerning their subsistence strategies.

ARCHAEOLOGY

Prior to the 1970's, the methods applied to questions of diet and subsistence strategies included analyses of plant and animal materials recovered from sites (Ritchie 1969). These analyses were often interpreted in conjunction with information derived from ethnographic investigations. Floral and faunal remains from several Woodland sites on Nantucket have been identified. These sites include: Squam Pond, Hughes and Herrecater Swamp (Bullen and Brooks 1947, 1948, 1949), Quidnet (Carlson 1990; Little 1984), Thompson and Ram Pasture I (Waters 1965), Marshall (Pretola and Little 1988) and Quaise (Luedtke 1980); see Table 1.

The traditional methods of floral analysis and ethnographic research, as applied in Nantucket, are not sufficient for developing diet models for several reasons. The direct analysis of plant and animal materials is inconclusive because flotation was not performed on the soil from these excavations and sieving was done with quarter-inch mesh only. Such large mesh does not retain small pieces of plant matter such as fragments of carbonized maize.

At the same time, information from ethnographic investigations comes to us only indirectly, usually through historic accounts which describe the populations inhabiting Cape Cod and mainland Massachusetts. These accounts indicate territorial groups that moved camps seasonally and subsisted on such foods as deer, fish, shellfish, occasionally dog (Butler and Hadlock 1948) and a variety of terrestrial and possibly some marine plants. For example, the explorer Samuel de Champlain (1968) reported in 1606 widespread cultivation of "Indian corn" at Nauset, Cape Cod. But this report describes the situation several hundred years after the lives of the humans in our study.

With the traditional methods unable to provide reliable information for the Woodland diet, we need to explore and utilize other techniques. The technique used in this study was stable isotope analysis of bone collagen and faunal and floral tissue samples.
Table 1. Species Found in Woodland Sites at Nantucket (adapted from Little 1985).

<table>
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<th>Squam</th>
<th>Hughes</th>
<th>Herren-</th>
<th>Thompson</th>
<th>Ram</th>
<th>Marshall</th>
<th>Quaise</th>
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<td>White-tailed Deer</td>
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</table>
SELECTION OF DIETARY SAMPLES (from Table 1).

The table of species provenienced from Nantucket Woodland period sites provides the raw data by which some conclusions about the subsistence strategies of the island inhabitants may be drawn. More importantly, the sites provide a body of material from which to cull a sample set for isotopic analysis. It appears from the faunal remains that island people enjoyed a diverse array of resources in their diet. The terrestrial staple is clearly the white-tailed deer, which appeared in the inventories of nearly all of the examined sites.

Some marine mammal remains are also present, chiefly seals and whales. Given the large size of most marine mammals, and the relatively low numbers of bones found at three out of the five sites, it is difficult to assess their use in diet.

Fish do not seem well represented in the inventories of the sites examined. While sturgeon and other fish are present in some inventories, their numbers are not great. This is surprising considering the diverse array of fish described by such explorers as Samuel de Champlain (1606) or when compared with the diverse array of fish available in the waters off Nantucket today (see also Andrews 1986). This phenomena could be a sampling error resulting from the use of large mesh screens or from the poor preservation of remains (bones) of fish compared to bones of deer or shells from shellfish. If we are to accept that fish were used in greater quantities than is being preserved in shell middens, then we must either simply estimate from what remains or use historical records of Indian fishing as a model for pre-historic fishing. Neither solution is ideal.

The shells of shellfish do, however, preserve extremely well. Not only do we know the species utilized at a given site, but sometimes have ratios of use by weight (Ritchie 1969). These measurements may be useful in building models of prehistoric diets. Unfortunately, not all researchers report the exact proportions of shellfish remains at all their sites. However, it is clear that the shellfish that consistently occur in the highest proportions are oysters, quahogs, clams and scallops (Ritchie 1969; Little 1986).

On the basis of the data above, we included a wide selection of faunal samples in our study. We collected at Nantucket samples of ocean and harbor fish, crustaceans, shellfish and deer. Deer provided the chief terrestrial sample; we have not yet studied water fowl.

With the exception of nut shells, floral materials do not preserve well in situ and we must seek other methods when attempting to establish the faunal record. These methods include soil analysis for degraded plant materials and pollen, and flotation for small fragments of carbonized floral materials. We strongly encourage future researchers to use such methods in their excavations. Our selection of plants relied upon the ethnographic record. We also collected samples of plants that form the base of many of the island's food chains.

When complete, our sample set comprised both archaeological and modern materials. Included were bone samples from three Late Woodland period humans, one archaeological and two modern deer, and a wide range of modern fish, shellfish, and plant specimens.

The human remains all come from single-burial sites located on private property and excavated as salvage sites. There is no evidence of malnutrition. Dental analysis reveals shovel-shaped incisors, moderate to high attrition and little or no caries. The three
conventional radiocarbon ages are: 940 ± 105 B.P. (Beta 18835), 610 ± 90 B.P. (Beta 21916) and 610 ± 80 B.P. (GX-14301-G) (Little 1988).

**METHODS: STABLE ISOTOPE ANALYSIS**

Certain aspects of diet can be estimated from the stable isotope ratios of carbon and nitrogen. This is because carbon and nitrogen, which are present in bone collagen, flesh, and other tissues, occur as different isotopes in the environment. The stable carbon isotopes are $^{12}\text{C}$ and $^{13}\text{C}$, the stable nitrogen isotopes are $^{14}\text{N}$ and $^{15}\text{N}$. The ratio of the heavy isotope to the light is usually expressed as the difference between the sample's ratio and that of a standard. This is known as a 'delta value' ($\delta$-value). These stable isotopes metabolize at different rates in various biochemical reactions, which leads to the phenomenon of fractionation. Fractionation is the difference observed between the isotope delta values of an organism's diet and that of its tissues. For example, $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values for bone collagen are always more positive than the food eaten, showing that the heavier isotopes ($^{13}\text{C}$ and $^{15}\text{N}$) are incorporated in bone collagen at higher concentration than they occur in diet. Because a consumer's isotope ratio reflects that of its diet, isotope ratios may be used to reconstruct diet (DeNiro and Epstein 1978,1981).

Generally, plants utilize one of two distinct carbon metabolism pathways during photosynthesis. These are known as the C3 and C4 carbon metabolism pathways and each has a distinctive carbon isotope signature (van der Merwe 1982; O’Leary 1988). C3 plants usually have $\delta^{13}\text{C}$ values averaging between -24 and -30 o/oo, while C4 plants are generally much more positive, ranging from $\delta^{13}\text{C} = -10$ to -16 o/oo (O’Leary 1988). C3 plants include the majority of terrestrial plant species, while C4 photosynthesis occurs in many tropical grasses including such cultigens as maize, sorghum and African millet (van der Merwe 1982). These species have all played major roles in the prehistoric diet of humans in the area in which they originated. As would be expected, individuals who rely heavily on one of these C4 plants themselves possess enriched $\delta^{13}\text{C}$ signatures. This is important to the Nantucket study because the primary question of our study concerns the use of maize, a C4 plant (Ceci 1979, 1982; Dincauze and Meyer 1977).

There is a third kind of plant, the Crassulacean Acid Metabolism or CAM plant, which can effectively switch its carbon cycle between C3 and C4 depending on the environmental conditions. Because these plants can utilize either carbon cycle, they may have intermediate carbon values (O’Leary 1988). Most of the CAM plants are succulent desert dwellers, such as the Nantucket native prickly pear (Opuntia humifusa).

The discrimination between a diet of C3 and C4 plants is also obscured when marine resources are available. A marine diet can produce an isotope signature intermediate between C3 and C4 plants. Hence, the present study is complicated because at least some marine component is a certainty on Nantucket. In a case such as this, where neither a C4 plant nor heavy marine reliance may be ruled out, the nitrogen isotope ratio may often be used to distinguish between a marine and C4 diet. Higher $^{15}\text{N}$ to $^{14}\text{N}$ ratios are found in the marine ecosystem and hence higher $\delta^{15}\text{N}$ isotope ratios reflect a marine component rather than a terrestrial component in a given diet (Schoeninger, DeNiro and Tauber 1983).
LAB PREPARATION METHODS

Once collected, plant and flesh samples were cleaned and ground. Bone collagen was extracted from bone by soaking in dilute hydrochloric acid for approximately five days. Roughly 5 mg of bone collagen, flesh, or plant material were loaded into vycor tubing and combusted at 800 °C for eight hours. After combustion, the resulting CO₂ and N₂ were purified cryogenically and analyzed using a mass spectrometer (Moore and Schoeninger 1986).

RESULTS AND DISCUSSION

Humans. The three human skeletons analyzed (Table 2) ranged in their δ¹³C values between -10.3 and -11.0 ‰, and averaged to -10.6 ‰ with a standard deviation of ± 0.4 ‰. Their δ¹⁵N values ranged between 14.1 and 15.5 ‰ and averaged to 15.0 ‰, with a standard deviation of ± 0.7 ‰. The close clustering of both the carbon and nitrogen values indicates that the individuals sampled shared a similar diet.

Table 2. Results of the stable isotope analysis for the three humans in the study. All values are expressed per mil (‰). Note that the measurements were on bone collagen.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Material</th>
<th>δ¹³C</th>
<th>δ¹⁵N</th>
</tr>
</thead>
<tbody>
<tr>
<td>3197</td>
<td>Human Bone</td>
<td>-10.4</td>
<td>15.5</td>
</tr>
<tr>
<td>2198</td>
<td>Human Bone</td>
<td>-11.0</td>
<td>14.1</td>
</tr>
<tr>
<td>3199</td>
<td>Human Bone</td>
<td>-10.3</td>
<td>15.3</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>-10.6</td>
<td>15.0</td>
</tr>
<tr>
<td>±</td>
<td></td>
<td>± 0.4</td>
<td>± 0.7</td>
</tr>
</tbody>
</table>

In studies where all analysis is performed upon the archaeological remains of humans and faunal resources, all results are derived from analysis of bone collagen. In the Nantucket study, however, the majority of samples were modern flesh or plant material. Before attempting a dietary reconstruction, we must take into consideration the fractionation factor between diet and bone, and transform the human δ-values appropriately.

Past research (DeNiro and Epstein 1978; Keegan and DeNiro 1988) has shown the difference between δ¹³C of bone and diet to lie somewhere between 5.0 and 2.8 ‰; one subtracts this conversion factor from δ¹³C of bone to convert to δ¹³C of the average diet. When converting δ¹⁵N values of bone to those of diet, a conversion factor between 3 and 1.5 ‰ is subtracted. In this study 5 ‰ is used as the carbon conversion factor, while 2.5 ‰ is used for the nitrogen conversion factor (Schoeninger 1989). Once converted to diet, the Nantucket samples’ δ¹³C values average to -15.6 ‰ and the δ¹⁵N values average to 12.5 ‰. Obviously, there is no effect on the standard deviations for either measurement. Table 3 summarizes the proposed dietary isotope values for each of the three samples. Both the actual results from the bone collagen analysis and the proposed values for human diet are graphed in Figure 1.
Effectively, the dietary δ-values of the consumer’s diet represent a weighted average of the δ-values of the dietary components consumed.

Table 3. Proposed stable isotope values for human diet. All values are expressed in parts per million (o/oo).

<table>
<thead>
<tr>
<th>Sample</th>
<th>Species</th>
<th>δ(^{13})C</th>
<th>δ(^{15})N</th>
</tr>
</thead>
<tbody>
<tr>
<td>3197</td>
<td>Human</td>
<td>-15.4</td>
<td>13.0</td>
</tr>
<tr>
<td>2198</td>
<td>Human</td>
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<td>12.5</td>
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<tr>
<td>±</td>
<td></td>
<td>± 0.4</td>
<td>± 0.7</td>
</tr>
</tbody>
</table>

Figure 1. Stable isotope values for humans in the Nantucket study showing both the measured results for bone collagen and the proposed values for diet.

Terrestrial Herbivore (Deer) (Figure 2). The carbon from the one archaeological and two modern deer samples were analyzed and yielded results which averaged to -21.0 o/oo δ\(^{13}\)C and 2.7 o/oo δ\(^{15}\)N in bone collagen. Flesh δ-values averaged to -24.1 o/oo carbon and 4.4 o/oo nitrogen. The δ-values for deer bone and flesh, and their position on the graph, should be kept in mind when the results for terrestrial plants are presented. It will be noticed that the deer δ-values fall in the center of the range for terrestrial plant resources.

Fish (Figure 3). The δ\(^{13}\)C results for the fish resources collected on and around Nantucket ranged from -13.4 to -23.9 o/oo. The average of these carbon values is -17.5 o/oo with a standard deviation of 3.3. The fish δ\(^{15}\)N values ranged from 9.8 to 16.6 o/oo and averaged to 12.6 o/oo with a standard deviation of 2.8.
Stable Isotope Results for Terrestrial Herbivores (Deer): Bone and Flesh

Figure 2. Stable isotope values for Nantucket deer. Both flesh and bone values were measured and both are shown here. All values in parts per mil (‰).

Stable Isotope Results for Fish (Modern Fish Flesh)

Figure 3. Stable isotope values for fish. All measurements ‰.

An interesting effect is noted when the results are examined more carefully. Fish such as bluefish, striped bass, and halibut, all of which are ocean-going fish, tend to have carbon values that cluster around -17 or -18 ‰, while tidal creek and harbor-dwelling fish
Stable Isotope Results for Shellfish
(Modern Shellfish Flesh not Shell)

Figure 4. Stable isotope values for the molluscs and crustaceans in the Nantucket study. Results are expressed per mil (‰).

exemplified by eel and cunner are much more positive, with values reaching as high as -13.4 ‰. White perch are freshwater fish.

Shellfish (Figure 4). Similar trends were noticed in molluscs and crustaceans. These had an average $\delta^{13}C$ ratio of -16.6 ‰ (sd of 2.2, range from -13.7 to -20.7 ‰) and an average $\delta^{15}N$ value of 8.1 ‰ (sd of 3.0, range from 3.5 to 11.8 ‰). The broad range of $\delta^{13}C$ values observed for shellfish seems to correlate with environment (Peterson et al. 1985). Like the fish, those molluscs and crustaceans harvested from inside the harbors consistently have more positive carbon values than those, quahog and blue mussel, taken from habitats in Nantucket Sound, or than an oyster taken from upstream in a tidal creek.

Floral Samples (Terrestrial and Aquatic) (Figure 5). Most of the plants we examined were terrestrial. These tended to have relatively light $\delta^{13}C$ values, ranging between -23.8 ‰ and -28.1 ‰. Only one of the indigenous fully terrestrial plants revealed a $\delta^{13}C$ ratio indicative of a C4 plant. This plant, the prickly pear, a known CAM that was evidently using the C4 carbon pathway, had a $\delta^{13}C$ value of -14.2. The nitrogen values ranged between -0.4 and 8.2. The terrestrial plant averages, excluding the prickly pear, were -23.0 ‰ carbon and 2.4 ‰ nitrogen.

Two intertidal and subtidal plants yielded interesting results. The spartina root had a $\delta^{13}C$ value of -11.8 ‰, and the eelgrass was measured at -5.9 ‰. These very high $\delta^{13}C$
results are important for two reasons. First, as we know, these two plants are the bases of two of Nantucket's most important ecosystems: the marsh and harbor respectively. Secondly, they can explain the high $\delta^{13}C$ signatures of those fish and shellfish living in tidal creeks and in or near the salt marsh.

The flint maize and broad bean, included for comparison, both yielded results consistent with what was expected, and the results of past studies.

CONCLUSIONS

Our results from the human bone samples clearly indicate that some dietary component was contributing a high $\delta^{13}C$ signature to the Nantucket diet. This is best illustrated when our results are graphed alongside the results of two groups with known diets: a group of Eskimos who are known to have subsisted mainly on marine animals and ocean-going fish; and a group of committed maize horticulturalists (Schoeninger, DeNiro and Tauber, 1983; Figure 6). As you can see, the Nantucket diet is intermediate between the Eskimo and maize groups. An initial hypothesis is that both types of resources, maize and marine mammals and fish, were utilized by Nantucketers in approximately equal quantities. However, as stated earlier, maize has not been found archaeologically on Nantucket, and the remains of marine mammals.
and ocean fish are not as abundant in middens as those of molluscs.

An alternative hypothesis, developed on the basis of our results, is that the measured diet was provided by fish, crustaceans and shellfish caught in the creeks or harbor where the base of the food chain is influenced by the C4-like and C4 plants, eelgrass and spartina. A difficulty with this hypothesis is the problem of protein poisoning (Speth 1989). There is no archaeological or ethnographic evidence in the northeast for the direct consumption of eelgrass or spartina, and little isotopic evidence for upland plant use on Nantucket. While it is known that molluscs and some fish have seasonally high carbohydrate and fat levels, further dietary research will be needed in order to determine whether these levels are high enough to allow a Nantucket diet of fish, molluscs and crustaceans without negative effects on health.

It is interesting to note that the δ^{13}C signature of the bones of a Late Woodland dog from Squantum, Mass., was -13.1 o/oo (Nelson 1989), a relatively high value that implies that dog meat would have contributed to the high δ^{13}C values we see in human bones. Dogs probably ate leftovers from people's meals, then as now.

In summary: Our findings do not allow us to exclude maize from the Late Woodland period Nantucket diet. They do, however, allow us to suggest an alternative diet utilizing a broad range of dietary components based primarily on resources obtained in or around the harbor, creeks, and salt marsh.
Acknowledgements: We thank the Nantucket Historical Association and the Maria Mitchell Association for their support of this project. Especial thanks are due Timothy Lepore, MD, Eleanor Lucas, and J. Clinton Andrews for supplying Nantucket floral and faunal samples for study. Two of the prehistoric human bone samples from Nantucket were provided by the Massachusetts Historical Commission, Brona Simon, State Archaeologist. An early version of this paper was presented at the 1989 Society for American Archaeology meeting in Atlanta.

REFERENCES CITED

Andrews, J.C.

Bullen, R.P. and E. Brooks

Butler, E. M. and W. S. Hadlock

Carlson, Catherine C.

Ceci, L.

Champlain, S. de

DeNiro, Michael J., and Samuel Epstein

Dincauze, D. and J.W. Meyer

Keegan, W.F. and M.J. DeNiro
Little, E. A.

Luedtke, Barbara

Moore, K. and M.J. Schoeninger
1986 Description of Procedures and Equipment, Bone Chemistry Laboratory, Peabody Museum, Harvard University.

Nelson, Charles

O'Leary, M.H.

Peterson, RJ., R.W. Howarth and R.H. Garritt

Pretola, John, and Elizabeth A. Little

Ritchie, W.
1969 The Archaeology of Martha's Vineyard. The Natural History Press, Garden City, NY.

Schoeninger, M.J.

Schoeninger, M.J., M.J. DeNiro and H. Tauber

Speth, J. D.

van der Merwe, N.

Waters, J.H.
The sites reported on here were identified in an archaeological survey of Peoples State Forest located in the western hills of the Farmington valley in Connecticut (Figure 1). The survey was carried out within the context of the on-going Farmington River Archaeological Project (FRAP).

The goals of FRAP have been fourfold:

1. to determine the prehistoric archaeological potential of the Farmington Valley,
2. to assess the nature of prehistoric Indian settlement in the valley,
3. to determine the nature of the relationship between the prehistoric inhabitants of the Farmington Valley and those of southern New England and New York State, and
4. to examine changes in prehistoric human cultural adaptation, including land-use patterns, through time.

During the first six years of our work we conducted small-scale archaeological reconnaissance surveys in the Connecticut towns of Farmington, Avon, Simsbury, Canton, and Barkhamsted. Through this project, we have located and identified over 100 archaeological
sites dating from approximately 5000 BP to 1740 AD in an area where previously very few sites were known and where little information had been collected or recorded. In addition, twenty-five of the most significant of the sites identified through our research have been at least partially excavated.

The focus of FRAP from 1979-1983 was directed toward survey and excavation of the valley floor and surrounding terraces of the Farmington River. Previous archaeological work had shown that prehistoric settlement in New England tended to cluster along such major river systems. In this period we found many sites (Feder 1981) dating to both the Archaic and Woodland periods. A typical Late Woodland floodplain occupation is the Meadow Road site located at the confluence of the Pequabuck and Farmington Rivers. Dated by radiocarbon to 830 ± 70 BP (Beta-12939) and by thermoluminescence to 720 ± 20% BP (Alpha-3313), the site is extensive, covering approximately five acres. Material recovered consisted primarily of ceramics; sherds were quite thin-walled, exhibited little in the way of tempering, and design elements were largely incised on or near the rim.

Having established the density of prehistoric valley floor settlement, at the end of the 1983 field season and in 1984 a survey in the western uplands bounding the valley was initiated in an attempt to determine the nature of utilization (if any) of such upland areas by prehistoric people. Since the river terraces exhibited use by people from the Middle Archaic through the Late Woodland, we were curious to see how people throughout this time range utilized the upland habitat. Specifically, a small section of Peoples State Forest in Barkhamsted, Connecticut, adjacent to a beaver-dammed stream was surveyed for likely spots where prehistoric seasonal hunting and food-gathering camps might have been located.

The 1983 and 1984 surveys were extremely successful and several prehistoric sites were located. In the field seasons of 1984 and 1985, two of the Late Woodland prehistoric sites identified in the survey were excavated, and further surveying indicated the presence of additional prehistoric sites. In 1986, through the support of a Survey and Planning Grant awarded by the Connecticut Historical Commission, we were able to conduct a thorough archaeological reconnaissance survey of Peoples State Forest. Coverage of the forest was extensive; nearly one thousand test pits were excavated, and twenty-eight previously unknown prehistoric archaeological sites were located and tentatively identified. In addition, one Contact period native site was investigated and nine historic sites were located.

PREVIOUS RESEARCH

Before we began our investigation of Peoples in 1984, there had been only one professional archaeological study conducted in the forest. This was the excavation of the Ragged Mountain Rockshelter by William S. Fowler at Yale University in 1948 (Fowler 1951). The Ragged Mountain shelter is located in the southern section of the forest on the slope of Ragged Mountain. The shelter is a large overhang some 25 meters in length and about 1 meter in depth. An amateur archaeologist (Walter Manchester) first collected there, at the turn of the century. Two members of the Archaeological Society of Connecticut, Charles F. Lyon and Ray N. Irons, initiated an excavation of the site in 1947. Yale University under the co-direction of Irving Rouse and William Fowler continued this excavation in 1948.

Artifacts recovered in the excavation included projectile points (Brewerton eared-triangles, Squibnocket stemmed, Vosburgs, and Levanna triangles), scrapers, knives,
gouges, hammerstones, and ceramics. Also of importance were quarry tools. The rockshelter was a source of steatite and was a quarry as well as a habitation site. A number of soapstone bowls also were recovered in the 1948 excavation. What is important here is that the rockshelter provides evidence of occupation from the Late Archaic through the Late Woodland.

**SURVEY METHODOLOGY AT PEOPLES**

The survey methodology we employed is fairly standard in archaeological surveying of forested uplands (Lovis 1976; Chartkoff 1978; Wadleigh, Furbish, McBride, and Dewar 1979; McBride 1985). The forest was first divided into a number of zones. These were:

1. Farmington River floodplain and terrace,
2. streamside and stream terrace,
3. general upland,
4. bedrock exposure.

These zones were selected as they probably had meaning to hunter/gatherers and were significant in terms of prehistoric land use patterns. Testpit transects were then placed so as to sample each of these zones either individually (transects placed within zones) or collectively (transects crossing zones). Transects were selected to provide areally representative sub-surface samples of each of the zones (Figures 2 & 3).

Test pits were generally placed along straight line transects at 20 meter intervals. The 20 meter figure is clearly a compromise between complete coverage and time constraints. Upland sites, as we show, are often quite small, less than 20 meters in extent and for 100% discovery of sites, one would need to blanket the forest with a grid of test pits perhaps no more than 5 meters apart. This, however, would expend in labor, time and resources far more than the entire survey budget of Connecticut - just for a single forest.
All test pits were shovel dug to glacial material, bedrock, sterile soil, water, or until other factors made further excavation impossible (tree roots, cobbles). All test pit matrix was passed through 1/8 inch mesh hardware cloth. Our experience in surveying for upland sites since 1984 indicates that the use of screening is absolutely essential for the discovery of all varieties of sites. Sites were found using 1/8 inch mesh which would not have been otherwise detected. Also, using 1/8 inch mesh resulted in the recovery of artifacts and organic material which would otherwise have been lost.

When a site was identified in a test pit transect, further test pitting was conducted in the vicinity of the find to determine the size of the site and to recover sufficient material to attempt to identify age and function. Test pits were placed at five meter intervals in the cardinal directions from the original pit where material was found.

SITE DESCRIPTIONS: THE BEAVER MEADOW COMPLEX

Based on our archaeological research in Peoples State Forest, the Beaver Meadow Complex of prehistoric archaeological sites has been identified. From nearly 4000 years ago until about 600 years ago, prehistoric Indians occupied the terraces overlooking Beaver Brook, a small stream draining the forested uplands of Peoples State Forest (Figure 4). I will briefly describe a few of these sites.

Site #5-9. Six 2X2 meter square units have been excavated at the Beaver Brook Site (BMC 1). Artifacts recovered include secondary and tertiary quartz debitage, generally quite small flint retouch flakes, and very little basalt debitage. In terms of functional types, we recovered knife forms, scraping tools, and perforators, projectile point tips, and some unidentifiable bifaces. Also, a number of complete projectile points were recovered. Point forms included what appeared to be small eared triangles, small stemmed quartz points, a single example of
a large slate triangle, and a single, small side-notched flint point.

Stratigraphy indicated that there were two separate, though not entirely distinct cultural levels at the site. The majority of the small, quartz point forms (earred triangles and stemmed) were recovered in the lower zone. The slate and flint points were recovered in the upper zone. Small fragments of charcoal recovered from the upper zone produced a radiocarbon date of 740 ± 60 B.P. (Beta-12942). Charcoal recovered from a hearth in the lower zone produced a radiocarbon date of 1310 ± 60 B.P. (Beta-12941).

Water separation of the feature material has just been initiated. Preliminary macroscopic analysis indicates the presence of burned hickory and acorn and, interestingly, quantities of burned seed.

Site #5-10. The Castor Site (BMC 2) produced a flint biface, small stemmed quartz points, flint debitage, charcoal and burned nut fragments. No carbon date could be determined for this smaller site since there was substantial recent burning in the soil above it.

Site #5-11. Analysis of the Yellow Trail site (BMC 3) is in a very preliminary phase. Stratigraphic analysis indicates a single component occupation generally contemporaneous with the upper zone at Beaver Brook. Two radiocarbon dates were obtained; one was from a hearth within which a long, stemmed slate point was recovered, 680 ± 50 B.P. (Beta-13464). The other date, 610 ± 70 B.P. (Beta-13465), was derived from small charcoal fragments recovered from an adjacent excavation unit. A mixture of debitage and presumed functional forms similar to that of Beaver Brook was recovered here.

Site #5-17. Super Tree (BMC 9) is a large, undisturbed site in the Beaver Meadow Complex. Recovered were quartz, flint, and hornfels debitage. Bifaces of basalt and quartz were recovered as were broken fragments of flint projectile points. The site is by a factor of three, the oldest yet discovered in this complex of sites. It has produced a radiocarbon date of 3970
± 100 B.P. (Beta-17453). While obviously not a Late Woodland occupation and therefore beyond the temporal scope of this symposium, it is significant that both Archaic and Woodland sites in these uplands are quite similar in size, location, and artifact functional types.

Site #5-36. The Lighthouse site is an historically known habitation. The Lighthouse has even been remembered in poetry:

Where now grow the birch and alder,
Hardy maple, oak, and walnut,
Graceful hemlocks, lofty pine trees,
Spreading up the shady hill-side,
Hill-side stony, steep, and rocky,
Was a ragged group of cabins,
Dwelt in by a people blended,
Partly white and partly Indian,
Partly from the early settlers,
And the vagabonds of travel... (Mills 1952:9)

A lengthy poem of which the above is an excerpt, was written in 1945 by Lewis Sprague Mills, a well known Connecticut educator. Its form was taken from Longfellow's "Hiawatha." In it, Mills tells the legend of the Lighthouse, a village dated to 1740 and initially settled by a Narragansett Indian and his white wife. The village, legend tells, was a magnet for various dispossessed Indians, whites, and freed black slaves.

As part of our project we tested the site. We have so far identified six of the houses in the village. These structures had stone foundations and were relatively easy to find. Many of the other houses in the village probably did not have durable foundations and so have left no obvious surface indications. Future excavation should result in the location of these other houses, if they did, in fact, exist. We have also located an area with a number of upright, unmarked fieldstones. This is likely the cemetery mentioned in the legend, though only about a dozen stones thought to be grave markers remain. To this day, people still place American flags on these supposed graves.

The artifacts and features identified at this very early stage in the research are interesting, particularly insofar as they appear to reflect a mixture of Indian and European cultures. Artifacts recovered include an English style gunflint, European whiteware crockery, and metal nails, along with typically Indian cutting and scraping tools of stone. Also, a possible large mortar for grinding seeds into flour was discovered at the site.

SIGNIFICANCE AND IMPLICATIONS

The prehistoric sites located in our survey of Peoples State Forest constitute a significant data set relevant to questions surrounding subsistence, settlement, and the culture history of the prehistoric inhabitants of southern New England. The group of sites here subsumed under the heading The Beaver Meadow Complex, represents an intensely interesting subset of these data. Here we have located nineteen upland sites in a small area where sites had not been previously identified. These sites reflect a utilization of upland habitat in the Farmington Valley beginning nearly 4000 years ago. The Beaver Meadow Complex sites are almost all located on the first terrace above Beaver Brook on both the east and west sides of the brook.
Their locations are, in essence, identical; they do not change in the different time periods represented.

The functional characteristics of the tool assemblages of the sites in the complex are also the same, regardless of age. These assemblages include cutting and scraping tools, projectiles, hammerstones, cores, primary and secondary debitage, and piercing tools (drills). These assemblages are indicative of a wide range of activities including tool manufacture and maintenance, woodworking, butchering, and hide processing. This is a far greater range of inferred activity than that expected at, for example, an upland hunting camp. It seems likely that sites in the Beaver Meadow Complex reflect a significant seasonal occupational focus on the western uplands of the Farmington Valley and the resources therein during both the Archaic and Woodland Periods.

The continuity of raw material utilization from 4000 BP to 600 BP is also of great research interest. The persistence of crystalline quartz exploitation, along with the use of cobble quartz, quartzite, and flint is clear. Beyond this, the presence of burned nut fragments and seeds at many of the sites also suggests continuity in subsistence and seasonality.

The presence of sites dated to both Archaic and Woodland times, their location in virtually identical micro-environmental settings, their great similarity in functional artifact assemblages, the presence of similar ecofactual material, and their indistinguishable raw material assemblages together indicate indisputable continuity in the form of prehistoric upland utilization in the Farmington Valley. This is of great research significance and contrasts with the situation in the Lower Connecticut Valley where the size of sites, their functional assemblages and raw material constituencies change rather drastically through time. This difference (i.e., the conditions of continuity versus change) between the Farmington and Connecticut Valleys supports a previous hypothesis of prehistoric differentiation between the two areas.

On the other hand, the Beaver Meadow Complex also contrasts sharply with Farmington Valley floodplain sites previously excavated by FRAP on the eastern margin of the Farmington Valley. Floodplain sites are commonly much larger, with a greater variety of features (cooking, storing, discard, manufacturing). They are also quite different in their lithic raw material assemblages; floodplain sites on the eastern margin of the Farmington Valley exhibit the almost exclusive use of Talcott Mountain basalt for stone tool production. Precisely how these upland sites relate to the floodplain sites remains to be determined.

Thus, the Beaver Meadow Complex of prehistoric archaeological sites presents us with a comprehensible picture of upland utilization by the ancient inhabitants of the Farmington Valley.

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REFERENCES CITED

Chartkoff, J. L.

Feder, Kenneth L.

Fowler, William S.

Lovis, William A.

McBride, Kevin

Mills, Lewis Sprague

Wadleigh, William, K. Furbish, K. McBride, and R. Dewar

RADIOCARBON AGE REPORTS

Powell Site, Kingston, MAS #M41-NW-113:
Sample: wood charcoal from a firepit (feature #15) containing fire-cracked rock, felsite and quartz chips. A ground slate effigy with serrations and incised markings was recovered close by at approximately the same depth (20 cm) as the top of the feature. Conventional age of sample: 4175 ± 145 (GX-14167) in radiocarbon years before 1950 ± 1 sigma. C-13 corrected. δ13C = -26.1 o/oo. Error is judged by the analytical data alone. 14C half-life: 5570 years; 95% NBS Oxalic Acid Standard. (Bernard Otto, Massasoit Chapter, MAS Matching Funds Application 1988; Geochron Report 1988).

Powell Site, Kingston, #M41-NW-113:
Sample: wood charcoal from a firepit (feature #9; originating 15 cm below surface) about 17 m southwest of feature #15 above. Conventional age of sample: 1025 ± 75 (GX-13719) in radiocarbon years before 1950 ± 1 sigma; C-13 corrected. δ13C = -23.2 o/oo. Error is judged by the analytical data alone. 14C half-life: 5570 years; 95% NBS Oxalic Acid Standard. (Bernard Otto, Massasoit Chapter, Geochron Report, 1987).
LATE WOODLAND AND CONTACT PERIOD LAND-USE PATTERNS IN RHODE ISLAND: CONTINUITY AND CHANGE

Peter Pagoulatos

Late Woodland and Contact Period land-use patterns are poorly understood in the Narragansett Bay region. The primary purpose of this paper is to present new data and summarize the results of a land-use study of Late Woodland-Contact Period sites from the Narragansett Bay mainland and nearby islands. The chronological setting is established and occupations assigned to the Late Woodland and Contact Periods are analyzed in terms of activity diversity and site location. A model of late prehistoric and early historic land-use patterns suggests that changes in land-use occurred in response to European economic activities during the seventeenth century.

INTRODUCTION

The Late Woodland Period (~AD 1000-1600) in the Northeast is most often characterized by the introduction of horticulture, suggesting a trend toward increased sedentism and social complexity (Ritchie 1969; Snow 1980). However, in southern New England, horticulture appears to have been a minor economic activity during the Late Woodland Period, which was characterized by a dispersed settlement pattern, without densely nucleated villages (Ceci 1977; Thorbahn 1988; Little 1988). Late Woodland Period settlement patterns in the Narragansett Bay region indicate that occupations are clustered toward the coastal margins and near interior river systems. Late Woodland occupations tend to yield finely made ceramic wares, Levanna projectile points, and a variety of tool types, features and preserved organic remains, suggesting the exploitation of a wide range of plant, animal and marine resources (Dowd 1984; Kerber 1988).

During the sixteenth and seventeenth centuries, contact occurred between European and Native American populations in southern New England. In 1524, Giovanni da Verrazzano explored Narragansett Bay, where he encountered and briefly traded with Narragansett Indians. Verrazzano is believed to have explored much of the Bay region during his two-week stay in this area, noting the presence of a dense population under the dual leadership of two sachems. Work parties sent to explore the coastal margins noted vast open clearings extending 5 to 6 leagues inland. Dispersed homesteads were noted away from the coast, in the near interior (Wroth 1970). By the early seventeenth century, Dutch traders explored the Narragansett Bay region. Henry Hudson, during his travels of 1609-1610 notes contacting and trading with Native Americans of Narragansett Bay. Adriaen Block, in 1614, also describes his exploration of Narragansett Bay, noting amicable populations willing to trade with the Dutch navigator (Jameson 1909). Dutch commercial records suggest heavy fur trade activity in this region during the seventeenth century, as the Dutch apparently established trading posts at Dutch Island and the present-day Charlestown area during the 1630's (Rider 1904; Bachman 1969). Undoubtedly, numerous other unrecorded Dutch, as well as French and English, explorers visited this region prior to the 1630's.
Despite the existence of records from the sixteenth and early seventeenth centuries, relatively little is known about Narragansett Indian lifeways prior to the 1630's. Much of what we know about the Narragansett from the Contact Period is based upon the writings of Roger Williams, a seventeenth century Protestant minister and founder of Providence (1636), who lived among the Narragansett for several years (Williams 1643).

The Narragansett Indians were part of a larger group collectively designated as Eastern Algonquian-speaking peoples. The Narragansetts are believed to have comprised a group of allied villages encompassing much of the present-day state of Rhode Island, including all of Kent County, Dutch and Conanicut Islands, and much of Washington County. This extended sachemdom featured two dominant sachems, Canonicus and Miantonomi, who were to figure prominently in seventeenth century European-Native American relations in southern New England. The Narragansett sachemdom apparently exacted tribute from less powerful groups in the region, including the Nipmuc to the north, and southern groups such as the Eastern Niantic of the Charlestown area and the Manisses of nearby Block Island (Simmons 1978).

Narragansett populations, during the seventeenth century, were primarily concentrated along the Narragansett Bay coastal region, practicing a mixed economy of hunting, wild plant gathering, fishing, shellfish collecting, and horticulture, characterized by a complex series of seasonal residential movements. Summer was a time of maximum mobility, as families dispersed to cultivate crops and harvest marine resources in the Narragansett Bay coastal margins and adjacent river systems. In the fall, family groups moved into the interior to collect nuts and hunt deer. By winter, Narragansett Indians primarily concentrated on the procurement of mammal resources in the interior. Populations tended to establish large residential villages in interior riverine areas during the winter months, in heavily wooded locales, which yielded an adequate supply of firewood and mammal resources. By spring, villages dispersed, as families moved from the interior to their fields, along the coastal margins, to sow their crops. In the spring, fish runs were also of importance during this time (Williams 1643; Simmons 1978).

One of the most critical issues in this paper is whether the land-use pattern Williams described in the 1630's was in fact an indigenous pattern which existed prior to European contact in the region or one that had been already altered due to earlier European trading activities prior to 1636. Sachem Canonicus, who was nearly 80 years old in the 1630's remarked to Roger Williams that Europeans had been visiting his territory since the early seventeenth century to trade (Dorr 1885).

Rubertone (1985) suggests that a major population shift toward coastal margins took place during the early seventeenth century in Narragansett Bay, in response to the presence of European traders along the coast. Narragansett populations placed themselves near the coastal margins, to have better access to Dutch, French and English traders as well as shellfish locations, from which they could produce wampum. A similar explanation has been proposed by Ceci (1977) who suggests that coastal New York populations may have altered their seasonal land-use pattern toward the coast in response to historic economic activities such as wampum production and European trade.
METHODOLOGY

The research methodology will require an assessment of archaeological data made available by the Rhode Island Historic Preservation Commission (RIHPC), including all Late Woodland and Contact Period sites listed in the files in the state of Rhode Island. In this study, two main types of information will be assessed: cultural data and environmental data.

Cultural Data

Cultural Data will be used as a tool to interpret human behavior, as reflected in the archaeological record. Cultural data used in this study will include: 1) the assignment of components to specific cultural time periods (i.e., Late Woodland and Contact Periods) on the basis of diagnostic artifacts, radiocarbon/thermoluminescent dates (Table 1), and 2) the development of an activity diversity index to discern the range of human activities at a site. Each form of cultural data is discussed below.

Cultural Time Periods. Late Woodland Period components will be defined primarily by radiocarbon dates (AD 1000-1550) and/or the presence of diagnostic Levanna projectile point types. Contact Period components have been so designated on the basis of radiocarbon dates (1550-1790) and/or the presence of European trade goods. In a few cases, historic documents were used to identify the location of particular Contact Period sites.

Activity Diversity Index. The Activity Diversity Index (ADI) is designed to assess the range of human activity at archaeological sites. The ADI will consist of the presence or absence of seven major classes of data from Late Woodland and Contact Period sites, including: 1) chipped stone debris 2) Levanna projectile point types 3) clay ceramics 4) features 5) marine resources 6) faunal remains, and 7) floral remains. Each site will be assigned an ADI number ranging from one to seven. Sites with a low ADI (1-2) contain few classes of data and are considered specialized loci, where a limited range of human activities took place. Conversely, sites with a high ADI (6-7) will be considered areas where a wide range of cultural activities took place. Occupations with a moderate ADI (3-5) will be considered places where an intermediate range of tasks occurred.

Environmental Data

Environmental Data is designed to identify associations between the archaeological record (Cultural Data) and environmental variables such as ecoregions and microenvironments. The association of certain environmental locations with Late Woodland or Contact Period sites could suggest continuity or changes in land-use patterns from the Late Woodland to Contact Periods. A settlement pattern shift might suggest changing subsistence patterns. Environmental data used in this study will include: 1) the location of occupations in relation to specific ecoregions, such as interior uplands, coastal bay margins and offshore islands, and 2) the proximity of sites to freshwater and saltwater microenvironments. Each form of environmental data is discussed below.
TABLE 1. Late Woodland and Contact Period Sites and Chronometric Dates

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</tr>
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<td>0114</td>
<td>1100+/-145, 550+/-50 (RIHPC)</td>
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<td>720+/-150, 200+/-40 (Bellantoni 1987)</td>
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<td>640+/-20% (thermoluminescent date; Bellantoni 1987)</td>
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<td>610+/-150, 370+/-40 (Bellantoni 1987)</td>
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<td>800+/-70 (Leveillee &amp; Thorbahn 1984)</td>
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<td>800+/-80 (RIHPC)</td>
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Ecoregions. Information on ecoregions in Rhode Island was made available from United States Geological Survey Maps (USGS) and the Rhode Island Historic Preservation Plan (RIHPC 1986). For the purposes of this study, the following ecoregion designations will be used: 1) the Interior Uplands 2) the Bay and Coastal Margins, and 3) the Offshore Islands (Figure 1).
The Interior Uplands will include both the upland interior and near interior ecoregions, as designated by the RIHPC. This ecoregion is at or above the 100' contour line, and is characterized by transitional forests and hemlock northern hardwood forests biomes. The Bay and Coastal Margins will consist of those areas (including the Salt Pond ecoregion) from the immediate shoreline to the 100' contour line, which is designated as a lowland coastal zone characterized by oak forests. The Offshore Islands will consist of those land masses which are separated from the Rhode Island mainland by bodies of water. Those islands include: Block Island, Conanicut, Prudence, Patience, Hog, Rose, Dutch, Gould, Aquidneck, and Dyer.

Microenvironments. Information on microenvironments such as proximity to watersource type and site locations was made available from USGS maps and RIHPC site files. The two major types of water source types included those of freshwater and saltwater. Freshwater sources included rivers, ponds, streams and lakes. Saltwater sources consisted of the actual shoreline (ocean), saltmarshes, and salt ponds. Archaeological site locations were designated as having a freshwater or saltwater source. Certain sites were within equal proximity to both saltwater and freshwater source locations, and were designated as being associated with both fresh and saltwater sources.

Figure 1. Map of Rhode Island showing ecoregions as defined in this paper, and very approximate site locations.
### TABLE 2. Late Woodland/Contact Period Sites and Cultural/Environmental Data

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Once the Cultural and Environmental Data was collected (Figure 1, Tables 1,2), the archaeological sites in this study were separated into Late Woodland and Contact Period occupations. The total sample size of components was 70, of which 56 were assigned to the Late Woodland Period (AD 1000-1550); 14 were assigned to the Contact Period (AD 1550-1790).
These sites were then analyzed in terms of the ADI, ecoregion, and microenvironment (Tables 3,4). Mortuary sites were not included in this study.

Interior Uplands

A total of six archaeological components have been identified in the Interior Uplands, of which four were Late Woodland sites yielding a low to moderate ADI, primarily characterized by the presence of Levanna points, indicating specialized hunting-related activities. Site RI 667, consisting of both Contact Period and Late Woodland components, yielded a high ADI, indicating intensive use and reuse of this location.

Bay and Coastal Margins

A total of 49 components have been identified from the Late Woodland and Contact Periods; these components are situated in proximity to freshwater and saltwater microenvironments:

Freshwater locations. A total of 14 Late Woodland components have been recovered in close proximity to a freshwater source, constituting about 25% of all sites from this cultural time period. Eleven of these Late Woodland sites yield a low to moderate ADI, suggesting that these locations were used for a limited range of extractive and maintenance activities. Two yield a high ADI. By contrast, one site (RI 935) containing both Contact and Late Woodland Period components and one Contact Period site (RI 194), all with high ADI's, have been identified, representing less than 15% of the total number of sites in freshwater locales in the Bay and coastal margin ecoregion.

Fresh and Saltwater Locations. A total of seven Late Woodland components were found in proximity to both freshwater and saltwater locations, constituting less than 15% of all sites assigned to this time period. Six Late Woodland Period sites yield a low to moderate ADI, indicating the presence of limited activity extractive camps; one had a high ADI. Contact Period sites were not identified in these areas.

Saltwater Locations. Twenty-six components have been recorded in close proximity to a saltwater source, of which 17 have been assigned to the Late Woodland Period, constituting about 30% of the total number of sites assigned to this cultural time period. These components have an ADI which range from low to high, indicating multiple activity locations. Nine Contact Period components have been found within this microenvironment, accounting for nearly 70% of the total number of components assigned to this period. These Contact Period sites all have a high ADI. However, seven of these sites also have a Late Woodland component, and may represent different episodes of intensive site reuse.

Offshore Islands

Fifteen components assigned to the Late Woodland and Contact Periods were identified on Offshore Islands. Thirteen of these were designated as Late Woodland components, and were recorded on Block Island, Prudence, Conanicut, and Aquidneck
TABLE 3. Number (percentage of total) of Late Woodland and Contact Period Components in Various Microenvironments.

<table>
<thead>
<tr>
<th>Microenvironment</th>
<th>Late Woodland</th>
<th>Contact</th>
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</thead>
<tbody>
<tr>
<td>Fresh</td>
<td>5(9%)</td>
<td>1(7%)</td>
</tr>
<tr>
<td>F/S</td>
<td>14(25%)</td>
<td>2(14%)</td>
</tr>
<tr>
<td>Salt</td>
<td>17(30%)</td>
<td>9(64%)</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>14</td>
</tr>
</tbody>
</table>

Islands. These sites had an ADI ranging from low to high, reflecting a diversity of processing and maintenance activities. Only two Contact Period components (RI 118, 120) were identified, both yielding previous episodes of Late Woodland occupation, and high ADI's, indicating site reuse or large multiple activity occupations.

Summary: Land-use and Microenvironments

To summarize, current data indicate both continuity and change when assessing Late Woodland and Contact Period land-use patterns in Rhode Island. There appears to have been a decrease in the number of Contact Period sites, compared with the Late Woodland Period. In spite of this change, sites during the Late Woodland (AD 1000-1550) and Contact Periods (AD 1550-1790) are distributed across a variety of microenvironments, reflecting the use of a wide range of resource zones (Table 3, Figure 1). The interior uplands appear to have been primarily used by Late Woodland specialized task groups. Coastal margins (salt marshes) on
the offshore islands were intensively used by both late prehistoric and early historic Native American populations. Narragansett Bay land-use patterns are generally similar for the two periods under discussion, as numerous locations were reused by Late Woodland and Contact Period populations. However, two changes are apparent by the Contact Period: 1) the absence of specialized loci, and 2) an increased emphasis upon saltwater site locations relative to other site locations (Table 3).

An assessment of the ADI indicates that Late Woodland sites are characterized by a wide range of activity loci, ranging from very specialized to highly variable. By the Contact Period, however, limited special-purpose locations are absent, as Contact components, usually located at high ADI Late Woodland sites, are exclusively characterized by a wide range of cultural activities (Table 4).

An evaluation of site locations indicate that by the Contact Period, Native American populations increasingly focused upon saltwater marshes and ponds, along coastal margins. For example, during the Late Woodland Period, about 66% of all recorded sites were found in close proximity to seaside saltwater microenvironments. By the Contact Period, although decreased in number, nearly 78% of all identified sites are near saltwater microenvironments (Table 3).

These data indicate that Contact Period populations continued to occupy Late Woodland coastal sites of high ADI, perhaps for longer periods of time, as reflected in the highly variable assemblages. Interior freshwater locations were used less frequently.

DISCUSSION

The basic question is why did a change of land-use occur between the Late Woodland and Contact Periods in Rhode Island? One possible explanation may be one proposed by Rubertone (1985), who suggests that changes in Narragansett Indian land-use during the seventeenth century may have been a response to European trade and wampum production.

The Dutch were actively trading with Native Americans in the Narragansett Bay by the 1620's. Commercial transactions included the exchange of European metal tools, cloth, liquor, and guns for furs and wampum. Wampum appears to have become an extremely important medium of exchange by the 1630's in this region, as it was transformed from an object of ritual importance to one of economic value. Major wampum production centers were on Long Island, coastal Connecticut and Rhode Island (Bachman 1969; Salisbury 1982).

The Narragansett Indians may have functioned as 'middlemen' in this trade network during the seventeenth century, as they may have served a dual role as intermediaries between the interior tribes of southern New England and coastal European traders. Wood (1634) notes that the Narragansett were well-known as being prime minters of wampum from periwinkle shells. Williams (1643) mentions that certain Narragansett were wampum craft specialists who collected shell during the summer and manufactured wampum during the winter months.

The fur trade appears to be intrinsically tied to wampum production during the seventeenth century. Just as the fur trade may have altered interior Native American land-use patterns, it also, in all likelihood, altered existing land-use patterns among coastal groups such as the Narragansett Indians. Wampum production may have necessitated an
increased emphasis upon coastal resource zones to collect shell during the summer and to manufacture wampum during the winter, as reported by Roger Williams (Rider 1904). The Dutch are reported to have annually reached the southern New England coast to purchase wampum and trade for furs in the fall and leave for Europe in the spring. Winter fur trading would have been optimal, since beaver fur would have been thickest and of best quality at this time (Trelease 1960; Bachman 1969). Therefore, wampum production would have been crucial during the fall and winter months, when Narragansett groups, prior to European contact, would have shifted settlements toward the interior uplands to hunt. Once wampum was manufactured, Narragansett trading groups would have most likely waited for Dutch trading ships in areas along coastal margins, in places that offered good anchorage points for ships (Ceci 1977). Therefore, the collection, manufacture and trading of wampum would have required Narragansett groups to spend longer periods of time near the coastal margins (Rider 1904).

To what extent would have wampum production altered existing Narragansett political systems during the seventeenth century? Thomas (1979) suggests that southern New England Indians who became involved in the European trade network altered their indigenous political systems rapidly, as 'Big Men' emerged who were able to consolidate groups to control wampum production and the fur trade in order to gain differential access to European trade goods.

Jorgenson and Lawn (1983) note the presence of a Confederacy in the Narragansett Bay region during the Historic Period, including the Narragansett, Eastern Niantic, Coweset, Shawomet, Nipmuc, and nearby Block Islanders. He suggests that this Confederacy was a response to European trade in the region during the early seventeenth century, and that the Narragansett sachems may have had the ability and power to channel human labor to make wampum and increase the volume of European trade in this region.

In the case of Narragansett Bay, sachems Canonicus and Miantonomi appear to have consolidated their power subsequent to the 1633-1634 epidemic, when nearly 700 Narragansett perished (Thomas 1979). Roger Williams (1643) notes that when he entered the region in the 1630's, sachems Canonicus and Miantonomi had a differential access to European trade goods, perhaps reflecting their higher social position in the Narragansett social system. I suggest that if Canonicus and Miantonomi were able to control the production of wampum, they could strengthen their position as 'middlemen' in the expanding European trade network during the early seventeenth century. Their hereditary territorial rights to optimal shellbeds along coastal margins and their ability to control the production of wampum would have made these two sachems important players in the European-Narragansett exchange system. Perhaps the need to control shellbeds for wampum production might explain the increased emphasis upon saltwater locations during the Contact Period.

The writings of Roger Williams have been traditionally used to describe Narragansett land-use patterns in Rhode Island. Many have used his descriptions as a model for the indigenous pattern of settlement. I suggest that what Williams witnessed in the late 1630's was a system which had been drastically altered by prior epidemics, the changing functional nature of wampum, and the expanding European fur trade in the Narragansett Bay region.

In all likelihood, similar changes took place in other parts of southern New England during the seventeenth century, which altered the nature of Native American settlement patterns, trade, and political systems (Ceci 1977; Thomas 1979). This study has attempted to
explain how and why land-use patterns changed in response to European commercial trade activities in the Rhode Island region. It is hoped that the model presented here will help explain processes of culture change that took place elsewhere in the Northeast as well.

**CONCLUSION**

Late Woodland and Contact Period land-use patterns have been presented in light of current data from Rhode Island. Available data on Late Woodland and Contact Period site distributions has allowed for the evaluation of changes which took place in the early seventeenth century in response to the Dutch fur trade and the need to produce wampum.

Three critical changes were noted for the Contact Period in Rhode Island: 1) a decrease in the number of sites, 2) a decrease in specialized activity loci and a focus on high activity loci, and 3) an increased emphasis, relative to the total number of Contact Period sites, upon saltwater site locations. This data suggests that by the early seventeenth century, Native American populations were positioning themselves along coastal margins for extended periods of time to produce wampum and increase trading activities with Europeans.

Future research should focus on the recovery and proper identification of wampum workshop areas, in particular, the re-analysis of possible wampum production areas which have been misidentified as shell middens. Secondly, a closer assessment must be made of Late Woodland/Contact Period multicomponent sites, to discern internal changes of activities from the late prehistoric to early historic period (i.e., wampum production). Finally, I suggest that the land-use pattern described by Roger Williams in the 1630's had already been altered by prior Dutch commercial trading activities between 1610 and 1635 in the Narragansett Bay region.

**Acknowledgments.** I wish to thank Denise Mowchan for her helpful comments and assistance in the methodology, structure, and content of this paper.

**REFERENCES CITED**

Bachman, V.C.  

Bellantoni, N.F.  

Bernstein, D.  

Ceci, L.  
Cox, D. C., P. Thorbahn and A. Leveillee  

Dorr, H. C.  

Dowd, A.  

Jameson, J. F.  

Jorgenson, H. C. and A. G. Lawn  

Kerber, J.  


Leveillee, A. and P. Thorbahn  

Little, E. A.  

Morenon, P.  

Pagoulatos, P. and D. Ritchie  

Rider, S. S.  
1904 The Lands of Rhode Island as they were known to Caunounicus and Miantunnoumu when Roger Williams came in 1636. Providence.
Rhode Island Historic Preservation Commission

Ritchie, W. A.

Rubertone, Patricia

Salisbury, N.

Simmons, W.S.

Snow, D.R.

Trelease, A. W.

Thomas, P. A.

Thorbahn, P.

Williams, R.

Wood, W.

Wroth, L.C.
KEEPING THE FAITH IN THE WEST: 130 YEARS OF ARCHAEOLOGY IN SPRINGFIELD

John P. Pretola

Good afternoon. I bring greetings from the Springfield Science Museum on this celebration of the MAS's 50th Anniversary. The Springfield Science Museum has supported MAS activities from the beginning. William S. Fowler worked on several projects at the museum in the 1940's. Leo D. Otis, Cataloger and later Director, served as an MAS vicepresident in the early 50's. Under William R. Young, a number of archaeological activities were carried out in the 1960's culminating in his great work, the Connecticut Valley Indian, a publication of the museum which stands as an important culture historical introduction to the valley's archaeology.

Despite budget constraints in the 70's and 80's, the museum has continued to support Massachusetts archaeology and has seen its collections grow through donation and excavation. Educational and exhibition activities have also been active. Several temporary exhibits including "Mother Earth, Father Sky" and "The Springfield Fort Hill Site" have been popular. A revamped Native American Hall design has proceeded despite problems of logistics and funding. It is anticipated that the Science Museum's new Native American Hall will be installed in the late 1990's drawing upon the museum's extensive collections.

The great diversity of those archaeological collections became apparent as I began inventorying them in the mid-1970's. Located in the south-central Connecticut Valley, the Science Museum was founded as a natural history museum in 1859. Most of its archaeological collections date to the 19th and early 20th century with some important exceptions - the recently acquired Charles W. Hull, Walter S. Rodimon, Barker Day Keith and Joseph Craig collections. As a rule, the older collections are from sites destroyed by urbanization. Such old collections are rich in whole artifacts not simply because of collector's bias, but also because farming technology was not so destructive to artifacts then.

There is a great deal of untapped information yet available in these collections. I find the key to understanding this local museum collection lies in archaeological thought as enumerated in newspapers, notes and books of the day combined with the more informative orientation suggested by Meltzer (1985) who states that archaeology at this time was essentially pre-university with emphasis on the holistic study of the American Indian. While some of the local collectors were sophisticated enough to be considered archaeologists in their own right (Young 1969), the majority should probably be considered antiquarians (persons who revere something because it is old).

Such an antiquarian was Philip Kilroy, a local medical doctor. In 1902, Kilroy donated his collection including 1250 local chipped stone and ground stone tools to the Science Museum. The museum hastened to add Kilroy's collection to an exhibit that it was preparing with the help of Harvard University Professor, Albertus L. Dakin. The exhibit was concerned with tracing the history of technology, a natural history approach.
With exhibits of this sort, the object as a representative of a technological state becomes more important than any associated contextual data. The Kilroy collection contains only the briefest provenience data for this reason. Despite this, the collection yields many interesting inferences. Because Kilroy's collecting territory is now part of the Springfield-Chicopee-Holyoke urban complex, the collection represents a major surviving archaeological data base for river valley sites in this region.

Studies in the less urbanized lower Connecticut Valley around Old Lyme, Connecticut, have identified a Terminal Late Archaic record referred to as the Susquehanna Tradition, Broad Spear Tradition or the River Plain Adaptation (Pfeiffer 1984). This tradition or adaptation is characterized by the utilization of the resources of the river plain. A great number of small habitation sites are found on the flood plain and terraces of the Connecticut River. Mortuary practices include dry bone cremation burial with grave offerings including ritual "killed" objects and food offerings. Lithic industries are characterized by the manufacture of expanding stemmed points and large broad blades manufactured from exotic Hudson Valley cherts, quartzite, Lockatong argillites and other exotic stone.

The Terminal Archaic in the Springfield area is less well known. Few studies have provided the kinds of interpretive data as in Connecticut. However, inspection of the Kilroy collection provides some inferences with regard to Terminal Archaic artifact forms and lithics for the central Connecticut Valley. Seventy-five points, drills and blades, 8% of the Kilroy collection, can be typed as Susquehanna Tradition forms. Snook Kill/Atlantic, Susquehanna Broad, Orient Fish Tail and Wayland/Dudley points are the predominant forms. Lithic analysis indicates that eastern New York cherts, eastern Massachusetts felsites and Lockatong argillites are the preferred chipping materials. These preliminary findings suggest similarities to the observed phenomena from the lower Connecticut Valley.

By contrast, the J.T. Bowne collection is an example of a true 19th century archaeologist's collection. Bowne was a librarian on the original faculty of Springfield College, and an archaeologist in the sense that he was a serious student of Native American prehistory, working when time was available. His collection of over 10,000 archaeological specimens is cataloged and accompanied by a notebook recording find data. His library, which was also donated, contains many personal notes and reviews of late 19th century anthropology works including the BAE publications, historical works and local publications. Bowne corresponded with many of the notable archaeologists of the day.

Bowne participated in several excavations including local historian Harry Andrew Wright's excavation of the Springfield Fort Hill Site on the property of Dr. Philip Kilroy (Pretola 1985, Young 1969). Bowne reproduced the site map in his notebook as well as artifact descriptions. His notebook review provides a participant observer's report on that important site. His commitment to professionalism led him to purchase bits and pieces of the Fort Hill assemblage whenever collectors would sell. By doing this, he prevented the scattering of at least some of the assemblage.

The analysis of old collections poses many problems. The usual collector's biases serve as a filter to which must be added a gauntlet of museum problems such as missing objects, scattered data, and inadequate or antiquated cataloging. After more than 14 years of work, much has been accomplished and yet I am still learning something new about each
and every collection. Interpretive and predictive abilities resulting from this work serve as an important resource for scholars as well as enliven our exhibits and educational programming activities.

In general terms they provide a sample of the types of diagnostic artifacts available, regional distributions and time periods represented, often from sites now destroyed. Regional site densities may also be inferred. Museum collections however can best be thought of as a passive resource. They can function to partially generate, contradict or augment hypotheses, but they are locked into the theoretical milieu of their creation. We cannot go back with hindsight and ask new questions expecting all the answers.

The reinterpretation of old museum collections reinforces the value of these collections. The preservation of regional collections as well as those from specific sites gives an air of replicability to archaeological science. Just like a repeated experiment, one can go back and examine the artifacts and notes that led earlier researchers to draw certain conclusions. The understandings gained in this manner can help to more accurately evaluate earlier work.

Perhaps one of the greatest lessons we can learn from old museum collections is to think of the curators that come after us. If every museum collection is a time capsule for its theoretical milieu, we owe it to the future to record as much information as possible. In addition to preserving the objects in repositories, we must save all the documentary information concerning those objects. Not only description, site location, and intrasite location, but also the circumstances of discovery or excavation, associations with specific features, or other artifacts, notes and publications resulting from the work. We must endeavor to keep this information together rather than scattering it. We owe this to future archaeologists. Toward these ends, the Springfield Science Museum has been participating in archaeological endeavors for 130 years and is still going strong.

REFERENCES CITED

Meltzer, David J.

Pfeiffer, John

Pretola, John

Young, William R.
The field of archaeology has undergone a tremendous amount of change and upheaval since the Massachusetts Archaeological Society was founded in 1939. One of the most important changes was the passage, in 1966, of the National Historic Preservation Act, which established historical and archaeological preservation as national policy and created, quite suddenly, the profession of contract archaeology. By the mid-1970s, states had established State Historic Preservation Offices, and the now familiar archaeological trilogy of Phase I locational survey, Phase II site examination, and Phase III data recovery had been developed for federal compliance projects.

The profession has many names - cultural resource management (CRM), public archaeology, archaeological heritage management, and rescue archaeology, as they refer to it in Europe and Latin America. One academic archaeologist I knew referred to it as "mercenary archaeology" back in the days when battle lines were being drawn between the supposed academic scholars and the contract shovel bums. The term "contract archaeology" is commonly used in the trade - it's not very dignified, but it certainly reflects the basic reality that, unlike in the past, this is archaeology for hire under a system of competitive bidding.

How far have we come since the 1970s, when it was all new, and everyone was basically stumbling about trying to develop a series of methods, procedures, and standards? Back then we were all trying to be something we weren't - professional archaeological consultants, in the same league as the professional engineers, architects, and lawyers with whom we dealt and for whom we worked. Today, we've basically got the process worked out; we've traded our dungarees for business suits (at least at client meetings), and we all seem to be pretty busy - lots of archaeology is being done.

But what is the quality of the work? And how is the profession reacting to the larger issues that we face, such as our responsibility to synthesize the mass of data we accumulate, our responsibility to our ultimate clients, the public, and our fundamental commitment to our region's threatened archaeological resources? I'm concerned about not just those in the project area we are getting paid to worry about, but all the sites that are threatened by development, vandalism, looting, and by underwater salvors intent on the commercial exploitation of our underwater archaeological patrimony.

I'd like to present some personal observations on the state of contract archaeology in the 1980s, based largely on my experience in southern New England. In my opinion, although the process of conducting cultural resource management studies for development projects has matured and become well established, the profession of contract archaeology has failed to mature at the same pace. I believe that the practice of contract archaeology presents a series of intellectual and ethical challenges that are not being adequately addressed by the profession.

For many reasons, I think that the field has settled into a general complacency in which
the tendency is towards the production of minimally acceptable work. I see some good studies being done, but few excellent ones; likewise, I see lots of run-of-the-mill studies being produced, and a few terrible ones. I believe we can, and must, do much better than we have been doing.

There are many factors peculiar to the American archaeological preservation system that contribute to the tendency to produce less rather than more. One is the nature of the competitive bidding process, which has resulted in a breed of low-bid archaeology, what James Hester has called "archaeology on the cheap" (Hester 1987). Originally, competitive bidding was thought to be a good thing for archaeology projects; under the free enterprise system, competitive bidding would encourage the development of new and creative methodologies carried out by "lean and mean archaeological machines." Unfortunately, however, the reality seems to be just the opposite. We're all "lean," but I'm not so sure how "mean" we are.

Here's how it often works. An engineer or an architect planning a development project finds out that archaeology must be done. Now this individual probably knows little or nothing about archaeology, or the archaeological review process. Archaeology is just one more obstacle or "sign off" to get before the project can proceed. The planner calls the state historic preservation office and gets the names of half a dozen archaeological consultants who do acceptable work in the state. Requests for proposals go out, bids come in, and the non-archaeologist planner, who cannot evaluate research designs, looks to the bottom line of the budget page, which he can evaluate, and makes his selection on the basis of the lowest bidder.

Now here's a fact of life: Archaeology is very labor-intensive. Given the fact that archaeological salaries are fairly consistent from group to group, the lower the budget, the less archaeology gets done. This is a simple equation but one with profound consequences. If one group proposes to dig 200 test pits, and another group proposes only 100 test pits for the same project, which do you think will have the lower budget? Remember - more digging also means more travel time, more lab time, more report-writing time. Which group do you think will get the job?

Another peculiar feature of our preservation system creates a number of potential ethical and practical conflicts. This is the fact that the professional archaeologists who discover sites must also define and argue their significance - that is, they must act as advocates for sites to be considered eligible to the National Register of Historic Places, our nation's inventory of significant cultural properties. But judging from the contract archaeology literature, many archaeologists lack even a basic grasp of the relevant preservation legislation and the applicable significance criteria. One federally-sponsored report for a prehistoric excavation simply declared that the site's significance "lies in the fact that it has provided us with another aspect of prehistory." No mention of the National Register criteria of eligibility; the site was "significant" simply because it was there.

Another problem that archaeologists face as advocates for the resource is that there is a tremendous responsibility for the archaeologist to be able to address the full range of sites, prehistoric, historical, industrial, urban, etc., and to understand what makes sites of each type important. I think that there is a tendency for the field to be fragmented into those who are either prehistorians or historical archaeologists; often, one knows (and cares) virtually nothing about the other's discipline. In New England the emphasis traditionally seems to
favor prehistory over historical archaeology. For some prehistorians, any historical site is dismissed as so much "historic fill" or is merely the "historic overburden" that obscures the prehistoric components. So far I haven't seen any historical archaeologists referring to prehistoric sites as the "prehistoric underburden," but I suppose it could happen. My most often heard comment from historical types who know nothing about prehistory is "Is this a flake?" If a principal investigator or a project archaeologist is only competent in one discipline, there is a risk that sites that fall outside that discipline may not be appreciated or even noticed. I know of one Phase I survey where an apparently well-preserved 18th-century farmstead site was written off while the discovery of a few prehistoric flakes produced a knee-jerk recommendation for additional investigations. I am not saying that we should become generalists instead of specialists. What I am saying is that we must become generalists in addition to being specialists.

In the area of field methods and techniques, contract archaeology generally offers little that is new or innovative. In fact, most of the creativity seems to go into ways of digging fewer holes in the ground so that one's budget stays low. A good example of this is the use of the small, hand-held auger to discover sites. For many years, this was the principal method of discovering sites among some archaeologists. This method, which was never adequately tested or verified, involved examining a series of soil cores taken at intervals across a project area. Anomalies such as charcoal were taken to indicate prehistoric site areas. In my own testing of this method at a prehistoric site with a very high artifact density (over 1000 flakes per meter unit), we found that soil cores discovered evidence of a site in only 2% of the attempts. The chief advantage of this method seems to be that it was cheaper than testing by shovel test pits. Other field methods are equally problematic. Sampling remains a critical issue, although no one seems to address it anymore. Again, the tendency is to do less rather than more. Excavation samples of 2-5% are common on Phase III excavations - and remember, these are the sites that represent the creme-de-la-creme of sites.

The accurate recording of sites in the field is a cardinal rule of archaeology, and one that results in the commission of a cardinal sin by many contract archaeologists. The failure to properly survey sites that are found can have serious legal and ethical consequences, and can result in the loss of data. Considering that our work is done in phases, that different groups may conduct different phases, and that years may go by between phases, it is all the more imperative to survey our sites and the locations of key test pits professionally. Yet, if you look at many contract reports you will see mostly amateurish sketch maps and reworked engineering plans of variable accuracy. Why aren't professionally made plans being done? Even on Phase III excavations, contour maps and absolute elevations rarely appear, including on urban sites, where deep and complex stratigraphy is the rule. A site plan showing six to ten feet of urban deposits without elevations is not very useful.

Contract archaeology reports have been a big problem for a long time (Dincauze et al. 1981:122-132). The dissemination of contract literature remains a critical issue. It's often difficult to know what is going on in your own state, much less elsewhere in the country. Other problems with reports are more mundane, but no less important: many reports are loaded with so much jargon as to be virtually unintelligible; others are poorly written, poorly edited, or poorly produced.

As I have indicated, there are a number of problems that exist in contract archaeology today. Many of these, including the basic tendency to do what is minimally acceptable, have
their roots in the peculiar nature of our archaeological preservation system. How, then, are we to improve? One important player here, perhaps the most important, is the State Historic Preservation Office (SHPO), which reviews the contract archaeology reports. The SHPO must take the lead in setting standards and demanding high quality work. Only it can provide the checks and balances needed to offset the realities of low-budget archaeology. Unfortunately, in an era of budgetary and personnel restraints, the SHPO may not have sufficient resources to effectively police the profession. Ultimately, contract archaeologists themselves must improve or we will continue to be our own worst enemies in developing the field as a profession.

At the beginning of my talk I referred to some of the "larger" issues that contract archaeologists must address. I only have time to briefly mention a few of these. One is the status of casual employees - the field and lab crew who are hired, without benefits, to work from project to project until they are laid off when the work runs out or the winter sets in. These people are the core of our trade, and yet they are the archaeological equivalent of migratory farm workers. We must do something about this situation.

My other points concern the relationship of contract archaeology and archaeology in general; and here, I believe that organizations such as the Massachusetts Archaeological Society must also address these issues, and can indeed play an important, perhaps the leading, role. We need to find ways to deal with the problem of archaeological site preservation on private land. We should support the State Historic Preservation Office and legislative initiatives that would require surveys for private development projects, and we should also promote creative methods of preservation, for example through preservation easements and restrictions.

We need to be more vocal as public spokespersons for archaeology and cultural preservation. We must counteract the Indiana Jones image of archaeology as treasure hunting, and get people interested in their own cultural heritage. We must represent the truth against the fringe groups who distort reality and clutter the public's perception of archaeology with fantasies about Celtic megaliths and cultural diffusion from outer space. And finally, we need to do something about the underwater salvors who pose as historians and archaeologists as they commercially mine our underwater archaeological resources. As archaeologists, we should not collaborate with them, and thereby validate their activities. And we must act to change the now archaic Massachusetts Underwater Archaeology Act of 1973 and take away the financial incentives from the salvors.

REFERENCES

Dincauze, D.F., H.M. Wobst, R. Hasenstab, and D. Lacy

Hester, James J.
THE PAST, PRESENT AND FUTURE OF CONTRACT ARCHAEOLOGY

Alan Leveillee

At The Public Archaeology Laboratory, Inc., we are engaged in the business of Contract Archaeology. Despite intermittent arguments to the contrary, it has been demonstrated that contract archaeology is making significant contributions to the research of the region's past, and it will continue to do so. The numbers of sites being added to the state and regional files as a result of Cultural Resource Management (C.R.M.) work is staggering. The increasing data base requires constant rethinking of our research questions. Without a doubt, archaeology in the late 1980's is a dynamic science. As contract archaeologists we feel we are in a unique position to consider both the immediate effects of our surveys and the larger contextual milieu. This paper is, in effect, a letter from the front, a retrospective consideration of the last ten years in contract archaeology with an eye to the immediate future. I hope to present this paper in a generally informal style similar to that often employed by our late colleague Pete Thorbahn. As an advocate for cultural resources, as a teacher, and as a peer, Peter is missed. I would like to dedicate this paper to his memory.

I would guess that many of us now in the field of cultural resource management are products of the relatively secure 50's and the socially and environmentally aware 60's. Prior to and during the years of our formal educations, we somehow collectively acquired and brought to our profession an epistemology that still binds us. We have in common an appreciation for and a desire to study and preserve elements of our past. Certainly we are not the first generation to share this ethic. We are, however, among the first generation of professionals with conservation and preservation legislation and an established system in which to practice.

Upon graduation from college many of us found ourselves in a field we referred to as "Salvage Archaeology." Our enthusiasm and ideals were well tested as we saw ourselves, armed with trowels, steps ahead of the bulldozers. While I am employing simplistic imagery, I'm sure many of us have stories of frantic excavation as heavy equipment rumbled around us. As I saw it then, and as I recall those times now, we felt we were advocates for the resource, while those who built roads were, for the most part, uncaring, sometimes openly hostile adversaries. By the late 70's things became a little more organized as we practiced "Public Archaeology." While we were still in generally adversarial relationships with our sponsors, they were becoming more aware of their responsibilities to the landscapes they were changing. During this period we, as professionals, actually forged good relationships with state and government agencies sponsoring the large projects on which we were working.

By the mid 80's, as a sluggish economy began to recover, the private development sector became an important source of revenue for our profession. While many of us retained the "Public" in our names, we were now engaged in "Contract Archaeology." To the developer we offered a service that was necessary and required, but seldom completely understood. These were times that had us scratching our collective heads a little, coming to grips with the fact that clients didn't share our enthusiasm for natural and cultural resources. We were no less committed ourselves, however, and we felt with added effort on our part we could identify,
preserve and protect endangered resources and educate the developers. We refined our methodologies and began to interact with developers both earlier in the planning process and at higher corporate levels.

Now, by the late 80’s we have polished our skills and are engaging in "Cultural Resource Management." I believe we are quite successful at it. As a professional C.R.M. organization, the P.A.L.'s primary focus is archaeological sites and their context. As large corporations become involved in planning multi-million dollar development projects, they are demanding continuity of personnel and corporate accountability. At the P.A.L. we continue to act both as a resource advocate and an objective consultant with an increasing number of informed clients. Events within the last year or so, however, have shaken my faith in the unfolding patterns within the field. I think that despite our best efforts we are losing important sites at an intolerable rate. Let me offer an example.

Not long ago the P.A.L., Inc. was asked by a development partnership to submit a proposal for an intensive locational survey of portions of a proposed housing project in Plymouth, Massachusetts. The Massachusetts Historical Commission (MHC) had reviewed the proposed plans and, based upon known sites in the area, recommended the survey. The greater project area, known as Nook Farm, had in past years been an active collecting spot. Furthermore, there was a question of human skeletal remains having been encountered in the vicinity. Prior to our involvement in the survey an MHC staff member had walked over the project area with the developers. During that walkover a few shell fragments and a piece of quartz chipping debris were noted in proximity to a knoll within one of the lots to be developed. It was suggested to the developers that the archaeological survey concentrate around the knoll.

Being familiar with the reputation of Nook Farm, we were pleased to be notified of the acceptance of our proposal to conduct the survey. During background study we looked at a number of articles from the Bulletin of the Massachusetts Archaeological Society describing a wide range of artifacts and features including burials from the Nook Farm area (BMAS 7:43 [1946]; 10:44 [1949]; 12:37 [1951]). Two informants visited the site at our invitation and identified sections of the knoll as yielding human skeletal remains.

The results of our preliminary subsurface testing were at one level exciting in that each test unit indicated a rich and complex site. At another level we found ourselves dealing with thousands of artifacts and scores of features, requiring time and effort we had not anticipated. It was quickly becoming apparent that this was a rich Late Woodland/Contact Period site of regional significance and that Nook Farm was worthy of years of research. A Native American settlement in close proximity to the Plymouth Rock landing site of the Pilgrims could generate interest on a national level. The value of the site as an educational resource was enormous. Our preliminary report concluded that Nook Farm was a valuable archaeological resource which would require a lengthy and expensive program of research. We recommended that the site be preserved in situ. With a great deal of support and encouragement from the Massachusetts Historical Commission and State Archaeologist, the developers decided to donate the land parcel to the Town of Plymouth and to cooperate in the preservation of the site. After our many hours of work, we were pleased that because of everyone's efforts and dedication the system had worked. We had saved Nook Farm for posterity and had a great model for C.R.M. Or so we thought.
A few months later I received a phone call from a Plymouth resident asking if I was aware that bulldozers were on the site. I contacted the M.H.C. and the developers, neither of which knew of construction in progress. A site visit verified that the knoll we had investigated had indeed been impacted. An on-site meeting with the developers, the M.H.C. and the P.A.L. took place to try and determine what had happened. During the next few months we conducted a damage assessment and determined that the impacts to the site were severe enough to eliminate it from consideration for nomination to the National Register. In short what had been a potential treasure had, within a few hours, been destroyed despite the best of intentions and considerable coordination efforts.

On the day that topsoil was to be spread to stabilize the remainder of the site, I was there and had the opportunity to speak to the bulldozer operator who had impacted the site. He never realized what he had done. Apparently, adjacent land parcels were sold for house lots and a connecting roadway. Fill was needed for the road bed and the nearby knoll seemed like a good source for the required fill. The subcontracted bulldozer operator had not been told of the archaeological value of the area. According to the operator he was also unaware that the site was on private property and not included as a development lot. Somehow the communication networks had broken down.

Within the past year several other instances of the destruction of significant sites have occurred in southeastern New England. In at least one case the destruction was a conscious act in defiance of conservation efforts. What is going wrong and what if anything can we do about it? For years our preferred option has been to preserve a significant site in situ. If the current rate of site destruction is an indication of a weakening conservation ethic or a failure to operationalize it, we are in trouble. We need to reexamine our strategies. Are there really enough guarantees for the protection of these resources? Perhaps we should be pursuing more vigorous programs of excavation and data recovery.

Without a doubt we have, in the last few years, educated many clients and heightened the awareness of the development community at large. However, it appears that we need better fail-safes in the system. Recently proposed legislation in Massachusetts calls for substantial punitive penalties for the destruction of archaeological sites. We applaud and support these efforts. Perhaps several years of punitive consequences will result in a healthier respect for cultural resources. The costs of increased numbers of data recovery programs would also serve to stimulate awareness where complacency now dwells.

I would also suggest that other audiences need to be addressed. I feel despite our successes we have not been effective in disseminating the results of our work to the public at large. We need to do a better job of selling a preservation ethic. We need also to address a younger and wider range of audiences. Toward these ends The Public Archaeology Lab supports an Educational Programs department and has created the staff position of Public Outreach Coordinator. Last year we hosted a field school and public lecture series. We are active in Rhode Island's public and private middle and high schools offering a range of archaeology-related experiences. This year our programs will include two summer field school sessions, workshops and possibly a second lecture series. We are hopeful that these efforts will promote to new audiences an awareness and appreciation for archaeological resources.

For the immediate future, however, how do we address the increasing numbers of sites being destroyed? I propose that we consider the formulation of a crisis intervention plan for
our archaeological resources. Unless we are able to utilize our collective talents to address the rate of site destruction, I fear we may find ourselves in a cyclical spiral where we will again, armed with trowels and rusting ideals, be steps ahead of the bulldozers "salvaging" whatever we can of the past. We should be beyond that. We encourage the formation of a panel to consider the need for a crisis intervention plan and pledge the active involvement of The Public Archaeology Laboratory.

I'll end this letter from the front with the observation that Contract Archaeology has come far as a profession in the past ten years. I would caution that we have a long way to go. Ours is a fragile existence. Archaeology in the early 90's will have to be both responsive and far-sighted. At The Public Archaeology Laboratory, Inc. we look forward to the challenge.


George F. Aubin

With the appearance of this two-volume set, scholars interested in the early contact history of New England have a major new source of materials available to them. Indeed, it would not be at all surprising to see this publication soon become a standard reference, taking its place alongside such well-known works as Eliot's translation of the Bible and Trumbull's Natick Dictionary, for example.

The heart of the Goddard and Bragdon work consists of all the known manuscript writings by native speakers in Massachusetts; no writings by non-native speakers are included. The publication of such a corpus, while perhaps not unprecedented, is decidedly noteworthy, all the more so since it makes documents in a now extinct Eastern Algonquian language widely accessible. Although it has long been known that some writings of this type survived, the number located must nonetheless be considered surprising: 154 documents of diverse provenance are presented, along with some other writings found in books (Bibles for the most part). Goddard and Bragdon carefully situate these documents in their historical and ethnographic context in a concise introductory section which presents a useful overview of the establishment and governance of the numerous Indian reservations or 'praying towns' in early Massachusetts.

The documents themselves are presented in a 'diplomatic' edition, with a photograph for virtually every document; illustrative photographs of the marginalia are also included. The detailed comments on each document discuss a wide range of pertinent issues: the physical condition and content of the document, its background, the author's penmanship, an analysis of the writing, including suggested readings of unclear or damaged letters, and so forth.

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Each document is carefully transcribed and then translated. For the most part, the
translations are literal, deviating from the Massachusett original only when considerations of
clarity or English usage make this necessary. In terms of content, the documents deal with
land transactions, deeds, depositions, records of town meetings and special councils, petitions,
wills, marriages, and other related more or less 'official' matters. The complete document
corpus has been alphabetically catalogued, and the present location of each document is given.

In the second volume, Goddard and Bragdon turn their attention to several related matters.
The Word Index (discussed below), sorted by grammatical label, serves as the basis for the
Grammatical Sketch, a valuable extended discussion of the linguistic system implied by the
documents that will be of interest to linguist and serious amateur alike. Every occurrence of
every inflected form has been taken into account, with a limited number of forms (all
carefully noted) taken from Eliot or elsewhere, primarily to fill out paradigms.

The analysis of the spelling system used by the native writers shows the pervasive
influence of the orthography developed by John Eliot, as well as evidence of dialectal
variation and of individual orthographic devices. In addition, the native writers exhibit a
sometimes disturbing lack of consistency, resulting in a number of spellings that are difficult
to analyze. In spite of these factors, and although some problematic areas of interpretation
persist, a cogent phonological system for the documents is established.

As in all Algonquian languages, the morphological system of Massachusett is particularly
rich, and Goddard and Bragdon devote the major part of their discussion to it. Of special
interest here is their detailed treatment of the verbal morphology, with the numerous forms
arrayed in more or less easy to follow (full or partial) paradigms accompanied by extensive
comments. In contrast, the discussion of syntax is more limited, primarily because of the
small number of sentence types found in the documents. Even here, however, one finds items
of interest, such as, for example, the observation that Massachusett sentences evidence free
word order, with grammatically linked words often occurring in more than one order. This
free word order is not random, however, and the particular order chosen in a given case is
presumably due to discourse functions, such as, for example, focus or emphasis. A brief survey
of the various syntactic patterns found in the documents is provided.

Following the Grammatical Sketch are sections that greatly enhance the usefulness of the
document corpus assembled by Goddard and Bragdon. A computer-generated Word Index to
the documents contains every Massachusett word in every document, including any suggested
readings given by Goddard and Bragdon in the course of their analysis of the documents.
Each word is given with its grammatical categorization and translation, to the extent that
these have been determined. The words, minus any pronominal prefixes, are listed in
alphabetical order, with references to each document and the line number in which the form
occurs. Following the Word Index is an English Index of subjects, personal names (with
biographic information wherever possible), and place names; this serves as a general guide to
the content of the Massachusett documents. Finally, an Appendix contains translations of
several of the documents made at roughly the same time as their Massachusett originals; a
small number of documents related in various ways to Massachusett originals are also included.

In sum, this Goddard and Bragdon two-volume work is a major contribution that bears the
hallmark of extraordinarily careful and painstaking research. Thanks to its attractive, easy
to use format, it should prove of great benefit, not only to anthropologists and linguists, but
to a wide range of researchers interested in the early contact period in New England.
IN MEMORIAM: RAYMOND J. SEAMANS, JR., 1937-1989

Kathleen S. Anderson

Raymond J. Seamans, Jr., a member of the Massachusetts Archaeological Society since 1979, and a resident of Carver, Massachusetts, died on September 14, 1989, after a long battle with diabetes. He leaves his wife, Nancy (Sanville) Seamans; a daughter, Tammy L. Seamans-Tatem of Boston; two sons, Timothy R. of Middleborough and Scott O. of North Carver; two brothers, Roger Seamans of Machias, Maine and William Seamans of Carver; a sister, Judith Johnson of Hingham; his parents, Mr. and Mrs. Raymond Seamans, Sr. of Halifax, Mass. and several nieces and nephews. Ray Seamans, Jr., a graduate of Boston State College, was a retired teacher in Middleborough, a former chairman of the Carver Conservation Commission and of Carver's Water Study Committee, and had been involved in Carver youth sports. Raymond Seamans, Senior, also a member of the Massachusetts Archaeological Society, has, at our request, written the following moving tribute to his son:

"His lifelong fascination with local prehistory was appropriate; he was a lineal descendant of Roger Williams and Richard Bourne, the two best friends the New England natives ever had. He became a third generation father to share this interest with his sons. A tireless searcher of the fallows and erosions of his county, he was the possessor of a fine array of ancient artifacts. He cherished his collection for its beauty and implications, as a tangible symbol of a classic and gentle aboriginal race.

"Through years of practice he acquired a unique skill in chipping Stone Age replicas. For many of these he produced authentic hafts and shafts of bone and wood. He experimented with steatite, made wooden dishes, atlatls and pecked and ground adzes. Only primitive tools were employed in his work. He ranged far and wide for suitable materials, gathering obsidian from Wyoming, limestone from Florida, agate from Arizona, felsite from Ipswich and the Blue Hills. He was a regular at Society meetings and gave much thought to patination-depth as a possible clue in determining the age of worked stone. Quite recently he was able to help the State Archaeologist in mapping a host of Southeastern Massachusetts sites previously unrecorded.

"Buoyed by the unbounded support of his wife Nancy, he faced increasing debility with calm courage. His whole life was a great enthusiasm." (Raymond J. Seamans, Sr.)
IN MEMORIAM: ARTHUR C. STAPLES, 1900-1990

Maurice Robbins

Once again it is my lot as a senior member of the Massachusetts Archaeological Society to pen a few lines in memory of an old friend and valued co-worker.

Arthur C. Staples was born in East Taunton in 1900 and passed away in February of 1990. Arthur became a member of our society and of the Warren King Moorehead Chapter in the early days of the society. In 1951 he became a member of the Cohannet Chapter. I was fortunate to have Arthur Staples at a number of archaeological sites, among which were the Titicut Site in Bridgewater and the Wapanucket Site in Middleborough. He directed the work at the Sweet's Knoll Site, the Back Porch Site and the Bear Swamp Sites #1 and #2. He also worked with the late Roy Athearn and Dr. Carol Barnes at the Peace Haven Site. In addition to his work in the field, Arthur devoted many hours to the Bronson Museum, building cases and preparing exhibits. He also served the society as its treasurer from 1956 to 1971.

Arthur was also very active in affairs in his home town of Dighton, serving for fifteen years as a Commissioner in the Water Department and also in the Municipal Electric Light Department. He was an active member of the Dighton Historical Society and served on the local Historical Commission.

His publications include:


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IN MEMORIAM: BARKER DAY KEITH, 1908-1990

John P. Pretola

Students of New England's archaeological past lost a venerable ally on March 23 with the passing of Barker Day Keith of Brookfield, Massachusetts. Barker was best known for his salvage of Tobin Beach, an important Middlesex Complex site on the shores of his beloved Quaboag Pond. In 1965, his findings were published as "An Adena-Connected Burial Site" in the Bulletin of the Massachusetts Archaeological Society (27:1-5). Barker also
excavated at the nearby Oakholm Site and collected from a number of surface loci about Brookfield. When the Massachusetts Historical Commission rated the significance of his collection, he felt a great sense of responsibility toward preserving it for future research and exhibition. This led him to approach the Springfield Science Museum as a repository and it was at this time that I came to know him. I was impressed with his dedication to preservation and his professional approach to caring for the Commonwealth's archaeological resources. Barker was widely respected throughout the Brookfields for that reason. Born in Worcester, Barker graduated from Worcester Academy and attended Clark University. He retired after 23 years as a custodian at Tantasqua Regional High School. He is survived by his wife, Blanche and many friends who will miss him.

CONTRIBUTORS

KATHLEEN S. ANDERSON, an ornithologist, conservationist, lecturer and Founding Director of the Manomet Bird Observatory, is a new board member of the M. A. S.

GEORGE F. AUBIN is professor of French and Linguistics at Assumption College in Worcester.

RICARDO J. ELIA, is director of the Office of Public Archaeology at Boston University. He is also Adjunct Associate Professor in the University’s Archaeology Department.

DR. KENNETH L. FEDER, an Associate Professor of Anthropology at Central Connecticut State University, has been conducting the Farmington River Archaeological Project since 1979. He is the co-author of Human Antiquity: An Introduction to Physical Anthropology and Archaeology and the author of the forthcoming book, Frauds, Myths, and Mysteries: Science and Pseudoscience in Archaeology (Mayfield).

ALAN LEVEILLEE, Senior Archaeologist and Director of Educational Programs, The Public Archaeology Laboratory, Inc., is chairman of the Warwick, RI, Historic District Commission, and the father of three boys (his proudest achievement).

ELIZABETH A. LITTLE, editor of the Bulletin of the Massachusetts Archaeological Society, is also curator for archaeology at the Nantucket Historical Association.

CHRISTIAN C. MEDAGLIA received his AB in anthropology from Harvard in 1989 and lives in Newton. He is presently applying to graduate school.

PETER PAGOULATOS has a PhD from the University of Connecticut. He teaches at Rutgers University and is a Senior Archaeologist at Research and Archaeological Management, Inc., Highland Park, New Jersey.

JOHN PRETOLA has an MA in Anthropology from the University of Massachusetts at
Amherst and is Curator of Anthropology at the Springfield Science Museum, where he is involved in research and interpretation of the archaeological collections.

MAURICE ROBBINS (1898-1990), founder and first president of the MAS, sent a contribution to this issue of the Bulletin just prior to his death in June.

MARGARET J. SCHOENINGER, an Associate Professor of Anthropology at the University of Wisconsin-Madison, is director of the Paleo Diet Laboratory at U.WI.

NOTES TO CONTRIBUTORS

The Editor solicits for publication original contributions related to the archaeology of Massachusetts. Authors of articles submitted to the Bulletin of the Massachusetts Archaeological Society are requested to follow the style guide for American Antiquity (48:429-442 [1983]). Manuscripts sent to the Editor for evaluation and comment should have double spacing and margins of 3 centimeters (5/4 inch) on all edges. Authors with MAC and IBM-PC compatibles are encouraged to mail floppy disks containing their files or send them electronically in ASCII to the editor. Tables should be submitted camera-ready.

Bibliographic references should be listed alphabetically by author and presented as follows:


Several references by the same author should be listed chronologically by year. Reference citations in the text should include the author's name, date of publication, and the page or figure number, all enclosed in parentheses, as follows: (Bowman and Zeoli 1973:27) or (Ritchie 1965: Fig. 12).

All illustrations are called figures. Each figure should fit within the space available on a Bulletin page, which is 17 cm by 23 cm (6 & 1/2 x 9 inches), allowing for margins. Full, half or quarter page figures should be planned carefully. Space must be allowed for captions. Figures must be referred to in the text and are to be numbered in their order of reference, with their number placed lightly on the margins of their reverse sides. Every item in each figure and each person should be identified. All lettering must be clear and legible and have high contrast. No pencil drawings are acceptable. Photos must be glossy prints with high contrast. Scales with dimensions should be included with all figures for which they are appropriate. Captions, not a part of the illustrations, should be typed on a separate sheet in order and numbered to correspond to the figures.

Dimensions and distances should be given in metric units or in metric units and English units. If feet and inches are used, they are to be spelled out.