New Investigations of the Cates Farm Site, Vassalboro, Maine

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Introduction

The Cates Farm archaeological site (prehistoric site 38.10) is located at the outlet of China Lake, in East Vassalboro. Artifacts collected from the site cover much of the span of Maine's pre-Eur-opean occupation, from Early Archaic through Late Ceramic (Trautman and Spiess 1992; Trautman 1996). Occupations by various Middle and Late Archaic cultures appear to have left most of the artifacts.

Reconstructions of Archaic period subsistence and settlement patterns have become possible with the accumulation of relevant data (faunal remains and charcoal) in recent years (e.g., Asch Sidell 1999; Spiess and Mosher 2006), necessarily focused on interior river and lake-side sites because of the effects of sea level rise in eroding coastal sites (see Kelley et al. 2010). Harvesting of diadromous and fresh water fish (such as sturgeon, alewife, eel, and sucker) were a large part of Archaic subsistence (Spiess and Halliwell 2011), and harvesting seasonal "runs" of anadromous fish must have had an effect on settlement patterns. People camped at the right time and place to harvest the fish runs, and constructed and maintained fish weirs such as the one in Sebasticook Lake (Petersen et al. 1994).

The Natural Resources Conservation Service (NRCS) archaeological work at the Cates Farm reported here adds modest but important information that alewife were harvested at the site 4000 years ago. This is not an unexpected piece of news. But restoration of anadromous fish in the lower Kennebec River, river herring (including alewife) included, has been a focus of effort since removal of Edwards and Fort Halifax dams. In particular, restoration of the alewife run up Outlet Stream into China Lake is a current focus of multiple fisheries and related agencies, including NRCS, and non-profit groups (McGuire 2015). Restoration of alewife runs has been a state-wide priority for various groups because of the perceived benefits to Gulf of Maine fisheries, among other things (Watts 2012), but not without controversy. In fact, the identification of alewife bones in Archaic and Ceramic period sites on the Spednic Lakes of the Saint Croix drainage was cited in the Maine legislature in arguments over restoring alewife runs to the Saint Croix (e.g., Miller 2015; Arthur Spiess to Paul Bisulca, personal communication April 29, 2015). Thus, the information reported herein is confirmation of the antiquity of the alewife run into China Lake. Documentation of alewife harvesting for at least 5000 years at the outlet of China Lake provides support for NRCS's planning to restore alewife runs in the Outlet Stream by creating fish passage through several dams.

Cates Farm Site Archaeological Background

The site at the mouth of China Lake on the east side of Outlet Stream in East Vassalboro was initially assigned site number 38.10 by Dean Snow, in the 1969 initial compilation of Maine prehistoric sites. Bruce Bourque visited the site in 1976, and observed in his 5-page "Report on an Archaeological Survey of the Lower Kennebec Valley and Adjacent Areas" (Bourque 1976) that a "recheck of 38.10 …indicated extensive plowing for generations. Artifacts recovered during this period are in the hands of family members and in the Vassalboro Historical Society." At the request of the landowners, Maine Historic Preservation Commission (MHPC) did archaeological testing of the site in 1990. MHPC produced a topographic map of the site and excavated seven 1x1 m test units and three 50 x 50 test pits, recovering 51 tools, 217 pieces of debitage, and 220 calcined faunal bones (2 turtle, 5 mammal, 10 small fish including one Alosine, the rest unidentified). The details, as well as reporting of the Vassalboro Historical Society collection and family collection are presented in the previously-cited Trautman and Spiess (1992) and Trautman (1996). Excavation of almost eight square meters by MHPC revealed two pre-European probable garbage pits (Features 2 and 5). The 2014 testing reported herein used three 50 x 50 cm test pits, and encountered a third sub-plowzone feature. Thus, 8 ½ square meters of testing encountered three features. The entire site area is 300 x 150 m, with the most intensely occupied area near the outlet being about 100 m x 100 m. Extrapolating from the 1990 and 2014 testing, it is possible that there might be hundreds of features below the plowzone.

Stone artifacts in the Cates Farm collection, mostly now with the Vassalboro Historical Society, include multiple pecked and ground stone tools: adzes, axes, gouges, celts, stone rods, plummets, and at least two ground slate points (Trautman and Spiess 1992; Trautman 1996). These objects were described and reported prior to Petersen's (1991) publication of descriptions of well-dated Archaic ground and pecked stone from the Sharrow site. In retrospect, the Cates Farm collection's ground and pecked stone appears to cover the Middle and Late Archaic. Diagnostic stone points from the Cates Farm include one Early Archaic Kirk-like point, two Neville-like points, four Otter Creek points, other Laurentian Archaic points, and at least three Susquehanna Broad points (Trautman and Spiess 1992:17-34). Diagnostic Ceramic period points are primarily Early Ceramic in age. Because of the plowed deposits and limited sub-plowzone feature recovery, we do not have enough information to determine the presence or absence of the "Gulf of Maine Archaic" (which is mostly without diagnostic bifaces).

There are few sites known around China Lake or along its Outlet Stream, perhaps because of a lack of systematic archaeological

survey. However, there are also few avocational archaeologists' reports, so the raised water levels in China Lake (outlet dam) and other dams along Outlet Stream might be affecting site visibility by inundation. A couple of linear rock features that might be fish weirs have been reported in Outlet Stream (site 53.95, Doug Watts, personal communication 2014). The situation changes as Outlet Stream joins the south bank of the Sebasticook River, one kilometer upstream from the Sebasticook's confluence with the Kennebec. Within one kilometer of the Sebasticook/Outlet Stream confluence, downstream to the mouth of the Sebasticook at Fort Halifax, there are 20 prehistoric site numbers assigned. These include mostly eroded or partially eroded sites with Middle Archaic, Otter Creek, Moorehead phase, Susquehanna tradition and Ceramic period components (MHPC site files). At the Sebasticook-Kennebec confluence, under Fort Halifax, a stratified prehistoric site begins with a circa 3100-year-old occupation, overlain by multiple Ceramic period levels (site 53.35; Spiess, unpublished). Fish bone in that site includes salmon and sturgeon (Spiess and Halliwell 2011:Figure 3). Multiple sites on the Kennebec downstream from the confluence have been tested, collected and published in some cases (e.g., Spiess 1999; Spiess and Hedden 1999, 2000), including much material found when Edwards Dam was removed and the water levels returned to natural flow (Spiess 2003, 2004; Spiess and Cranmer 2000).

Testing and Analytical Studies in 2014 and 2015

In June 2014 Shaffer conducted limited archaeological testing of site 38.10 where NRCS planned to assist the Cates family with installation of a seasonal high tunnel (hoop house). Background research had indicated that site 38.10 has been the scene of avocational collecting by the family, as well as of professional archaeological survey by MHPC (Trautman 1996; Trautman and Spiess 1992). That work, as mentioned above, recovered artifacts primarily from the Middle and Late Archaic periods, while the Early Archaic, Ceramic, and historic periods were also represented. Most intensive occupation seemed to be during the Vergennes Phase (ca. 6000 – 4500 B.P.). The MHPC has found the site to be eligible for the National Register of Historic Places.

Installation of the high tunnel on the cultivated land would entail no grading or other site preparation. The only ground disturbance associated with its installation or use would be minimal: the setting of stakes to anchor the structure to the ground. Still, as a federal agency conducting a review under Section 106 of the National Historic Preservation Act, NRCS's assessment of adverse effects includes consideration of "reasonably foreseeable effects caused by the undertaking that may occur later in time …" (36 CFR 800.5.a.1). In that light, one should take into account that a high tunnel, in

Figure 1. View to the north of the cultivated ground proposed for the high tunnel and tested with a walkover and shovel testing.

the future, might include the addition of appur tenances like buried irrigation pipes that could impact archaeological resources. Accordingly, it seemed warranted to examine that part of site 38.10 where the high tunnel would be set so as to provide information for any historic preserva-tion conditions needed for installation of the farm structure.

NRCS's archaeological testing began with a walkover survey of the 30-x-72-ft (9-x-22- m) footprint of the planned high tunnel. NRCS client Chris Cates laid out the corners of the area (ca. 50 m east of China Lake's outlet stream) and noted that most artifacts had been found in previous years in the western part of this lower garden rather than in this eastern section (see Trautman and Spiess 1992: 40). The soil had been harrowed and was bare of vegetation, providing excellent visibility of any artifacts (Figure 1). The survey crew walked in parallel transects separated by ca. 2 m and found four sherds of historic ceramics. These

Table 1. Artifacts Recovered during the Testing of Site 38.10.

Provenience	Artifact/Material	Comments
Surface of proposed foot-print of high tunnel	1 body sherd salt-glazed stoneware 2 rim sherds blue-edged whiteware 1 basal sherd bone china	Stoneware 1705-1930, blue-edged whiteware c. 1830-1860, bone china 1794-present (Brown 1982; Miller 2000)
STP 5 m/Ap/0-33 cm Below Surface (B.S.)	1 nail or wire fragment 3 pieces coal 1 body sherd whiteware 1 body sherd redware 1 quartz fragment (flake?) 1 Kineo rhyolite flake	Whiteware 1820 – present, redware 19th century (Brown 1982; Miller 2000); rhyolite flake (medial – distal fragment) weighs 5.8 g
STP 10 m/Ap/0-33 cm B.S.	1 piece coal 1 rim sherd blue-edged whiteware 1 body sherd whiteware 1 body sherd glazed redware 1 iron spike	Spike 10.5 cm long
STP 10m/Feature fill/43-53 cm B.S.	Calcined bone, charcoal	See identifications by Spiess and Asch Sidell
STP 15 m/Ap/0-28 cm B.S.	1 iron spike 1 United States Winged Liberty Head ("Mercury") dime	Spike 9.8 cm long; dime minted 1919

items could date from the eighteenth through twentieth centuries (Table 1). They represent items discarded either by the Cates, who had resided at the farm since about 1830 (Cates family, personal communication 2008), or earlier occupants.

Next, Shaffer excavated three 50-x-50-cm shovel test pits (STPs) to examine the length of the high tunnel area. He measured in these pits down the centerline of the high tunnel, with the first at 5 m south of the northern end and the other two at 10 m and 15 m south of the northern end. Accordingly, the test pits

were designated "STP 5m," "STP 10m," and "STP 15m." The spacing of the excavation pits would provide sufficient areal coverage of the tunnel's footprint. The three NRCS test pits are located just east of the "lower garden" as mapped by Trautman and Spiess (1992:Figures 4 and 6). The NRCS test pits are approximately 30 m east of the 1990 N260 E100 and N280E100 test units that located Features 2 and 5, respectively. STP excavation by hand shovel proceeded by soil horizons and, for the subsoil, by 10-cm levels within them. At the base of the plowzone, the floor of the test pit was troweled and examined for cultural features. Digging continued at least 10 cm into the subsoil till artifact-free soils were encountered. Excavated soil was sifted through ¼-inch mesh hardware cloth. Artifacts were collected according to STP and level. Recordation of the STPs involved compiling maps with global positioning system points and triangulation to nearby farm buildings, drawing STP soil profiles, noting cultural finds, and taking appropriate photographs. NRCS will curate these records and other survey notes in its State Office in Bangor, Maine. Processing of identified artifacts from the test pits and surface collection entailed cleaning prior to analysis and storage in acid-free polyethylene bags labeled with provenience. The landowner will retain the artifacts.

Excavation of the STPs revealed Ap horizons ranging from 28 to 33 cm deep. These plowzone soils were of 10YR3/2 (very dark grayish brown) very fine sandy loam. The underlying B horizons were also of very fine sandy loam, while colors ranged from 10YR4/4 (dark yellowish brown) to 2.5Y5/3 (light olive brown). Test pit excavation continued down to depths generally of 42 or 43 cm below surface. These soils are consistent with Scio very fine sandy loam, the sediment mapped for the project area in the Kennebec County soil survey (Faust and LaFlamme 1978). Scio very fine sandy loam soils are found on sloping or gently sloping terraces adjacent to streams and natural drainageways. The soil can be wet in the spring and during periods of heavy precipitation. The soils are free of stones, and nearly all have been cultivated at one time, but the Scio soils are used mainly as woodland and for hay and pasture (Faust and LaFlamme 1978).

The Ap horizons of the three STPs yielded several historic artifacts and a smaller quantity of prehistoric material. Historic items included ceramic sherds dating from the nineteenth to twentieth centuries, a United States "Mercury" dime of 1919, coal, a nail or wire fragment, and iron spikes. With respect to the prehistoric period, excavations found one flake of Kineo rhyolite and a chip (flake?) of quartz (Table 1). No artifacts were recovered from sifting the B horizon sediment.

Importantly, troweling of the top of the B horizon soils revealed a feature (later designated as Feature 2014) in STP 10m. Feature

2014 first appeared at 33 cm below surface as an indistinct darker area. Further excava tion of the B horizon to 43 cm below surface showed this stain to become more defined along the western wall of the STP (Figure 2). A relatively thin rock sat on edge to the immediate east of the stain. The position of this rock may indicate it served as a form of site "furniture." Earlier excavations by Trautman and Spiess (1992:11) elsewhere at the site found that the base of a garbage pit (Feature 2, dated to 5000 ± 70 BP) sometimes rested on clusters of burned rock slabs. Following photography and scale-drawing of the newly identified feature, Shaffer excavated its dark soil and bagged it for more detailed analysis. The feature's fill consisted of 10YR2/1 (black) silt loam with a greasy feel. This dark fill continued down to a depth of 53 cm below surface, making for a shallow pit at least on this edge of the feature (Figure 3). It is possible the feature is deeper to the west. A profile view of Feature 2014 reveals that some intact B horizon soil covers the feature (Figure 4).

Processing of Feature 2014 began with flotation of 3.1 kg of moist fill in a clean tub with water, agitation of the fill with a plastic rod, and recovery of a light fraction from the water's surface with a clean brass testing sieve (no. 60 mesh or 250 micrometers). The non-floating heavy fraction was placed on 1 mm mesh hardware cloth and water-screened. Following drying, the fractions

Figure 2. STP 10m (50 x 50 cm) with the surface (in the B horizon) at 43 cm below surface and the dark feature along the west (left) wall.

Figure 3. STP 10m with feature fill removed from the floor (in the B horizon) at 43 cm to 53 cm below surface (north at top). Note standing rock adjacent to feature.

Figure 4. STP 10m's western wall profile following removal of the feature's fill.

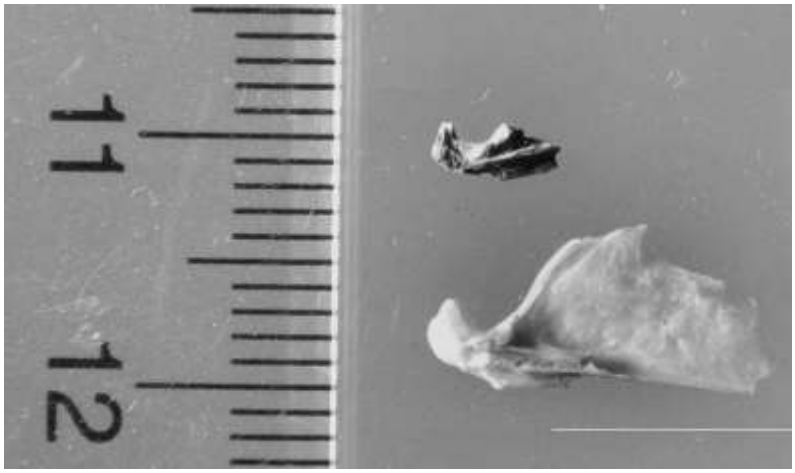

Figure 5. The calcined alewife bone (top) and a modern comparative specimen (cm scale).

were examined for cultural materials. No artifacts were identified, but biological items were present: one or two calcined bone fragments and several pieces of charcoal.

Spiess analyzed the calcined bone and succeeded in identifying one as the mouth apparatus from an alewife (river herring; *Alosa pseudoharengus*). Adult anadromous alewives swim up streams in early May to early June and spawn in lakes and ponds. Surviving adults swim downstream to the sea afterward; and young alewives head seaward from July to November. Fish-eating birds and a range of other fish and mammals prey upon alewives. Human consumption of alewives taken from Maine's river fisheries declined relative to other fish species in the twentieth century; commercial demand for the fish is high, however, as lobster bait (Maine Department of Marine Resources 2012).

The bone from the feature fill in NRCS STP 10m is a calcined (burned) fragment of the left angular bone (part of the jaw apparatus) of an alewife (Figure 5). Bone does not survive for long after burial in Maine's acid, interior soils unless it has been calcined. Moreover, alewife bone is generally quite delicate, and few pieces of the skeleton would be expected to survive in archaeological context (see Spiess and Halli well 2011:5-7 for calcination etc., and Figure 3 for images of delicate alewife bone). Only a few skeletal

elements of alewife seem to be "hard" enough to survive to be recognizable in calcined archaeological assemblages: some vertebral centra (backbone central parts), the round portion of the pro-otic bulla (ear bone at base of skull), and limited portions of some of the jaw apparatus. The hook-shaped portion of the angular bone found in the NRCS STP 10 feature fill is one of these. The angular bone is paired, and this one happens to be a left-side specimen roughly 2 x 4 mm in size. Calcination shrinks bone by 10 to 30%, accounting for the slightly smaller size of the archaeological specimen (Figure 5).

There are three closely related Alosine fish species that would yield a similar bone (Spiess and Halliwell 2011): alewife, blueback herring (*Alosa aestivalis*), and shad (*Alosa sapidissima*). The shad is noticeably larger (about 2x linear dimension) than the other two species. Mixed schools of river herring (blueback and alewife) begin their spawning migrations on Maine's lower rivers and streams, but the blueback herring (usually, 10% of the beginning of the run) drop out and do not proceed as far upstream as the inland lakes where the alewife spawns. Thus, the Feature 2014 bone is identified as alewife or blueback herring based on size and morphology, but it must be alewife based on inland location.

Nancy Asch Sidell analyzed the carbonized plant remains recovered by tub flotation of the Feature 2014 fill. The sample was very small--consisting of only 0.137 g of "dirty" charcoal fragments larger than 0.5 mm. Visual inspection (rather than sieving the fragile specimens) determined that only ten wood and one possible bark fragment were larger than 2 mm (Table 2). Uncarbonized plant remains were assumed to be more recent inclusions and were not tabulated. For the ten tiny wood charcoal fragments in Feature 2014, the transverse section was first studied at 30X magnification after manually breaking the charcoal to obtain a clean section. The red oak group specimens were easily identified at that magnification. The cherry specimens were also viewed on a tangential section at 400X to confirm the presence of diagnostic irregularly-spaced spiral thickenings on the vessels. The white pine radial section viewed at 400X had characteristic window-like cross-field pitting and lacked dentate ray tracheids, which distinguishes it from red pine and pitch pine.

Table 2 also includes wood identifications from Features 2 and 5, which were analyzed in 1990. In those features, 20 fragments of wood were identified from each sample using a magnification of 30-70X. The larger sample size in Features 2 and 5 revealed an even greater number of wood types, including beech, birch, pine, red oak group, ash, and sugar maple. Red oak group includes only northern red oak (*Quercus rubra*) in Kennebec County (Maine Forest Service 2008).

Table 2. Carbonized Plant Remains from the Cates Farm Site.

Feature	2	5	2014	Total
Square	N260E100	N280E100	STP 10m	
C-14 date (BP)/Affiliation	5000+/-70	Late Archaic	3640+/-30	Late Archaic
SAMPLE WEIGHT (g)				
>2 mm	5	0.98	n/a	
0.5-2 mm	1.17	0.50	n/a	
Total	6.17	1.48	0.137	
SAMPLE COMPOSITION (>2 mm ct.)				
Wood	422	95	10	
Bark	27	-	1	
Pitch	10	13	-	
Rhizome	1	-	-	
Unknown	7	3	P	
Total >2 mm	467	111	11	
WOOD IDENTIFICATIONS Count				
Acer saccharum, sugar maple	1	1	-	2
Betula spp., birch	1	7	-	8
Fagus grandifolia, beech	8	3	-	11
Fraxinus spp., ash	6	-	-	6
Pinus spp., pine	-	7	-	7
P. strobus, white pine	-	-	1	1
Prunus spp., cherry	-	-	4	4
Quercus spp., red oak group	4	2	5	11
Total	20	20	10	50
PLANT COMMUNITIES				%
Northern hardwoods (sugar maple, birch, beech)–**white pine**				58.00
Bottomland forest (ash)				12.00
Oak (northern red oak)				22.00
Disturbed woods/thickets (cherry)				8.00
Total				100.00

Notes: P = present in 0.5-2 mm charcoal.
Features 2 & 5 analyzed 3/20/1991; Feature 2014 analyzed 4/17/2015.
Identifications by Nancy Asch Sidell.

The analysis of wood charcoal from Cates Farm site (Table 2) revealed a mixture of wood types in all three features, indicating that the nearest available deadwood was likely used for everyday campfires. Classifying each genus or species according to its usual habitat (Asch Sidell 2002), the data suggests that a mixture of plant communities grew at the outlet of China Lake between 4000-5000 B.P. The assemblage was dominated by northern hardwoods including northern red oak. The Cates farm site is outside of the present range of most southern species such as hickory, black oak, scarlet oak, and bear oak. The site may be on the edge of the northern distribution of pitch pine, white oak, and American chestnut (Maine Forest Service 2008), although none of these wood types were identified at Cates Farm site.

Given the calcined alewife bone in a small feature with associated charcoal, radiocarbon dating of the deposit was warranted to establish the date of harvesting fish at this site at the outlet of China Lake. Accordingly, Shaffer submitted a sample of the Feature 2014 cherry wood charcoal to Beta Analytic for accelerator mass spectrometry radiocarbon dating. The material was subjected to pretreatment with acid/alkali/acid. The analysis yielded, after correction for total isotopic fractionation effects, a conventional radiocarbon age of 3640 ± 30 BP (Beta-413738). Two sigma calibration using the 2013 INTCAL program found probability ranges of Cal BC 2130 to 2085 (Cal BP 4080 to 4035) and Cal BC 2045 to 1930 (Cal BP 3995 to 3880). The dating indicates that Native Americans were harvesting alewives probably at Cates Farm site around 4000 years ago during the Late Archaic period. This date of 3600 radiocarbon is within the probability range of the earliest Susquehanna tradition occupation of Maine, after the end of the Moorehead phase.

Discussion and Conclusions

Testing of the footprint of the planned high tunnel confirmed the presence of significant archaeological resources of site 38.10. The single rhyolite flake was found mixed with historic artifacts in the plowzone. However, a pit feature (Feature 2014) provided information on site occupation and its biological materials offered significant data on the site's economy and dating. With regard to the NRCS conservation practice, installation of the high tunnel would entail minimal impacts: the driving in of anchoring posts. This action should have no adverse effect on site 38.10, *conditional* upon there being no other sub-plowzone disturbance within the footprint of the agricultural structure.

Beyond the outcome of the historic preservation review, the recent testing of the Cates Farm site has added significant information to knowledge about Late Archaic environment and subsistence. At 3600 radiocarbon years ago (about 4000 calendar years), a probable

Susquehanna tradition group of people at the Cates Farm were harvesting the spring alewife run, and firing their hearth with wood from nearby trees that included red oak, cherry, and white pine. (It is possible that an adult alewife was caught from the lake during the summer, before they returned to the sea. However, it is most likely by far that the bone marks harvest of the concentrated spring spawning run into the lake.)

MHPC Feature 2, a probable Vergennes phase large garbage pit (Trautman and Spiess 1992:40),is radiocarbon dated 5000 ± 70 B.P. (Beta 44175); and the charcoal (Table 2) includes beech, ash, red oak, birch, and sugar maple . Feature 2 yielded 171 fragments (2.3 grams) of calcined bone, of which two were identifiable as muskrat (*Ondatra*), one as alewife or shad, and eight are unidentifiable small fish (ibid.: Table 2, p.13). MHPC Feature 5 yielded three calcined bones that could be identified: large mammal, small fish, and turtle carapace. Feature 5 charcoal included pine, birch, beech, red oak, and sugar maple (Table 2). Thus, during the Late Archaic at the Cates Farm, people were harvesting fish runs, other aquatic animals (turtle, muskrat), and hunting larger mammals, in a hardwood-dominated forest.

The Maine forest cover at European settlement is known (at some level of detail) from surveyors' records of the trees they encountered as they laid out township lines, so-called "witness trees" (Barton et al. 2012:56-66). At 1770-1800 A.D. (roughly), the uncut forest cover in the Waterville–China area fell within the "Northern Hardwood 2" type (ibid. 62-63). Northern Hardwood forests were dominated by spruce, beech, and hemlock, with yellow birch, sugar maple, white pine, and red oak. However, the townships of the lower Kennebec River valley immediately adjacent to the south fell within a "Southern Oak–Pine" forest cover type dominated by beech, white pine, hemlock, red oak and white oak. The boundary between these forest types was quite abrupt, characterized as an ecotone (Barton et al. 2012:63). It could be speculated that warmer climate during the Middle and Late Archaic may have been characterized by a more northerly extension of a tree association like the "Southern Oak–Pine" forest. However, the analysis of wood charcoal from three features at the Cates Site did not recover any evidence of "southern" species. The presence of cherry wood in Feature 2014 is an indicator that there may have been openings or disturbed areas in the forest around 4000 BP. The ubiquity of red oak wood in all three features suggests that acorns could have been a food source; however, the absence of charred acorns may support the idea that the site was occupied in the spring during the alewife run rather than in the fall when the acorns would have been harvested.

While it would take many charcoal identifications from many Native American fire hearths to "track" the changes in the prehis-

toric forests of Maine in detail, data such as these can contribute to understanding ecological change over time. Similarly, animal bone distributions, especially fish, record change or continuity in animal species distributions as the forest cover changed and as water levels and temperatures rose and fell.

Acknowledgments

We appreciate that Chris Cates has been very supportive of the archaeological investigations and other historic preservation studies conducted as part of the NRCS high tunnel project. MHPC funded Asch Sidell's archeobotanical identifications of the charcoal. We thank David Halliwell for comments improving the manuscript. NRCS Maine's State Conservationist Juan Hernandez arranged for funding the AMS radiocarbon dating. Amanda Burton of NRCS Maine assisted with the fieldwork. Trade names are used solely to provide information. Mention of a trade name does not constitute a guarantee of the product by the U.S. Department of Agriculture nor does it imply endorsement by the Department or the Natural Resources Conservation Service over comparable products that are not named. The USDA is an equal opportunity provider and employer.

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