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Contents

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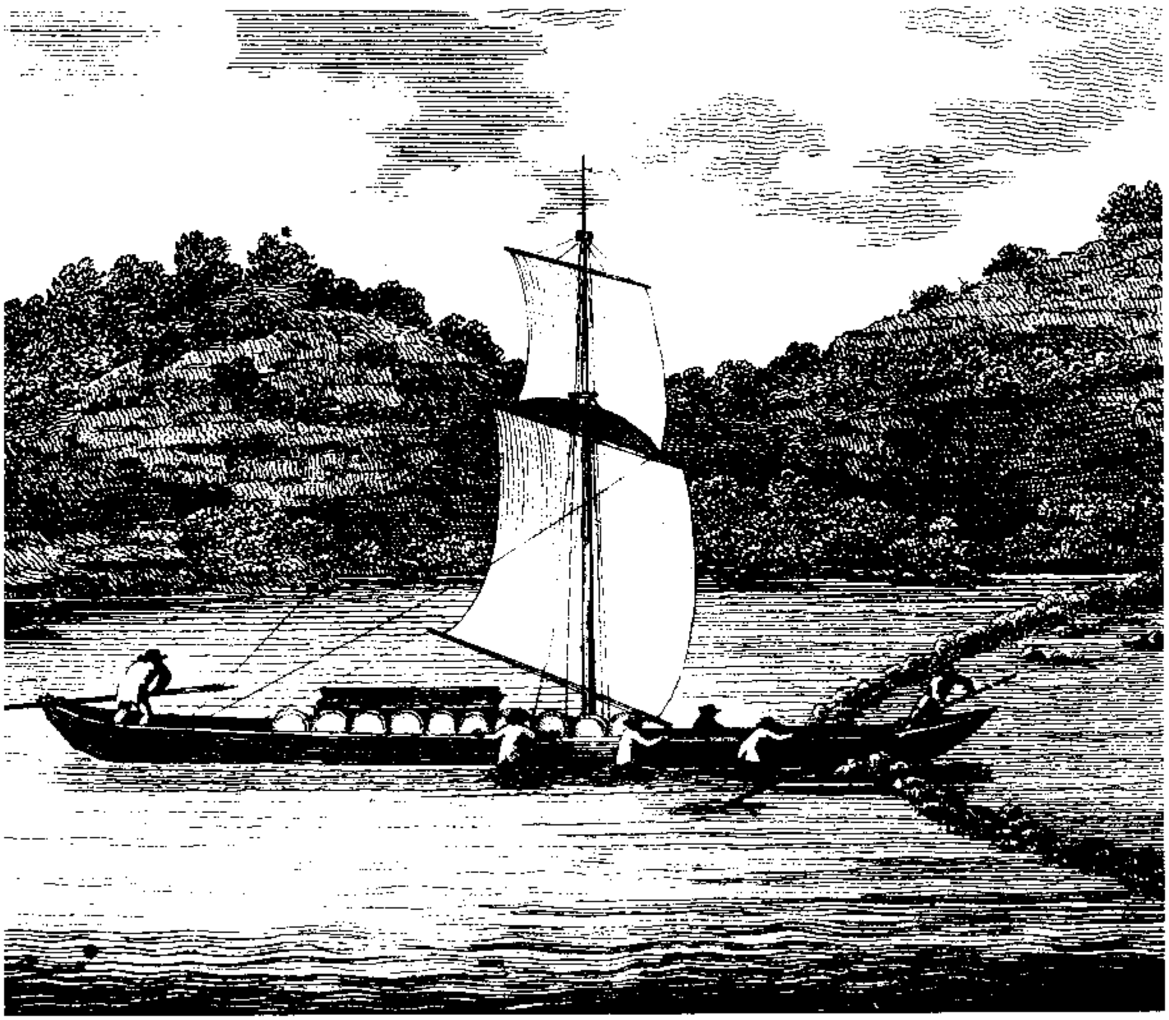

Navigating on the Mohawk River.

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The Wing Dams at Snouk's Rapid: A Proto-Lock on the Mohawk River

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In the quarter century before the opening of the Erie Canal, a private canal company improved Mohawk River-navigation by constructing rock wing dams on numerous rifts. The dams were patterned after eel weirs built previously by Native American inhabitants and others. One complex of such navigation dams, recorded in 1803, approximates in design and function a true canal lock.

Since prehistoric times, the Mohawk River has been the major link in a chain of inland waterways that reached between the upper Hudson River and the Great Lakes. During the latter half of the eighteenth century, this navigation network connected the Atlantic trade port at Albany with the Great Lakes port at Oswego and permitted the westward expansion of settlement, areas of resource production, and markets for manufactured goods, after the Revolution.

This transportation system was not without its limitations, however, and during the closing decades of the eighteenth century, these became increasingly problematic for the developing nation and state. The necessity of a land road between Albany and the Mohawk River port at Schenectady to avoid the Great Cohoes Falls, the carry around the lesser falls at Little Falls, and the Great Carrying Place at Rome between the Upper Mohawk and the head of navigation on Wood Creek, all produced delays, inconvenience, and excessive cost, and severely limited the size and capacity of the vessels used in the system. In addition, seasonal periods of dry weather and the numerous shallows present in these inland waterways restricted the length of the navigation season, often unpredictably, thus placing at risk the profitability of any inland shipping and forwarding enterprise.

All this difficulty was resolved with the building of the Erie Canal, completed in 1825, which joined the Atlantic port at Albany with the Great Lakes port at Buffalo with one, continuous slack-water channel designed to both insure and prolong the navigability of the inland route. Today, the modem Barge Canal, built in the 1920s,performs the same function, following for most of its alignment east of Rome the old Mohawk Valley corridor of the eighteenth century, often utilizing the river itself, just as did the bateaumen over 200 years ago.

However, the building of the Erie Canal in 1825didnotmark the true beginnings of the era of artificial channel navigation. A quarter century earlier, a private enterprise, The Western Inland Lock Navigation Company, undertook improvement of the natural waterways by constructing artificial ones which were substantial as engineering experiments if yet modest in their scope. These improvements included the cutting of thirteen short "canals" across narrow necks of land along Wood Creek in 1793, the construction of a mile-long canal at Little Falls in 1795, the building of a 1.7-mi canal at the Carrying Place at Rome in 1797, a 1.1-mi canal at German Flatts in 1798, and construction of four wooden locks on Wood Creek in 1803.

In addition to the creation of such completely new, artificial works, this company also undertook to improve the natural waterways themselves, clearing trees, rocks, and debris from the channel. In the Mohawk, the special character of that river prompted something else to be created, something which combined natural channel improvements with artificial construction, and something which, while totally new from a navigational perspective, was based on a technology exceedingly ancient.

The Mohawk River in the late eighteenth and early nineteenth centuries was characterized by shallow waters whose depth fluctuated dramatically with the seasons and whose course was obstructed by over 90 distinct rifts or rapids. These rapids ran the gamut from mere shoals over which a boat could pass with only moderate difficulty to minor falls of such magnitude that boats had to be unloaded and dragged overland to continue their passage. The most significant of these latter obstructions was the rapid at Little Falls, so-called as a lesser version of the great falls at Cohoes, and equally as impassable in spite of its small size.

Many of these rapids included boulders and rocks, while others consisted primarily of stones and gravel tossed up into bars and shoals by the violence of the river during periods of peak flow. Spring meltwater "freshets," often carrying quantities of plowing ice that scoured out portions of the riverbed or diverted the flow around dams of ice blocks and gravel, represented the major force at work on these channel formations.

The most impressive of the rapids could be found immediately downstream from the inlets of numerous streams and small rivers that intersected the Mohawk from either side. The debris flushed into the river from these streams each spring tended to be driven a short distance downstream by the flow of the Mohawk, and then to be thrown up into bars and islands.

This process is described with some insight in a contemporary source.

> May 18. 1794... I observed along our route, that the rapids were all formed at the mouths of creeks. by the stones and -ravel, which these streams when swollen and overflowed by the melting of the snows, sweep into the river, where they pile up and form bars. These can not be carried away by the

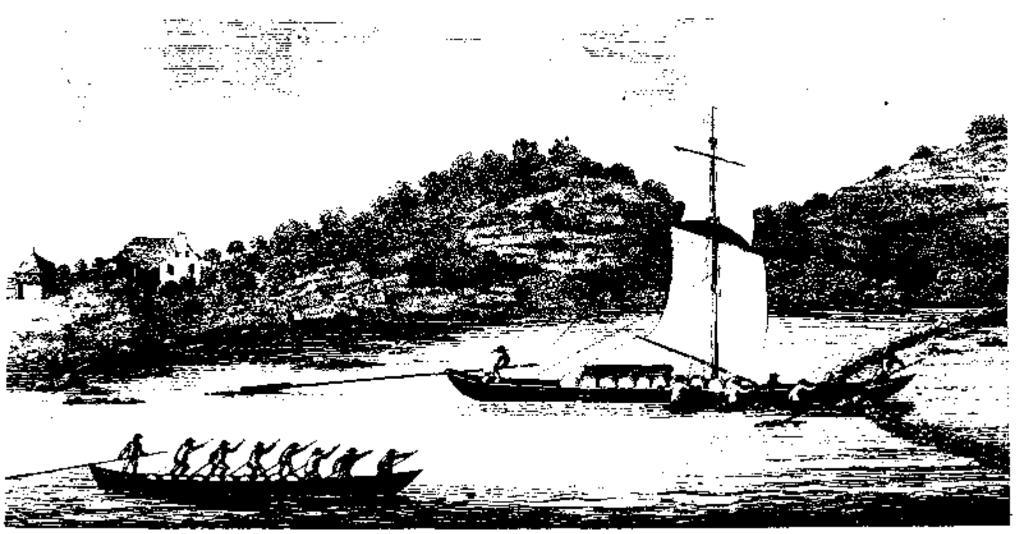
> main current of the river, since, as the water subsides, the force of the current is lessened, and soon ceases to move these materials further. The formation of islands is due to the same cause. They begin by rapids, which bring down new deposits of rocks, gravel and sand each year, which gradually heap up to the level of low water, and finally of high water, when plants and aquatic shrubs find root and grow. These form a lodgement for mud and sand, which every freshet brings down, and for these reasons we always find islands at the foot of the rapids of rivers, and below the mouths of creeks. The rapids and islands are always proportioned to the force and volume of the confluent waters [Pitcher 1985:56-57].

These deposits either forced the river over such shallows that passage became difficult, or divided the channel into so many minor courses that none was of sufficient depth to carry a vessel.

The principal craft plying the Mohawk during the late eighteenth century were bateaux of between one and two tons capacity, about 30 ft long and 5 ft wide. These flat-bottomed boats had pointed ends and flaring sides, as well as a raking bow and stem, all designed to provide lift over the rapids. Propelled by poles and oars, or sails if conditions permitted, and steered by a long oar at the stern, such boats required only a few inches of water to navigate. Late in the eighteenth century, and more prominently during the pre-Erie decades of the nineteenth century, a larger craft of essentially the same basic design began extending its range westward from the boatyards of Schenectady toward the ultimate goal of the Great Lakes. The "Durham boat" was to the bateau what the 18-wheeler is to a pick-up truck today and the implications for improved and more profitable commerce and transport are analogous as well. Being up to 60 ft long and only 8 ft wide, such vessels could carry over 12 tons while drawing less then 2 ft of water fully loaded (Figure 1).

To accommodate these larger vessels, and to extend the navigation season for these as well as the smaller bateaux, the Western Inland Lock Navigation Company undertook the construction of "wing dams" at several of the shallower rapids in the Mohawk River. These dams consisted of little more than lines of rocks, taken directly from the rapids on which the dams were to be constructed, and piled up to form a "V" in the riverbed, with a gap at the apex. This V-dam had its openings facing upstream and was built high enough to contain the water that normally flowed over the rift. As passage for the largest boats in service on the Mohawk at that time only required 24 in of water, a dam of less than three ft in height would be more than adequate to the purpose. In letters transmitted to Albany during his field survey of the Mohawk River in 1803, Benjamin Wright suggests a height of only "12 or 16 inches and "16 or 18 inches" for some of the new wing dams he recommends to improve several Mohawk River rifts (Wright 1803a). As the normal depth of water at the rapids to be improved was, therefore. under 18 in, one can visualize how easily workers at the rift could stand in knee-deep water to draw and pile the rock for these constructions.

The effect of these wing dams was simply to force water that was normally widely distributed across the surface of perhaps a 200-ft broad rapid into a central gap, often no more than 10 ft wide. The resulting swell could raise the water level significantly. In addition, as the bow of the boat, running upstream, was drawn



A View of the Boats & manner of navigating on the Mohawk River.

Figure 1. This 1810 engraving captures an eyewitness image of a Durham boat passing one of the Mohawk wing dams in 1807.

into the gap at the downstream apex of the "V," the water passing the gap would swell an additional amount, thus giving ample float for passage. Running downstream, with the current, a swell would also occur, although the maximum lift would probably not occur until the boat was well into the gap.

In design, these navigation dams adapted a technology almost as ancient as the river itself, namely that of the aboriginal, and later colonial, fish trap or "weir." Such fish traps were not only similar in design and construction to the navigation dams but they apparently coexisted with them on the same river. Wright records some sort of linear rock dams on 12 of the 91 discrete rapids he maps in 1803. Only one set of these is labeled as a navigational "wing dam," 3 others are probable wing dams, 3 (or more correctly, 3 sets of dams) are labeled "eel wares" and an additional 5 (again sets of dams) can be assumed to be eel or fish traps (Wright 1803b).

If we compare two contemporary descriptions of these weirs with a description of the navigation dams, we can readily see similarity.

> These waters abound in catfish, salmon, bass, eel, and corperals, all very fine, and fat. They are caught in eel weires, formed by the Indians thus:- Two walls of loose stones are thrown up, obliquely descending across the river, to a point, where they are taken, at a small opening, in baskets, or eel pots [Watson 1820:39].

> Eels are found here in the greatest abundance, and are the finest and largest that ever I saw. They have an invention for taking them similar to our eel-pots, but made very, large, and requiring no bait. These are always set in a strong current, either at the inlet or outlet of a lake, or on some swift part of the stream upon the rivers. Two ridges of stones arc piled up in the manner before described on the Mohawk river, at the lower end of which the pot or basket is set. I was present when one of the baskets, which had been set over night, was taken up: it filled two barrels, and the greater part of the eels weighed from two to three pounds each [Schultz 1810:21].

> The Mohawk is by no means dangerous to ascend, on account of the slowness of the boat's progress: but, as it is full of rocks, stones and shallows, there is some risk in descending it of staving the boat: and, at this season, is so low as to require it to be dragged by hand over many places. The channel in some instances is not more than eight feet in width, which will barely permit a boat to pass by rubbing on both sides. This is sometimes caused by natural or accidental obstructions of rocks in the channel: but oftener by artificial means. This, which at first view would appear to be an inconvenience, is produced by two lines or ridges of stone generally constructed on sandy, gravelly, or stony shallows. in such a manner as to form an acute angle were they to meet, the extremities of" which widen as they extend up the river; whilst at the lower end there is just space enough left to admit the passage of a boat. The water being thus collected at the widest part of these ridges, and continually pent up within narrower limits as it descends, causes a rise at the passage: so that where the depth was no more than eight inches before, a contrivance of this kind will raise it to twelve; and, strange as it may appear, a boat drawing fifteen inches will pass through it with safety and ease. The cause is simply this; the boat, being somewhat below the passage, is brought forward with considerable velocity, and the moment it dashes into the passage, its resistance to the current is such as to cause a swell of four or five inches more, which affords it an easy passage over the shoal [Schultz 1810:7-8].

It would seem that the only difference in design between these two types of river rift construction would be that those built for navigation had the gap left open for passage, while those built for harvesting fish had a basket or other container inserted into the gap. It would seem that either dam type could function as a navigation aid, and one might imagine more than one frustrated boatman driving his vessel through the basket of eels at the end of a strategically placed weir when no other passage could be seen. It is possible, however, that the navigation dams were built more watertight, as their purpose was to create a pool of deeper water above the dam, while the eel weir needed only to deflect the migrating fish toward the trap at the end of the dam, letting excess water pour freely between the rocks.

It is noteworthy that on several of the dammed rapids recorded by Wright in 1803, the navigation channel, designated by a dashed line and the word "channel," avoided these "eel wares" and followed what must often have been a lesser flow of the river to avoid entanglement in the fish traps. One early account states:

> A log house occupies the site of the fort, and its occupant has piled up stones and gravel in a triangular form, almost entirely across the river, and at the point is a opening where there is fastened a willow basket called an eel weier. These structures almost entirely destroy the navigation, and although forbidden, yet in these wilds there are none to see that the laws are carried into effect [Hough n.d.:7].

Navigational wing dams were probably initially built in the Mohawk channel by the Western Inland Lock Navigation Company (1792-1821) as one of their earliest endeavors. While it seems reasonable to expect that some application of this technique may even predate that company, it appears not to be the case. The first report of the company, made after a 1792 survey of the river, states: "Several of the rapids might be deepened by erecting small stone dams, nearly across the river, leaving a passage for boats..." (O'Callaghan 1850:1091).

A nineteenth-century regional history, in recapitulating the evolution of eighteenth-century, Mohawk River navigation, also appears to confirm the identification of these constructions with the Western Inland Lock Navigation Company.

> In the riffs a channel was made by throwing out boulders which were in the way. In time the line of deepest water became defined and all the riffs came to be named and were land marks in the itineraries of travelers. The efforts of the boatmen during a century were furthered by the "Inland Lock and Navigation Company," which built a series of wing dams on all the riffs. They were usually crude affairs and intended only to serve their office in low water. These wing dams-collections of stone which were dragged from the channel and arranged in the shape of a V, the wings stretching over the shallow from the shore to the centre, where there was a narrow outlet. The effect of this was to throw what water there was into the centre of the stream and float the boat. Then by dint of wind and muscle-sail and poles, and men towing at a long line, the boat was hauled over the rapid into stiller water again and so pursued her joumey [Pearson 1883:423].

We know that as late as 1803 discussions for continued improvements of the Mohawk rapids by the building of new dams, or the expansion of existing ones, were still underway. The somewhat informal nature of these works, being less of an engineering feat and requiring less material or human resources than actual canals and locks, seems to have mitigated against the detailed recording of the completion of these dams, and the historic record suffers from lack of their documentation.

The best evidence we have for the location and design of these wing dams and the scope of this type of Mohawk channel improvement project remains the series of maps of the Mohawk River created by Benjamin Wright in 1803. Wright was commissioned to make a survey of the Mohawk Valley, recording existing features and identifying a potential route for the construction of the proposed Erie Canal. As the most advantageous alignment for that canal lay in proximity to the Mohawk River, Wright's survey encompasses the entirety of the river and records in some detail the terrain adjacent to the river. Although it was not essential to his task of plotting a land route for the new canal, W right has taken pains to record all the rocks, rapids, and channel obstructions in the Mohawk from Schenectady to Rome. On a number of these rapids he has drawn and identified various types of low rock dams (Figure 2).

On map "No. 5" of the series, Wright illustrates 4 mi of the Mohawk channel from about one mile above the Schoharie Creek junction to about 3 mi below. Almost dead center within this drawing we see a chain of islands of various sizes around which the Mohawk braids its channel for over a mile. Certainly such a division of the channel must have reduced the depth of water in any one of the passages much below what would have been required for navigation, and the presence of rapids and shoals here appears to confirm that.

In what appears to be the main channel, and across a rapid opposite a pair of buildings attributed to a "Snouk." a complex of

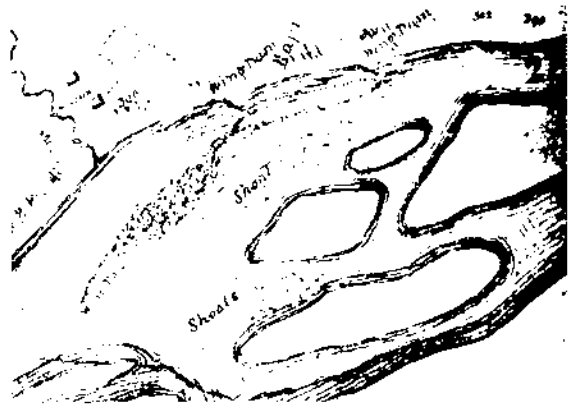


Figure 2. A p ortion of Wright's 1803 survey.

rock dams can be seen, labeled in three places "Wing Dam." This is the only place on the Mohawk River where Wright uses the term "wing dam," a term specifically attributed to navigation structures in use at that time.

In his letter reports, written during the field survey for his 1803 map series, Wright describes verbally numerous details about existing features in the channel, among these the various rock dams illustrated on the maps. For only one of these is some chronological context given, and fortuitously for the very complex of dams we are discussing. "Near Mr. Snouks the Cl. Company formed some dams some time ago. The upper one ought to be lengthened considerable and the lower ones the channel cleared out so as to make deeper water and draw more current this way" (Wright 1803a) (Figure 3).

It is very probable that these are the same dams noted in a report prepared by Philip Schuyler the year before. III surveying the stretch of river "between Schohara Creek and Schenectady," he makes reference to "the wing dams made in 1799" and suggests that these "require to be compleated and several others made which were then not attempted" (Schuyler 1802).

Although it is rendered with minute and somewhat sketchy inkwork, we can reconstruct the structure created here by the Western Inland Lock Navigation Company and recorded by Wright in 1803. The system of dams appears to take advantage of the natural north bank of the river as well as a small rock or gravel bar at the upstream end of a cluster of islands. The first (moving downstream) wing dam extends into the broad natural channel to capture and deflect flow into the navigation channel north of the rocky bar. Why the dam was not extended completely across the river to divert all of the flow into the navigation channel is not clear. Apparently Wright was puzzled by this as well as he states that this dam "ought to be lengthened considerable..."

Passing northward of this dam and the rocky bar, one next encounters a typical V-dam like that described in early accounts. A short distance further downstream a second, almost identical, V-dam is encountered, but this one having the hint of a downstream extension below the gap. An unmistakable line of rocks connects the two V-dams in a line parallel to the shore and defines

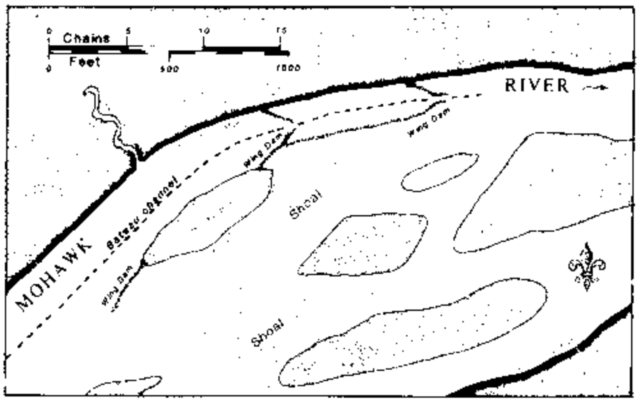


Figure 3. This site plan reveals the wing dam complex opposite Snouk's homestead on the lower Mohawk.

the deep water channel along the edge of a shoal to the south. Since it is unlikely there would be a desire to deflect water coming across this shoal away from the navigation channel, we can only assume the function of this wall was to prevent water already diverted into that channel from spilling away to the southward between the two V-dams.

This linear dam may have been nothing more than an artifact of the removal of rocks from the proposed navigation channel, much as a farmer creates stone walls from field-clearing activities. However, it would have functioned, by intent or de facto, as a retaining wall, helping to maintain the pool being created above the lower V-dam by preventing lateral spillage. In essence, then, a "chamber" has been created in which a pool of water is being contained, or more correctly, detained. That chamber is bounded on the north by the riverbank, on the south by the rock wall joining the two V-dams, and on the east and west by those dams themselves (Figure 4).

In this configuration we may be seeing a primitive version of a canal lock, both in terms of design and function. A true canal lock conducts the vessel from high to low water, or vice versa, through three flat water levels, the middle one moveable, controlled by two completely closeable gates that alternately stop the flow. These locks are usually positioned at or adjacent to the sites of falls or rapids in the natural river, where a descending terrain causes the water to fall at an unacceptable pitch for navigation.

The lock structure in effect throws a dam across the stream, creating a slack-water pool that is at the height of the upstream end of the rapid. Below the lock structure the river continues to run at the level of the downstream end of the rapid, fed by flow over the dam spillway. Vessels are conducted between these two levels by the raising and lowering of water within the lock chamber-in effect an intermediary slack-water pool-controlled by the coordinated opening and closing of the watertight gates at either end of the chamber.

The "proto-lock" construction, represented by the wing dam complex at Snouk's rapid, conducts the vessel across the rift through two open-ended, partially slack-water, pools, main

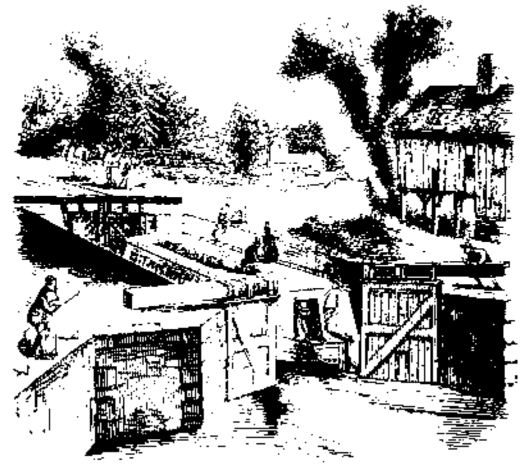


Figure 4. A lock on the Erie Canal, c. 1830.

tained as swells behind incompletely closed walls or dams. Because the proto-lock structure has no moving parts, it must remain open at the apex of each dam in order to afford the boats passage. Instead of two fixed levels at either end of the rapid, as in a true lock, with the middle one raised or lowered to match the end level wanted, the dam complex uses these swells to produce a series of intermediate levels through which the boat passes, thus dividing an otherwise steep and shallow rapid into a stepped series of sloping pools.

Details on surviving rock dams are rare for New York State waters, and virtually nonexistent for the Mohawk River after about 1820. Some historic eel weirs on other rivers in New York State (Figures 5 and 6) have survived long enough to be measured and suggest a construction technique that involved building a compound of interconnected or immediately adjacent V-dams spanning the river from bank to bank. If we look on Wright's map, just upstream from the wing dam complex at Snouk's, we see just such a configuration.

Except by extrapolation from Wright's maps, precise dimensional data are sorely lacking. The average length for each arm of one non-Mohawk New York weir, observed in 1890 and believed to be fairly typical, was cited as 200 ft with a dam height of only 2 ft (Powell 1894:549). Another such weir, mapped by Wright in 1803, still existed on the Mohawk at the Caughnawaga Rift near Fonda as late as 1890, when it shows up in a drawing by Rufus Grider (Grider 1900:19), but no data are given nor is it even identified for what it was.

However, a reconnaissance of the Potomac River in Virginia, made twenty years after Wright's Mohawk survey, preserves for us very detailed descriptions of several navigation dams and mentions the employment of parallel walls to line the channel below the V-dam, a structural configuration suggested by Wright's sketchy drawing of the Snouk's rift area. As these Potomac constructions are already being described as "ruins" in 1823, we may assume they are contemporaneous with the late eighteenth-century dams of the Mohawk.

Figure 5. The Hick's family eel weir on the Delaware River. October 1992.

Figure 6. Abandoned eel weir on the Delaware River similar in scale to the Mohawk River dams of 1803.

They consist in low dams running across from shore to shore, elevated about 18 inches or two feet from the bottom and made of rounded stone picked up out of the bed of the river, of a size that a man can conveniently handle, the greater part not larger than a man's head, and raised on a broad basis of from ten to twenty feet in width. This transverse low wall or dam is usually connected with two walls about the same height, but built on a narrower basis of from six to eight feet placed parallel to each other, and to the shores, at the distance of 20 feet from each other, through which passage, by a gap in the transverse dam, it is intended to force the current of the river and to deepen the waters by collecting it into this artificial channel. The number of these transverse walls, connected as stated, with 20 feet sluices on the river, is very great, but it was not thought necessary to count them. Indeed, in such a state of ruin were the greater part of them found that they were difficult to be distinguished from the numerous fish dams found along the whole course of the river [Briggs 1823:10].

Surviving in an environment free of the erosive impact of spring ice flows, many of these early Potomac River dams can still be seen today, and so afford an opportunity for modem study long since lost in the Mohawk channel.

A 1969 archeological study of "fish traps" on the Potomac (Strandberg and Tomlinson 1969:312-319) provides a detailed look at 36 surviving examples of this technology. Unfortunately this is a "photo-archaeological" study, relying on aerial photographs without field reconnaissance, so we do not have data on the heights of dams or the size of stones used in construction. We do have data on dam length and find that most had wings that were less than 200 ft in length, with some being less than 100 ft long. Because the author provides no insights into the possibility that sonic of these "fish traps" may have been remnant navigation works, and in fact does not even suggest knowledge of such possibility, we cannot know if we are seeing the modern survivors of this earliest of navigation aids.

The dam complex at Snouk's rift drawn by Wright has wing dams built on a comparable scale to those cited above, being each less than 200 ft long. To some extent this length is controlled by the narrowing of the channel here, imposed by a substantial rocky bar opposite Snouk's establishment.

In plan and scale this complex appears to be a gargantuan precursor of the wood and stone lock structures being built by the Western Inland Lock Navigation Company during the last decade of the eighteenth and first decade of the nineteenth centuries. Such locks had an average chamber length of 72 ft and width of 12 ft, while the "chamber" of the "proto-lock" at Snouk's rapid is approximately 858 ft long by 165 ft wide. While this structure is about 12 times larger than the true locks being built by the company, the ratio of length to width in both cases is about 6 to l.

Whether this late eighteenth-century double win-dam complex at Snouk's rapid represents some sort of primitive application of true lock technology or merely exhibits a coincidental design, it remains possibly the earliest and most interesting example of this type of navigational aid in New York's inland waters, if not in all of the Northeast, and certainly the best documented of its class.

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Dryden Lake Recreation Area Project

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The Town of Dryden, Tompkins County, New York, was awarded a New York State Parks grant for development of a multi-purpose park on the west end of Dryden Lake. Archaeological study, as part of the requirements for receipt of the grant, was carried out in 1989, through SUNY College at Cortland. This cultural resource study was a cooperative effort between the college archaeological field school, cultural resources contracting personnel, and members of the Dryden community. Location of a prehistoric archaeological site and protection of it through modification of park plans demonstrated the value of close interaction and cooperation between archaeological personnel and planners of the town and village involved. Paid and voluntary support from State personnel, historical societies, Scouting personnel, and other community members illustrate what can be accomplished with relatively limited funds.

Introduction

The purpose of this paper is to show an approach to cultural resource management that might be applied in a variety of contexts. It offers ways to use project methodology and results to educate the public about what contract archaeologists do, how they do it, why they do it, and how the results benefit everyone on both the short term and long term.

While this particular case study, the Dryden Lake Recreation Project, located in the Town of Dryden. Tompkins County, New York, is not the only project in which these kinds of per sonnet and methods have been used, it serves as an example of a project that gained positive publicity and public interest. The interest was from diverse angles and has continued to generate cultural resource-related concern. Because of the level of local public attention, cultural resource factors have remained in the forefront of on-going plans of the Town of Dryden to expand their recreation area and to consider such resources as they plan other types of projects within the Village of Dryden and the Town of Dryden.

Cultural resource management has stirred up controversy among those required by law to include archaeological studies in their project proposals. It is controversial within government, at local, state, regional, and national levels, where personnel must understand and deal with the regulations for such project studies. Professional archaeologists who undertake contract projects of this type, as well as professional archaeologists who do not do so have encountered numerous questions and ethical issues about them from one another and from outside the discipline of anthropology. From time to time the public has found fault with the regulations and with their implementation. Professional, popular, and newspaper reports criticize the existing regulations and guidelines. Reports of such work, generated by archaeologists for the agencies hiring them, may be meager-looking or lacking in any "important archaeological finds," while at the same time, they may have cost as much as other reports that have presented information on "significant archaeological finds."

From within anthropology, archaeologists who do not undertake cultural resource contract projects in some cases perceive their colleagues who do as less research oriented or less concerned for archaeological research questions as the focus of their studies. Preparing a sampling design to fit State or Federal guidelines for a project area that consists of many miles of a narrow corridor of land may be the requirement for a contract project. The search is for potential cultural resources of any and all types that are present and that might have significance and cultural integrity. Significance and cultural integrity are judged by the State or Federal personnel whose job is to make that determination rather than by the archaeologist who has provided the evidence. The contracting archaeologist provides only the data, following guidelines prepared by others, and any determination of site significance will depend upon that researcher's skill in reporting and the ability to provide convincing proof of the site's eligibility for National Register nomination.

Generation and application of any and all research questions in this setting will be dependent upon this factor as determined by set criteria and set evaluators. The decision about archaeological importance and site value, as well as the fate of the site itself, will he in the hands of those in the governmental office where determinations of eligibility are made, not in the hands of the contract archaeologist.

Despite often grandiose research and sampling designs, a project area, or series of them may yield negative results from the standpoint of many people. Time and money went into the project, yet there are no sensational new cultural resources to report. There are no outstanding new contributions to the understanding of the human past to share. Contracting firms may heave a sigh of relief; archaeologists may be able to complete their project reports without the agony of controversies over artifact repositories, plans for follow-up studies, or concerns about how mitigation of impact on the sites they found will fit their preferences. The construction project may proceed without a hitch. However, those who begrudge the costs of such studies or requirements for them may express frustration about such expenditures or contempt for regulations that force them to have a study like this done at all. To find no cultural resources that require consideration may seem to them a waste of money and time for frivolous purposes.

The project reports, fulfilling the guidelines of the regulations set by Federal and State agencies, tend to be somewhat uninspiring reading matter. While many, if not all, may be available for public study, the procedures to gain access, the format of the reports, and the publicity or lack of it may limit their distribution. Sometimes this suggests suppression of information about a project. On occasion, there may be efforts to downplay results of a study or the nature of the project itself. This may be due to potential problems of site vandalism or to legal aspects of a project, including land ownership or procedures for land acquisition.

Whatever the factors, cultural resource management project reports do not achieve wide public readership. Indeed, they are not acquired very easily by other contractors in some instances (Patterson 1992). Sometimes this problem of access has been written into a contract and relates to the ownership of data until the final report and its parent environmental impact report have gone through channels and have received governmental approval. Sharing information in the interim, without permission of those involved, may be irresponsible. From the outside, it may seem like concealment of public information.

If the reports are of limited readership, and/or if they indicate that no cultural resources have been located during the project, are they of limited significance to archaeology and to the general public? Answers to this question vary. Archaeologists assert that negative evidence for human activity in an area tells something about the environment, the needs and desires of the humans who may have been in the vicinity, the historic situation, the nature of the sampling system used to make the determination that nothing is present, the nature of the project area or study area, and chance. As more and more parcels of land are modified, opportunities for gathering information diminish. Not all modifications are preceded by any archaeological consideration, no matter what the archaeological potentials of the tract of land may be.

To decrease the extent and speed of natural and cultural resource loss. State and Federally funded projects have been placed under the protection of an assortment of laws and regulatory guidelines. Once in place and once applied, those affected by the legislation may react differently from the way they responded earlier to hypothetical examples of the value of such requirements.

Complaints about the regulations and the cultural resource reports that are products of these may be valid in some instances. Report circulation, not to mention concern that vital research data present in project reports may languish undisseminated in a governmental file, are problems that need to be addressed.

There have been a number of efforts to do something about some of these difficulties. The New York Archaeological Council (1985-1986), an organization of professional archaeologists in New York State, has worked with the State Historic Preservation Office to compile a bibliography of contract reports prepared for in-state projects. This document has been updated from time to time and is sold to anyone who wishes to acquire it. Access has been limited by the lack of publicity about it, partially the result of meager funding for advertising. The Council and State personnel have provided some advertising through their networks with project engineers, historical societies, and other local or regional organizations within New York State.

A file of archaeological sites located by Council members during contract projects and of sites volunteered for inclusion by others was generated for New York State. In the initial stages of this project, 1974-1980, there was some enthusiasm and mutual cooperation. As more cultural resource management contracting developed, problems of site protection and site information access increased as did costs of information exchange. Personnel with special interest in this computerized system moved out of state, and the system reverted to a regional or institutional one, not a statewide one.

Other Council projects included a student research paper prize to be awarded annually for a student paper based on cultural resource project data. This award was an effort to demonstrate potential broad applications of data gained from such projects. College student participation and usage of these data were viewed as useful for their training and for broadening the ways in which contract information could be applied in research.

A statewide U.S. Geological Survey quadrangle map sampling study of archaeological resources was undertaken, under joint sponsorship of the New York Archaeological Council and the New York State Division for Historic Preservation (McDowell-Loudan and Loudan 1977a), to document all known prehistoric cultural resources within specific quadrangles across the state. This was part of a State Plan for better understanding and management of cultural resources. Its purpose was to suggest directions for broadening the database and protecting cultural resources at the State level.

In 1992, the Council, in cooperation with other groups including the New York State Museum and Science Service and the State Historic Preservation Office, instituted an annual Archaeology Week. All across New York State, archaeologists presented public talks, tours, and workshops on cultural resource management projects and other archaeological topics. One purpose was to demonstrate what archaeologists do and why. Some of the programs were geared to dissemination of information gathered in contract projects carried out in the region in which the program was given. They offered people the Opportunity to comment and question those who had been involved in such projects, while showing that there were no attempts to hide the results of such studies.

Programs of this type have become more and more common in areas where cultural resource contracting has generated controversies and interest. They have served as a means for showing what the public can gain from this type of work and how the information gathered can be integrated into school classes, historical society offerings, public programs, and even tourist attractions. The Dryden Lake Recreation Area project is an example of this kind of application.

Case Study: Dryden Lake Recreation Area

After several years of planning and preparation, the Town of Dryden, located in the center of New York State in eastern Tompkins County, was awarded a New York State Parks grant in 1988. Through partial funding by the State, this type of grant assists communities with the modification of their land for a variety of public uses. In the case of the Town of Dryden, the proposed recreational area has been planned as a multi-staged one. Funding from the State in 1988 was limited to monies for two segments of land, referred to as Parcel A and Parcel B, located on the west shore of Dryden Lake. A third segment, Parcel C. is adjacent to these and is located across West Lake Road from the other two on State Land (McDowell-Loudan and Loudan 1989). The parks grants are awarded and administered by the New York State Office of Parks, Recreation and Historic Preservation.

Plans for Dryden's recreation area included the creation of nature trails: the upgrading of an existing boat ramp; the construction of ball fields: the addition of picnic, rest room, trash collection, and parking facilities; and the installation of signs that would inform visitors of what they might find. Of interest to the Town of Dryden planners were archaeological sites, both prehistoric and historic, as potential features for their park.

The two parcels of land involved in the first phases of the project consisted of 35 acres of woodland, swamp, open brush. lake shore, and badly eroded, rocky, sparsely vegetated hillsides. In one area at the southernmost edge of the park, remnants of an abandoned railroad bed bear mute testimony to changing transportation needs of the area (Lee 1977:56: Palmer 1974:30-31).The bed is that of the 1869 Southern Central which was later taken over by Lehigh Valley Railroad in 1895, only to be leased to the New York State Department of Transportation for Conrail usage in more recent times. Today, the tracks are gone, and the railroad bed near Dryden Lake and extending into the Village of Dryden is ash-, mud-, and weed-filled. The Dryden park planning group hopes to develop the railroad bed as a bike trail eventually connecting the Village to the park itself. This they perceive as an attractive addition to the recreational facilities and to the recognition of the railroad beds history.

Presently, access to the park is possible from East and West Lake roads. There are dirt trails in some portions of the two parcels, some of which the Town hopes to improve for more environmentally sound usage. Trails in areas that are being damaged by trail bikes or motorized vehicles may be modified to discourage that activity.

A major focus of the Parks grant proposal is the protection of the native vegetation in certain areas of the project area. Development of trails for instructional purposes where a variety of microenvironments can he observed is part of the plan.

Under New York State law, a State-funded project of this type must include an archaeological evaluation. This study must be carried out before modification of the project area occurs, and it must be evaluated by State personnel in advance of the actual park construction activities.

McDowell-Loudan was contacted by Michael Lane, Mayor of Dryden, Gina Prentiss, Dryden Historical Society, and Thomas Niederkorn, Planning and Environmental Research Consultants, to arrange for this archaeological study. In 1989, under contract with the Town of Dryden and with the administrative support of the State University of New York Research Foundation, Cortland College Office, McDowell-Loudan and Loudan executed a Phase I Reconnaissance and Literature Search for Archaeological Potential, as required by New York State Law. Following guidelines for such archaeological studies, checks of State and local sources of data and a surface and subsurface field inspection were carried out to determine what archaeological resources might be present.

Contacts with personnel in Dryden and elsewhere in Tompkins County had been made during earlier research for contract projects and for work related to research in adjacent Cortland County. Among these earlier projects were a literature search for sewer expansion in the neighboring Village of Lansing (McDowell-Loudan and Loudan 1977b), a Town of Lansing housing development literature search and reconnaissance (McDowell-Loudan 1988), and a multi-stage archaeological study for sewer expansions in the Town of Dryden (McDowell-Loudan and Loudan 1981-1984).

In 1985, as part of an archaeological presentation for the Dryden Historical Society, an informal inventory of artifactual materials found by local collectors was compiled. The information gained during that meeting served as an aid to this new project. Requirements for the archaeological report that must be submitted to New York State, include a Report for Archaeological Potential and a Report of Field Reconnaissance as outlined by the New York State Department of Environmental Conservation in 1985. If archaeological sites are located, there are forms for reporting the sites which are submitted to the New York State Museum and Science Service, Office of Archaeology, as well as to the New York State Division of Historic Preservation.

To carry out the necessary field work for the Dryden Lake Recreation Area project, McDowell-Loudan and Loudan worked with one paid crew member to make a 35-acre walking inspection and preliminary plan for appropriate subsurface sampling intervals. The goal was to determine what subsurface testing units would provide maximal coverage and efficiency of study for this tract of land. Town of Dryden personnel, including Historical Society members, the Village Mayor, and the Town Supervisor, were enthusiastic about McDowell-Loudan's supplementary plan to incorporate this project into her 1989 archaeological field school training project. This arrangement offered the opportunity to provide wider coverage of the subsurface areas tested, while keeping to a minimum the funding that would be required to gain this coverage. A major purpose of the development of this recreation area was to broaden outdoor facilities for instruction and recreational activities. The idea of on-site archaeological study, providing the opportunity for local elementary and secondary schools to observe what occurred and contributing to the SUNY College at Cortland's Field School in Archaeology for no additional cost to the Town, was well received. Since this contributed supplementary materials that went beyond the minimal guidelines required by the State, the Town of Dryden was delighted to agree to this mutually beneficial plan of research.

A literature search and survey of all known repositories of data yielded one known archaeological site thought to be located within the project area's 35 acres. Despite all the fascination about the site and its reputation as Dryden's major archaeological Native American site, little specific information could be located. Many of those who were said to have known about the site were deceased. Records and artifacts collected by people like Cornell University's Erl Bates, an ethnologist from the 1930s and 1940s, appear to have been lost in a fire in facilities housing the now defunct Southern Cayuga Lake Archaeology Society (Robert DeOrio 1977, personal communication).

The only existing information, including that on file at the New York State Museum, is found on the 1938 New York State marker located beside West Lake Road, south of the bridge over the Dryden Lake outlet. The marker states: "Indian Camp: Hunting and Fishing Grounds on Dryden Lake. Arrows, Sinkers and Flint Abound in Great Numbers." Robert E. Funk, Senior Scientist at the New York State Museum, stated that files for this site and those with similar markers in Cortland County of the same general dates, appear to have been destroyed in a fire in Albany's facilities. The artifactual materials that were in that repository were lost as well (Funk 1977 and 1989, personal communication).

Another mystery surfaced when McDowell-Loudan's memory of the location of the historic marker appeared to be faulty. In 1989, when a windshield survey of the project area and vicinity was undertaken, the marker was not where it was remembered to have been in the 1970s. Indeed. it was located in an area almost 0.5 mi south and west of the remembered spot. Despite numerous inquiries, it was not until the Fall of 1989, after the Dryden Lake Recreation Area report had been submitted, that it was learned that a local farmer had moved the marker to stop people for tramping around in his fields as they surface collected artifacts from the site. The new sign location was on the edge of a swampy dumping area which discouraged trespassing and bore no visible connection with the archaeological site itself.

Fortunately, the field school students and contract crew had located evidence of prehistoric activities in the field adjacent to the earlier placement of the marker, right where McDowell Loudan had remembered it to be. It was in this northwestern segment of the project area, the one designated Parcel A, that the 1989 SUNY College at Cortland Archaeology Field School centered its study.

The site, 35 TO 20, consists of most of the cornfield at the northeastern end of the project area in Parcel A. Starting at East Lake Road, at an elevation of about 1,190 ft above mean sea level, the field slopes south toward the lake. Current plowing patterns expose an irregular rectangle, approximately 650 ft north-south by 450 ft east-west. In the northwestern quarter of the field, there are spots where water bubbles out of the ground. From these spots, water drains west and south into a swamp, creating erosion channels in the field along the route. The northern one-sixth of the field is rocky and fairly flat and yielded fewer artifacts than did areas to the south. To the east and south, an area was mechanically stripped to the surface of the subsoil. This stripped area of the site corresponded with the locations of buried pits. The pre-stripping surface elevation in that area was about 1,180-1.185 ft above mean sea level. To the south, the remaining section of the field was systematically surface collected in an effort to determine the locations of artifact concentrations. In this area, plowing tended to be deeper and more irregular with deep dead furrows in the lower elevations (approximately 1,175 ft above mean sea level). Initial test excavations were carried out in the southern end of the field, where clusters of lithic debitage and fire-cracked rock had hinted that there might be buried cultural features. No definitive features were located in this lower portion of the field before steady rains for several weeks terminated the excavations in that wet area.

The field school crew consisted of five college students, both undergraduate and graduate. The work they carried out was coordinated with the systematic shovel-test excavating of the paid crew, Loudan and Heath. All personnel were under the direct supervision of McDowell-Loudan. Field work occurred from May 22 through June 30, 1989, and processing of the data, as well as library research and informant interviews, were carried out throughout the period of May through July, 1989.

Due to a lack of consistent site designation for many counties in New York State and the loss of information that occurred when fires damaged some of the repositories, the archaeological site found during the 1989 survey at Dryden Lake has been labeled 35 TO 20. Probably it is the site designated by the State marker. To date, no new designation has been given by New York State to identify the site differently.

A total of 421 test pits were investigated. Areas within roadways, swamps, and rocky outcrops were excluded from testing. Each pit measured 12-18 in. in diameter and was excavated by shovel and trowel as deeply as possible to determine soil stratigraphy and to determine the presence of artifacts or buried features. These shovel-test pits were 50 ft apart and were laid out in a grid that covered both Parcel A and Parcel B of the Dryden Lake Recreation Area. Within Parcel A, forty-three 5-ft-by-5-ft squares were scraped to the surface of the subsoil within the area that had been determined, through surface survey and shovel-test pits. to yield artifacts that might reflect buried cultural information. These squares were shoveled and troweled, and all soils were screened through 1/4-in mesh sifters. Seventy-three 10-ftby-l0-ft squares were surface-collected to provide a controlled collection for use as a guide to other potential buried cultural materials and to supplement other .sampling methods.

All recovered prehistoric materials and a preponderance of the historic materials came from the cornfield in Parcel A. The fact that other areas had not been exposed through plowing the way the cornfield had been may have influenced the quantities and distribution of artifacts found in the survey. However, the meticulous surface inspections and shovel-testing throughout the entire 35 acres of Parcel A and Parcel B appear to support the artifact distribution reported here.

The prehistoric artifacts consisted of approximately 500 fragments of chert debitage, as well as 6 projectile points and 5 tips, 3 scraping tools, 1 drill tip, 5 hammerstones, 1 net sinker, 28 ceramic sherds, and more than 700 lb of fire-cracked rock. Details of these materials are reported in McDowell-Loudan and Loudan (1989). Nowhere else in the excavations were diagnostic artifacts found within the excavated units in contexts that were not plow mixed. The diagnostic projectile points were surface finds.

The small sample of potentially diagnostic projectile points provides some general boundaries for analysis. A large chert projectile point, possibly a lance or spear point, although broken, appears to fit the type category called Otter Creek, dated elsewhere to 3_500-2500 B.C. (Ritchie 1980:84-89). Alternatively, it might be a large Meadowood variant, a point style characteristic of the early Point Peninsula (Point Peninsula I) cultural complex from approximately 2448 B.C. (C-794, Libby 1954:137 in Ritchie 1971:35), to 563 B.C. (M-640, Crane and Griffin 1959:183 in Ritchie 1971:35). Both artifact types have wide geographic distributions and tend to have been manufactured from local lithic materials. Both have been found on sites in Central New York as well as in Ontario, Canada, and in Ohio, Pennsylvania, Vermont, and further afield, according to Ritchie.

Because of the presence of two other projectile points that fit criteria for Brewerton side-notched points, the Otter Creek affiliation for the aforementioned point seems likely. According to Ritchie (1971:40-41), Otter Creek points have been found on sites attributed to the Brewerton complex of Central New York, Robinson Site. Onondaga County, for example, and both Brewerton and Otter Creek points occurred on the Vermont sites where Otter Creek points were found first and given their type names (Vergennes complex of the Archaic Laurentian on Otter Creek).

A lobate stemmed point, Lagoon. Rossville, or Adena-like perhaps, and a rounded isosceles triangular point do not fit any of the type descriptions or specific ranges of variation for point type guidelines presented by Ritchie and others in the typology (Ritchie 1971). It may be that these specimens, as well as the Brewerton-like ones, have been resharpened and broken to the stage where their original contours have been blurred too much for concise identification. Suggesting Rossville affiliation for the lobate stemmed point would place it in a Late Archaic or Early Woodland time and cultural frame, about 800 B.C. to A. D. 800. This date, correlated with the morphological features, would fit Adena or Lagoon placement. This tool styling is an example of broad geographical and temporal extent of cultural usage of certain stylistic features. It serves as a warning that one should not become too narrow in focus when trying to reconstruct the interaction spheres of archaeological sites within a county, state, or region.

The isosceles triangular shaped projectile point may be of Levanna affiliation, although its attributes do not fit Ritchie's examples closely (Ritchie 1971). Norris (1969) noted examples of Owasco culture, including Levanna-type points, in artifact collections from the Dryden Lake area when he made his study of Indian trails and traces. The single example from 35 TO 20, a surface find, has a straight base and rounded contours which are inconclusive. Dates from sites of Owasco cultural materials where contexts could be radiocarbon dated, began about A.D. 1070±60 years (Y-1534) at the Roundtop Site, in Endicott, Broome County, New York, and A.D. 1100 ± 100 years (Y-1173) at the Maxon-Derby Site, located l.0 mi east of Jordan, Onondaga County, New York; Owasco seems to merge into Iroquoian groupings about A.D. 1310 ± 95 years (I-2399) at the Nahrwold No. 1 Site, 1.0 mi south of Middleburg, Schoharie County, New York (Bradley 1987: 210; Ritchie 1980: XXIV-XXVI, 274-275). So far, the ambiguous artifacts from Dryden Lake's 35 TO 20 do not seem to reflect the transition to identifiable Iroquoian groupings.

The remaining fragmentary point or drill tips lack diagnostic attributes. While their lithic material and shape hint that they could be characteristic of Levanna points of Owasco culture, neither these artifacts nor the single chert end scraper are definitive of this connection.

As noted previously, there were modifications to the planned sampling of the cornfield area (35 TO 20) due to weather conditions. The summer of 1989, especially in its early half, was exceptionally wet. The topography of the field where excavation occurred included a gradual slope south and east to the lake. Artifactual materials, both historic and prehistoric, were more frequent on the surface, in the lower portions of the field, corresponding with the deeper plowing and dead furrows in some cases and deeper deposits of slope wash in other cases. These areas became increasingly wet, making excavation impossible in some instances.

Under these conditions, intensive controlled surface collection of 10-ft-by-l0-ft squares was carried out to make use of data on the surface. Also, after each rain storm the upper reaches of the field were inspected for newly exposed clues to buried features, and all artifacts and discolorations found were plotted on the site map. It became evident that more rain was predicted and the lower parts of the field could not be excavated further during the five weeks of the field school; this necessitated an alternative approach. In a portion of the field that was upslope (north and slightly east) from the earlier excavations, where surface indications included fire-cracked rock and chert flakes. a backhoe was used to strip off the plowzone in an area designated the North Strip. This rectangle measured 20 ft north-south by 50 ft east-west and was girded into 5-ft-by-5-ft squares, each of which was scraped to the surface of the subsoil with trowels, exposing a series of fire-reddened and ashy gray discolorations. Screening of-soils was carried out once the features were exposed. A number of features, some containing charcoal for possible radiocarbon-dating, were located, plotted, photographed, and excavated. Not all were free of rodent disturbance, but in two cases, there appeared to be prehistoric burned features in which grit-tempered pottery, some with exterior cordmarking, was found. This may provide a clearer indication of one set of occupants at the site during the Woodland Period, probably Owasco affiliates.

The historic artifacts found were scant. Except for a small clear glass salt dish and an ambiguous bit of glazed ceramic, which might pre-date 1900, all other materials appear to represent 1970s and 1980s debris. Amongst these materials are a bent tire iron, glass fragments, aluminum foil, a nail, and plastic wrap. These materials as well as all the prehistoric artifacts were found in Parcel A. It seems probable that the historic materials arrived at the site as part of the material in the manure that was spread in early days of the field school program. Some of the historic materials were products of discard by hunters and fishermen who cross the field to reach the lake shore.

Discussion and Recommendations

A number of positive factors are represented by the Dryden Lake Recreation Area project. Among them has been the enthusiastic support of and interest in the archaeological part of the project by the Village and Town officials. The project had been in the planning stages for at least a decade, and there had been efforts to involve as many people as possible in the plans. McDowell-Loudan had been invited to speak at the schools from time to time about her research in nearby Cortland County and about what might be relevant to the eastern portion of Tompkins County. Informal discussions of the ideas for the park had occurred while research for the sewer project was under way. At that time, a booklet outlining walking tours within the Village of Dryden had been offered as an illustration for possible use when the lake's recreation area was developed. There was enthusiasm about incorporating archaeology into a set of environmental guide books or trail-side signs.

In 1985, when the Dryden Historical Society arranged for a talk on local archaeology and invited those who came to bring artifacts for identification and recording by site, if possible, there was a large turnout of adults, children, including elementary school classes, and Boy Scouts. A number of artifacts were brought for identification, although provenience was unknown in most cases. Several people arranged to provide information at a later date, and some of them have been helpful since that time.

The idea of an archaeological field school on a site near the Village was raised, and there was interest in such a possibility. The planning preparation for the park grant from New York State had hit a snag, however, and many aspects of the project were on hold at that time.

Between 1985 and 1988, there were informal information exchanges, but the park grant proposal was stalled. The local historical society, however, was continuing its preparations, one of which was the publication of a guide to barns located around Dryden Lake and its vicinity (Prentiss 1988). Data about the history of these structures and their age were valuable to the archaeological study in 1989.

As soon as the park grant was awarded, the archaeological portion was placed high on the priority list by the Town personnel. Every effort was made to provide information, necessary names, services, and access approvals for going onto the lands to McDowell-Loudan. The efficiency of response demonstrates what can be done when aspects like archaeological studies are treated as logical and significant segments of a project rather than relegated to the last-minute nuisance category.

News of the project, while kept to a level that avoided potential site damage, did reach people who provided positive reporting for the Tompkins and Cortland county areas. Wider reaching publicity included an article in Lapidary Journal in December of 1989. Its editor came to the site for the last two days of field work as participant and reporter (Berk 1989).

What are the results of the study? A significant prehistoric site was located. It is one that had been identified and marked in the 1930s, but it was never studied with any degree of scientific control. No significant historic sites that might be endangered by creation of a multi-purpose park were found. Conveniently, the limits of the prehistoric site appear to correspond with the cornfield in Parcel A.

According to the Dryden Recreation Area proposal, a roadway along the eastern edge of the cornfield was planned to provide access to a parking lot plotted at the south end of the field near the lake. These two planned modifications were located within the apparent bounds of the prehistoric site's major concentrations of surface materials. The preparation of a roadway and gravel parking lot would damage these and adjacent potentially sensitive segments of the site that had not been delineated during the 1989 study clue to swampy conditions and time constraints.

The variety of prehistoric artifacts and their ambiguous distributions suggest there were separate activity areas present in the field. These might correlate with the specific groups present at a particular time. More study is needed to make such distinctions. The nature and distribution of artifacts suggests that slope wash transported some lightweight materials downhill south and slightly eastward. However, there are also concentrations of heavy and light artifactual surface materials which seem to reflect separate use in several parts of the cornfield.

Recommendations for the site included changes in plans for parking and the roadway. More archaeological study of the field to document all its prehistoric components and leaving the field untouched were suggested as alternatives. If additional excavations were the chosen option, areas where the road, parking area, and other subsurface disturbances would occur needed thorough study. More mechanical stripping and screening of the subsoil, mapping of subsurface features and their contexts, and sampling of soils in the features, for flotation and other tests, would be appropriate. Charcoal samples for radiocarbon-dating, if possible, would be informative. To gain the maximum amount of artifactual material from the site, the plowzone should be screened, and all archaeological material in it should be analyzed, in at least some large sampling areas. The Town of Dryden chose to seed the field, omitting the proposed roadway and parking area from their plans.

Sub-plowzone features were not evident from artifact and soil color indications on the surface in many cases. In part, this may be due to plowing activity and slope wash. Other factors may be the depth of the features, the dispersal of materials as manure is spread, and the creation of artificial color changes resulting from the spraying of fertilizers and other chemicals. Some upland areas of the field are very rocky. Such obstructions result in irregular plowing, which can create misleading color changes on the surface that do not correspond with buried features.

The literature, local informants, and the 1989 field study point to a multi-component prehistoric site, strategically located near Indian trails, where groups of Native Americans exploited local resources from time to time over several thousand years. Despite years of plowing and surface collection by artifact hunters, evidence in the form of material culture from several time periods before the arrival of Europeans in the area continue to turn up on the ground surface.

This suggests that site usage may have been fairly intensive and that subsurface features may still remain in the field, relatively intact, despite plowing activity. The discoveries of a set of such subsurface features in this study indicate that although some are truncated from plowing, a portion remains intact. Loss of other potential information of this type at this site would be unfortunate when there is an opportunity to retrieve or protect it for future study. If construction activity demolishes it now, the decision to try to find out more about the past cannot be made in the future.

Facts, inferences, and speculations about the Dryden Lake area are tantalizing. While Owasco cultures Levanna-style projectile points were said to be common finds at the Dryden Lake Site in the past, and while the New York State marker reports a "hunting and fishing ground" there, the 1989 study added other dimensions. It yielded artifacts and buried features from other time periods and perhaps for other kinds of activities, including tool making and repair as well as cooking.

In buried, possibly datable contexts, pottery was recovered at the site. While pottery does not rule out hunting and fishing as a major focus of attention, it does suggest that cooking or pottery making activities and the presence of farming people as well might be factors for consideration.

These prehistoric people may have vi sited the lake shores for hunting, fishing, and plant-gathering, as well as for farming-related tasks. Perhaps this was a meeting place for family bands who converged on the location to share its diversity and an opportunity to socialize.

In early historic times, the area near Dryden was known for brick-making, according to Harford historian, Mary Anne Negus. Sources of clay for the purpose are available nearby, and similar sources might have been exploited for the manufacture of prehistoric pottery.

Michael Lane, Mayor of the Village of Dryden, noted that a source of cash for local residents in the 1800s was the burning of wood charcoal for production of potash for sale. He wondered whether any of the discolored areas within 35 TO 20 could be attributed to that historic activity. This is another focus for future archaeological consideration within the park area.

Prehistoric settlement patterns are not understood thoroughly in Central New York for many time periods. Additional study within the vicinity of the Dryden Lake Site might show where and how far away the prehistoric groups lived, what particular resources they exploited, why they came to the lake, why they left the area, and when they did so.

Among the non-artifactual material collected in 1989 are charcoal and soil for testing. These were obtained from all excavation units and all features within them. Perhaps these will yield data about seasonal site use and other ecological factors. While preservation of plant and animal remains outside burned contexts is very poor at the site, additional pits and hearths might provide better opportunities for their preservation.

Remaining areas of 35 TO 20 have the potential for yielding fish scales, animal bones, bits of charred basketry, charred nuts, and charred seeds, as well as other materials that might help broaden the range of data available to document other times and human activities of the area. While some sites in Central New York have provided useful materials like these and like those found at Dryden Lake Site, their contexts are not always well documented, and the distribution of the sites continues to leave geographic and temporal gaps that are not well understood.

As housing developments, sand and gravel quarries, and urban development expand land modification, potential site locations for study decline. It is not enough to have historic markers noting the former presence of human activity for some time in the past. It is vital to gather details of time, cultural affiliation, site activities, seasonality, and ecological or environmental context for the sites.

The interrelationships of sites to one another as well as their distributions at one time and through time are important. For example, there are few documented prehistoric sites in Cortland County just east of Dryden Lake or for the southeastern portion of Tompkins County itself. At the same time, prehistoric and early historic trails plotted by Norris (1969), Parker (1922), and others suggest that these areas were part of the travel network over thousands of years (McDowell-Loudan in Vanaria 1986).

Funk (1992, personal communication) commented on gaps in site distributions on inland and upland areas away from waterways. It has been assumed that the fact that waterways were major access routes in many parts of the Eastern United States explained site correlations with waterways. Study of the hillsides in the vicinity of Dryden Lake and adjacent areas is needed to determine whether there are sites away from the lake or nearby streams, and if so, for what purposes.

Conclusion

The archaeological study of the project area within Dryden Lake Recreation Area was a success from a cultural resource management viewpoint. Information gathered has been utilized for college-student training, public education, background material for other planning, and for a supplement to research carried out in adjacent areas on Virgil Creek by the Soil Conservation Service.

Recommendations for site preservation, as provided in the 1989 archaeological report, were welcomed by the Town of Dryden, rather than perceived as a stumbling block to the project. Town officials conferred with the archaeologists to determine the best way to stabilize and protect the site. Currently, the field is seeded with grass. An alternative site away from the archaeologically sensitive portions of the park was developed for the access road and parking lot.

There is interest in the acquisition of a field cast of 35 TO 20, which has features similar to those of the site itself. Indeed, local artifact collectors noted that it may contain more prehistoric artifacts than the Town-owned property (Prentiss 1989, personal communication). This tract, currently under cultivation, is another broad one which slopes southward to the lake with a narrow swampy strip along its shore and a drainage channel for waters from north of the area. The channel runs from north to south into the lake. Members of the Historical Society, naturalists clubs, the Audubon Society, fishing and boating clubs, and hiking groups would like to see this land retained as parkland rather than developed as more housing. Again, Michael Lane and Dryden Historical Society personnel expressed interest in an archaeological study of this tract. Their hope is that determining the range of potential archaeological, historical, natural, and recreational features for this real estate might provide ideas for a means of acquiring it for the park (Lane 1992, personal communication).

Admittedly, some of the reasons for interest in archaeological potentials of the currently owned and potential land acquisitions for the recreation area are not due to an absolute commitment to archaeology. A multi-purpose park has different value for diverse populations. However, an environmental protection theme, within which floral, faunal, geological, historical, and cultural concerns are addressed is one that has been stressed verbally and implemented consistently as the Dryden Lake Recreation Area project has developed.

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Catlinite and Red Slate Ornaments from the Enders House Site, Schoharie Crossing State Historic Site, Montgomery County, New York

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Archaeological excavations at the Enders House at Schoharie Crossing State Historic Site revealed an eighteenth-century foundation. This was in contrast to the documentary research which traced the existing building to the early nineteenth century. In addition, the eighteenth-century house was associated with a Mohawk Iroquois occupation. The red slate and catlinite objects used and manufacture by the Mohawk at this site are described in this report.

Introduction

Archaeological excavations at the Enders House at Schoharie Crossing State Historic Site provided material evidence of the eighteenth-century site of Fort Hunter, which was built in 1711 at the Mohawk Indian settlement of Tiononderoga (Figure 1). Schoharie Crossing State Historic Site is located at the confluence of the Schoharie Creek and the Mohawk River in Montgomery County, New York. Plans to repair and rebuild portions of the Enders House foundation required the removal of historic soil deposits around this building. Archaeological excavations were conducted in 1989 and 1990 prior to this restoration.

These excavations provided a new and different perspective on this site. In contrast to the documentary history, which traced the existing building to the early nineteenth-century, archaeology revealed an eighteenth-century construction date for a portion of the stone cellar. In addition, soil strata containing eighteenth-century material items that were deposited prior to the cellar construction were identified.

The material objects recovered from eighteenth-century contexts consist of a variety of English ceramics, glass, tobacco pipes, wine-bottle fragments, and other items. Glass trade beads, tinkler cones, a Jew's harp, a triangular copper-alloy brass arrowpoint, and ornaments of catlinite and red slate indicate a house on the site may have been occupied by Mohawk Iroquois. The faunal collection reflects a diet based upon both domestic and wild animals.

The Mohawk occupation of this site is supported by the documentary evidence for the spatial arrangement of the settlement at Fort Hunter. The Enders House is situated near the estimated location of the chapel, which was centered within the original Fort Hunter and rebuilt in 1740 (Moody and Fisher 1989). The chapel was the focus of the Mohawk community at Fort Hunter, which consisted of 40 or 50 wigwams within a palisade (Lydekker 1968:37). This community was formally separated from the English by the construction of a new fort in 1755. A fire in 1773 destroyed two curtain walls of the fort, and "two good framed houses belonging to the Indians adjacent thereto" (JP 8:753). The objects from the Enders House excavation that clearly identify the Mohawks as former occupants are the catlinite and red slate ornaments. These objects have been found on many late seventeenth- and eighteenth-century sites that are associated with Native American occupations in the Northeast. This report describes these ornaments and offers an interpretation of their presence at this site.

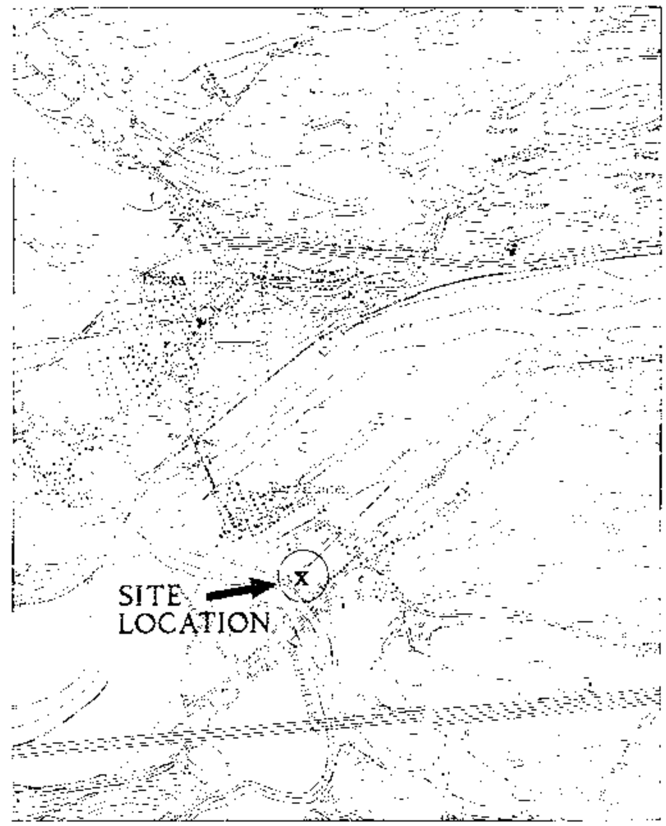

Figure 1. Location of Enders House. Schoharie Crossing State Historic Site on USGS Tribes Hill. N.Y. Quadrangle.

The Archaeological Context

Fort Hunter was constructed in 1711 near the site of a Mohawk Iroquois village. In 1712 Reverend William Andrews noted this village "stands by the fort, consisting of 40 or 50 wigwams or houses" (Lydekker 1968:37).

The construction of the stone foundation at the Enders House took place sometime after 1760. The presence of creamware in the builders' trench indicates the house construction may have taken place late in the 1760s. The presence of the builders' trench in several excavations has enabled the division of the eighteenth-century strata into two periods. The early strata were deposited prior to the cellar construction (pre-1760), while the late eighteenth-century strata developed during and after the cellar construction. Several strata could not be directly related to the builders' trench, so they are identified only as eighteenth century in date in Table l. The occupation of this site was disrupted by the Revolutionary War, which may be considered as the end of what is referred to as the eighteenth-century occupation of this site in this report.

Nine of the twelve catlinite and red slate objects were recovered from eighteenth-century deposits. Three items (#550, 404, 390) were found in disturbed contexts, probably the result of nineteenth- and twentieth-century foundation repairs that interrupted earlier, eighteenth-century deposits.

Bead Descriptions

Eight beads of catlinite and red slate were recovered from excavations at this site, representing four different shapes of beads (Table l, Figure 2).

Type I

A single example of a square slate bead with a center hole (#380) similar to those depicted by Kent (1989:166) is present in this collection. This item is about 5/8 in wide and 3/32 in thick. The center hole was bored from opposite sides and has a diameter of approximately 5/32 in. This specimen was probably broken in manufacture, since there is no evidence of the holes necessary to string this bead.

Type II

Two flat, triangular ground-stone beads with concave sides and bases represent a second bead type. Each of these has a hole which was drilled through the long axis from each end of the bead. Specimen #550 is red slate, about 7/8 in long, 5/32 in thick with a maximum width of about 3/4 in. The bore diameter of this hole is 1/16 in on one end and 3/32 in on the opposite end, possibly enlarged from wear abrasion. Another triangular bead (#505) is made of catlinite. This specimen is 14/32 in wide, 1/8 in long, and in thick. The bore diameter is less than 1/16 in.

Type III

A third type of catlinite bead found at this site has a narrow triangular shape with a smoothed medial ridge that resulted in a rounded, diamond-shaped cross-section. They are longitudinally drilled.

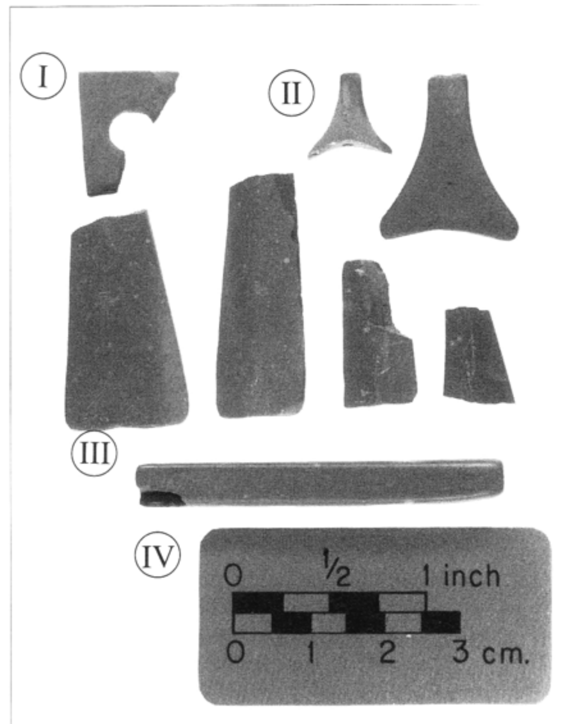

Figure 2. The four ornament shapes recovered in excavation.

Specimen #489 has a maximum width of 5/8 in, has a length of 1 3/32 in, and is about 1/4 in thick. There is a single large (1/8-in) perforation at the wide end of this object and two smaller (1/16 in and 5/64 in) holes at the narrow end. These two drill holes meet each other and the larger hole inside this specimen. This double drilling created a bead which may have been used as a pendant, since two strings may enter one end and exit as a single string through the larger hole.

Specimen #604, a narrow, triangular bead, is 1 7/32 in long and1h- in thick and has a maximum width of 15/32 in. It is broken at the narrow end, where the bore diameter is about 1/16 in. The bore is 5/64 in at the wider end.

Both items #688 and #404 are broken examples of narrow triangular beads. Specimen #688 is 1/2 in long and 5/32 in thick and has a maximum width of 3/8 in. The drilled perforation is 1/16 in in diameter at the wider end and 5/64 in at the narrow end where a portion of this bead is missing. This object was not broken in manufacture, since the broken end was ground smooth. Specimen #404 is a small section only 1/2 in long with a 1/16 in diameter perforation.

Type IV

The fourth bead type represented is a catlinite tube bead (#385). This object is drilled from one side and broken at the opposite end where the drill broke through the edge of the bead. This item is 1 7/8 in in length and 3/16 in in maximum width and

Table 1. Summary Table, Catlinite and Red State Beads.

Type	Cat.#	Date*	Material	Description
I	380	18th c.	Red Slate	Flat-sided, thin, square bead with center hole, unfinished
II	550	M	Red Slate	Triangular bead with concave sides and base
II	505	18th c.	Catlinite	Triangular bead with concave sides and base
III	489	18th c.	Catlinite	Narrow triangular bead/pendant, diamond-shaped cross section, longitudinally drilled
III	604	E	Catlinite	Narrow triangular bead/pendant, diamond-shaped cross section, longitudinally drilled
III	688	L	Catlinite	Narrow triangular bead/pendant, diamond-shaped cross section, longitudinally drilled
III	404	M	Catlinite	Narrow triangular bead/pendant, diamond-shaped cross section, longitudinally drilled
IV	385	18th c.	Catlinite	Tube bead, drilled from one end

Table 2. Modified Catlinite and Red Slate.

Cat.#	Date*	Material	Description
452	L	Catlinite	Rectangular bead blank, undrilled
286	18th c.	Catlinite	Rectangular bead blank, undrilled
616	E	Red Slate	Rectangular bead blank, undrilled
390	M	Red Slate	Triangular shaped with 2 cut and "snapped" edges

*Note: All specimens Acre recovered from eighteenth-century contexts except those indicated "M," which were found in strata mixed or disrupted by later intrusions. "G" indicates early eighteenth-century deposits formed prior to t he stone cellar construction. "L" indicates later eighteenth-century deposits formed after the stone cellar construction.

thickness. The perforation is 1/16 in in diameter, although a larger (9/64 in) bore, probably a starter hole, exists at one end.

In addition to these eight stone beads, four pieces of catlinite and red slate ornaments exist in an unfinished condition (Table 2). These items indicate the production of stone beads took place at this site.

Two items of catlinite (#452, #286) and one piece of red slate (#616) appear to be blanks for tube beads. They are rectangular in shape, with rough edges and undrilled. Specimen #286 is 2 3/32 in long, 9/16 in wide, and 1/2 in high. This object evidences the method of removing the blank from the raw material. A slab of catlinite, approximately 1/2 in thick, was partially sawed to form grooves on each side about 1/2 in from an edge. The rectangular piece was then "snapped" off, leaving a rough ridge on the cut edge. This ridge was then ground down. The initial sawing, the rough central area of the cut edge, and the grinding are all visible on this object. The second catlinite bead blank is 1 13/32 in long, 1/4 in wide, and 7/32 in high. One end of this object has a small indentation, possibly a "set" for drilling.

The red slate bead blank (#616) is about 1 in long, 11/32 in high, and 9/32 in wide. One end of this bead has been ground smooth.

A single piece of worked red slate (#390) was recovered. This item is triangular in shape with edges of 1 3/4 in, 1 5/32, in, and 1 15/16 in. The thickness varied from a maximum of 7/32 in to 1/8 in. The longest and thickest edge was cut from both sides and "snapped" but not ground smooth. A second straightedge was cut from one side and "snapped" but not ground. This object may have been a square bead, in process, since it was not thick enough to be a tube bead.

The bead manufacturing process represented here is similar to that reported by Fox (1980). The major difference lies in his identification of the raw material as red siltstone pebbles. No evidence of red slate or catlinite in cobble form is present in the collection from the Enders House.

Discussion

Catlinite and red slate ornaments are clearly associated with historic Iroquois sites in New York State. Beauchamp (1897:26-67) noted that "a little before A.D. 1700 catlinite or red pipestone was brought east in small quantities and soon became quite abundant." Wray (1973:30) listed these items as "index traits" of the historic Seneca. Although tubular slate and catlinite beads appear on Seneca sites of the seventeenth century, Wray defined the period 1710-1730 as the "Catlinite and Slate Era" (Wray 1973:8).

Objects similar to the catlinite and slate ornaments from the Enders Site were reported from the Primes Hill Site (Bennett 1988). This site, an Oneida Iroquois occupation, was given a mean date of 1733, based upon the European tobacco-pipe sterns recovered. The numerous examples of red slate pendants and beads recovered from the Primes Hill Site include all the types identified at the Enders Site. The raw material of the Primes Hill Site specimens was identified as red slate of northeastern New York. This locally available slate was utilized to create objects similar to those of catlinite, suggesting the shape and color may have been as important as the raw material.

Closer to the Enders Site, Guldenzopf (1986:130) reported a triangular catlinite pendant and a red slate tubular bead from the site of the home of Mohawk leader Joseph Brant. "This area along Nowadaga Creek in the town of Danube, Herkimer County was a separate settlement associated with the eighteenth century upper or Canajoharie castle" (Guldenzopf 1988:91). Brant's house site was located about 1000 ft north of the Anglican mission church built for the Mohawks, now known as Indian Castle Church. Hesse (1975) found a rectangular catlinite bead and a red slate pendant at the historic Indian village of Unadilla in the Susquehanna Valley. This site was occupied between 1753 and 1778, when it was burned by American soldiers during the Revolutionary War.

Kent (1989:169) reported "hundreds of catlinite ornaments" from eighteenth-century Susquehannock sites in present-day Pennsylvania. These people were closely related, culturally and linguistically, to the Iroquois. The triangular beads were the most common form of catlinite ornament, with square beads with cutout centers the next most popular form. These were followed, in quantity. by the narrow triangular beads. The collection from the Enders Site, therefore, contains examples of these most numerous ornament types among the Susquehannocks.

At Coney Town an intact necklace of square catlinite beads was found (Kent 1989). This necklace contained glass beads placed inside the cut-out centers of the square catlinite beads. This provides a rare example of the appearance of a complete catlinite ornament.

The source of catlinite for the eighteenth-century Iroquois was probably within present-day Minnesota, although the Seneca sources may have been in the current State of Wisconsin (Kent 1989:165). The spotted pipe quarry in Pipestone, southwestern Minnesota, may have been the source of some of the Enders House specimens that are marked with lighter spots (Sletto 1992:22). The sites near these sources produce debris and unfinished items from the manufacturing process, but "no such pieces, implying local manufacture, have been found in the lower Susquehanna Valley sites" (Kent 1989:171).

The diffusion of catlinite to the Susquehannocks occurred as finished items. The Mohawk Iroquois at the Enders Site, however, discarded incomplete catlinite ornaments. The presence of incomplete items in different stages of manufacture indicates that catlinite was not obtained by the Iroquois only as finished objects but that the ornaments were completed by them.

Kent (1989) suggested that the catlinite ornaments may have been associated with the catlinite pipes and together diffused into the Eastern Woodlands in the calumet ceremony. This seems reason able due to the limited geographic source for catlinite and the similar temporal appearance of both forms of worked catlinite. Turnbaugh (1979) offered an explanation for the spread of calumet ceremonialism as a nativistic response to the fragmentation of traditional lifeways in the historic period. Blakeslee (1981) responded with an alternative thesis which presented the calumet pipe's eastward diffusion as the result of trade and alliances. Blakeslee provided documentary references for the calumet ceremony among the Plains Apaches in 1634 and archaeological evidence for the prehistoric existence of calumet pipes. On the basis of this evidence, he argued that the calumet ceremony existed before the disruptive European contact. The diffusion of this ceremony, therefore, must have been a result of trade and war alliances.

The age of the calumet ceremony in the Plains, however, does not rule out the nativistic role in the diffusion of this ceremony into the Eastern Woodlands. In fact, the age of this ceremony may contribute to the association of traditional values with it. While the origin of this ceremony was not a response to culture change, its diffusion may have been.

At the same time, the role of trade and alliances cannot be denied. The Iroquois, in their role as middle men, could obtain catlinite and furs from the Great Lakes region because they had access to European objects desired by other native groups. The presence of similar objects in locally available red slate indicates that their meaning extended beyond the formation of alliances, as Blakeslee (1981) suggests.

These catlinite ornaments may have functioned in several ways at the same time, changed function through time, or held different meaning to different participants in the activities. Groups from the Great Lakes region may have employed catlinite, and the associated ceremonialism, to establish trade relationships with eastern groups that had direct access to European manufactured items. The same ceremonies may have had additional associative meanings for the Eastern Native Americans, such as the Iroquois.

The interpretation of these material items at the Enders Site requires a consideration of the specific historical context. In response to the request of the "Indian Kings" who visited London in 1710. Queen Anne ordered the construction of a chapel inside a fort and a house for two missionaries. Fort Hunter was constructed in 1711 near the Tiononderoga Mohawk settlement. with a chapel containing a six-piece set of communion plate and other gifts from Queen Anne.

In 1712. William Andrews became the missionary to the Tiononderoga Mohawks and initially "enjoyed a measure of evangelical success.... Sixty or seventy regularly attended chapel" (Axtell 1985:259-260). This success did not last, since by 1716 only "about 50 Mohawks attended pretty constantly ... when at home" (Axtell 1985:260).

> By the fall of 1717 chapel attendance had slipped to twenty-five diehards: ... only two were men, and they were not ashamed to sleep through church in the morning and "be drunk in the afternoon." Six months later the faithful were reduced to fourteen or fifteen. Christian marriages fell off equally sharply, after the Spring of 1716, to none; the Mohawks apparently preferred "their own loose ways".... Even the baptism of their infants, ... meant something quite different to the Mohawks....
>
> By 1717 the other Iroquois nations were equally hostile to Christian proselytizing. When any of them passed Fort Hunter en route to Albany, they did not attend services but merely stuck their painted faces in the chapel door to "mock and deride" the participants. Simultaneously, the two hundred Mohawks at the second castle of Canajoharie forbade Andrews and Claessen to visit them again. When the missionary forced the issue and began to preach to a half dozen hardy souls, the traditionalists beat a drum up and down the village to drown him out [Axtell 1985:261-262].

In 1719 Andrews resigned from the post at Fort Hunter. The Iroquois mission was left empty until 1727.

Axtell (1985:262-63) attributed the problems at the Fort Hunter mission to the "renewed faith of the Iroquois in their ancient communal ceremonies." The smallpox epidemic of 1716 and the arrival of the Tuscaroras may have encouraged the Iroquois to resume traditional practices. The need for captives as replacements for dead kin members renewed a series of traditional rituals involved with war parties, mourning, and adoption.

The subsequent history of the Fort Hunter mission does not evidence constant progress but "backsliding"---overtly practicing Christian teachings while covertly leading traditional lives (Brenner 1980:146). There were brief periods, usually after the arrival of a new missionary, when attendance at the chapel increased. In 1742, following the completion of a new stone church, "the whole Mohawk tribe was (at least nominally) Christian, there remained only two or three of the number who were unbaptized" (Lydekker 1968:55).

Less than a decade later, in 1750, the missionary John Ogilvie reported that the Mohawks were "universally, degenerated. Since the war they are entirely given up to drunkenness. Many seem to have lost all sense of religion, and the best are in a state of indifferency" (Lydekker 1968:66). Reverend Samuel Hopkins echoed Ogilvie's opinion about the state of the Christian mission among the Mohawk in 1753. Hopkins noted that most of the Mohawks "remain in a state of heathenism, and that those of them who pretend to be Christians know but very little of the principles of Christianity" (Hopkins 1911:79).

Ogilvie referred to additional problems among the Mohawk that resulted from alcohol and trade in his 1752 report to the Society for the Propagation of the Gospel. The traders "seem to have a very ill-effect upon [their] Minds & I fear in a great measure influences them to think that Christianity is not of that importance that the Missionaries represent it or (Lydekker 1968:72). Ogilvie reported that a sachem's wife "who officiates as reader in Church, during my absence" was murdered in 1751 (Lydekker 1968:73). Another church member died from burns he received after getting drunk and falling in a fire.

The problematic relationships between the English and the Mohawks at Fort Hunter may be viewed in Sir William Johnson's 1755 proposal for a new fortification, which separated the Mohawks from the English. He recommended

> it to be nearby on a Line with Fort Hunter, to take in the church as a Bastion & to have a Communication Pallisado between the two forts.... in case of an attack [DHNY 2:657].

In 1756, Johnson referred to 100 men from the lower Mohawk castle: "Seventy in their Castle as they call it, besides the thirty Lieut. Williams has in the Kings Fort" (JP 9:509). The 1758 description of a conflict between Mohawks and soldiers provides further evidence that separate English and Mohawk forts existed near each other at Fort Hunter. After he was pushed away from the gate of the English Fort, a Native American returned to his house and "attempted to stop the soldiers" from entering "the gate of the Indian fort" (JP 13:105).

Guldenzopf (1986:137) states that the traditionalist Mohawks "had apparently begun to decline in number during the eighteenth century." While they may have declined, they did not disappear. Christian marriages and baptisms increased, but these may have been additions to traditional ceremonial life. In 1772, Reverend Stuart claimed success for his ministry at Fort Hunter since he had 20 communicants (Lydekker 1968:131). Others, he noted, "still continue in their former state" (Lydekker 1968:130). Only 19 "Indian Communicants" from both Mohawk castles received the Sacrament from Reverend Harry Munro in 1770 (Lydekker 1968:128) when there were 160 inhabitants in the lower Mohawk village and another 180 at Canajoha6e (Guldenzopf 1986:71).

Summary

By 1717, the Mohawk Iroquois at Fort Hunter were avoiding the chapel built at their request in 1711. In addition, the neighboring Mohawk community at Canajoharie warned the missionary to stay away. When Andrews arrived and tried to preach, traditionalists drowned him out with drum beats. This revival of traditional ceremony and ritual may be attributed to an outbreak of smallpox and the arrival of the Tuscarora among the Iroquois in 1716 (Axtell 1985).

These events occurred within the period Wray (1973) has defined as the "Catlinite and Red Slate Era" among the Seneca. Turnbaugh (1979:689) has argued that the native response took form in the expansion of tobacco and pipe ritualism. While catlinite pipes are related to the calumet ceremony, the role of catlinite and red slate ornaments is not similarly documented.

The catlinite beads and pendants are associated with catlinite pipes through their acquisition from the same geographic source during the same time period by the Iroquois.

The calumet pipes, as a clear material symbol of the ceremony, may have been a problem for Native Americans living at Christian missions. According to Turnbaugh (1979), the Jesuits among the St. Francis Abnakis refused to permit the performance of the calumet dance. The Abnakis responded by suggesting the dance was not very important while performing it in secret.

Beauchamp (1907:434) stated that the calumet pipes were not common in New York in the eighteenth century because wampum belts of shell beads were used to open councils and treaties instead. The presence of catlinite beads and pendants may have had a traditional meaning to the Iroquois that was unknown to the missionaries. The lack of catlinite pipes at the Enders Site suggests the possibility of ornaments as substitutes in the native system of meaning. This would have been consistent with their strategy of "backsliding," evident in the documentary history of this site. The meaning of these items to the Mohawk extended beyond their role in forming trading and war alliances.

Artifacts are important in the construction of cultural identity. Material objects, when viewed as symbols, communicate and express the non-material phenomenon of culture. Ornamentation is part of the visible display of cultural identity, "The infallible mark of a praying Indian was his English appearance" (Axtell 1985:172).

The use of red slate, locally available to the Iroquois, for the same ornaments indicates that both the color and the shape of these items had important meaning. Fox (1980) reported similar beads of red siltstone may have been copies of red glass beads acquired from Europeans. In his discussion of the meaning of glass trade beads to the native people of the Northeastern Woodlands, Hamell (1983) has provided a framework for interpreting catlinite and red slate beads as well.

> Redness is also an inherent quality of blood, certain mineral pigments and stones, native copper, some berries and fruits,.... As a semantic frame, redness connotes the animate and emotive aspect of Life .... Depending upon the ritual context, "redness," the animate aspect of Life, may be contrasted with either "whiteness," the cognitive aspect of Life, or with "blackness," the converse of animacy and cognition [Hamell 1983:7].

Beauchamp (1907:431) noted that "red calumets are most esteem'd ... for when they have a calumet in hand, they go where they will in safety."

The manufacture of these ornaments by the Mohawks at Fort Hunter implies the production of traditional forms in a highly Europeanized material world. This raises questions about the function of European-made objects in the hands of Iroquois at the Enders House Site. Future studies of this archaeological collection will examine this problem.

Acknowledgments

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Oysters and Settlement in the Lower Hudson Valley

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The remains of oyster shell middens are a vital source, for studying past lifeways in the Lower Hudson Valley. They may yield information which cannot be extracted from lithic or ceramic artifacts.

The sizes of midden shells infer the practice of selected gathering in the Hudson Valley. The results of the measurements could also indicate a more permanent rather- than sporadic occupation of the Lower Hudson lands during the Late Archaic Period.

Social and economic relations between occupants of several Hudson sites have been assumed in the past. Recent tabulations of more than forty radiocarbon dates define specific, narrow time ranges within which such contacts could have taken plate. In addition, the presence of processing middens at various sites suggests that Indians probably provided oyster meat to base camps or engaged in exchange.

Introduction

The concept of settlement patterns in the Archaic Hudson drainage conveys the image of nebulous happenings involving migrating hunter-gatherer bands. However, recent research may modify this interpretation of prehistoric lifeways. Many millions of oyster shells lined the Hudson shores from Battery Park to Peekskill. These shell middens represent a vital feature of past Indian activities still available to explore prehistoric occupations. While the American oyster is not particularly beautiful, it is a very important animal to archaeologists. The study of shell accumulations may yield information on Indian life which cannot be extracted from lithic or ceramic artifacts. The extensive shellfish exploitation shaped the adaptation of local inhabitants.

Environmental Setting

The Lower Hudson lands between the river and Long Island Sound were covered for the past 8000 years by mixed stands of oak, hickory, chestnut, and maple which were home to the white tailed deer, black bear, and smaller mammals like beaver, raccoon, and cottontail rabbits. An almost inexhaustible fresh water supply honeycombed the area, most of whose rivers, creeks and brooks emptied into the Hudson every few kilometers. "This biome seems to have been one of the most conducive to human utilization of any area of the Northeast" (Tuck 1978:35).

Delayed Research

The pioneering archaeologist Charles Rau, who excavated shell middens at Keyport in New Jersey during 1863, remained a rare excavator for a long time. The general neglect of studying any changes in prehistoric American cultures before the First World War seemed to stem from "a longstanding assumption among White settlers that native Americans were incapable of significant cultural development" (Trigger 1986:xxii).

In addition, shell middens did not rank high on investigators' priority lists. It meant difficult digging with few expectations of diagnostic artifacts while scientific tests like radiocarbon dating would not be available for another half century. Shell middens were accorded less attention than colonial brick walls.

During the nineteenth century, researchers of the Danish "kokkenmoddinger" (kitchen middens) had already recognized that the shell heaps were not natural phenomena but had been deposited by aboriginal people. They observed that "(a) the valves of the same animal were rarely found together, (b) native artifacts were mixed with the shells, (c) the shells were often charred and broken, and (d) the soil under the middens was not of marine origin but resembled the surrounding terrain" (Trigger 1986:xii). Finally, four decades ago, Louis A. Brennan began to explore systematically the oyster shell middens in the Lower Hudson Valley and was able to ascertain through radiocarbon dating that early residents had eaten oysters during the Archaic Period-leaving the shell piles behind.

Many chronological questions still await clarification by radiocarbon testing-among them the periods during which shell sites were used. Other archaeological research questions extend to regional comparisons of the resource zones of Metropolitan New York and neighboring coastal areas (Amorosi 1991:95).

Substantial amounts of archaeological resources had already been destroyed by colonists who used the shell to "sweeten" their fields or to produce lime (Kraft 1986). Urban development depleted the remainders further: "in coastal New York, for example, known sites and sensitive areas now lie below city streets, dredged landfill, railroad beds and highways that hug the shore, countless docks and marinas" (Ceci 1984:65). The exploration of the Hudson shell middens is more akin to a salvage operation than to the exposure of pristine archaeological sites.

Evidence

Since the end of the last ice age the American oyster has been native to the Atlantic coast estuaries from St. George Bay to Florida. The shell accumulations along the Hudson shores consist almost entirely of the American Oyster (*Crassostrea virginica*). Clam or mussel shells are rarely found within the heaps. During its prolific life cycle the average oyster may release 50-100 million eggs per year into the surrounding water. Since the Hudson above Manhattan curves for about 50 km in a northwestern direction, the river and tide waters tend to carry the oyster eggs toward the eastern shores. This in turn helps to explain why shellfish beds-and therefore the shell middens were predominantly located at the eastern banks.

The oysters grow rapidly, and under "favorable conditions, spat may grow as much as 1 cm per month" (Kent 1988:5). But as Kent's investigations show, the growth rate slows considerably after the first year and continues at a relatively steady rate of about 100 mm per three years. "The relationship between height and age is normally curvilinear... but the plots for data from oysters in archaeological sites can usually be adequately described by a straight line" (Kent 1988:75-76). Since "oysters can apparently live at least 10 or 12 years" (Kent 1988:8), sizes of 200 to 250 mm (8-10 in) would not seem unusual in undisturbed oyster beds on the Hudson. An old valve of 25.5 cm (10 in) from Connecticut is pictured in the U.S. Fishery Bulletin (Galtsoff 1964: 18, 33). The height of the shell is measured along its longitudinal axis although that distance is sometimes referred to as its length.

Discussion

The present investigation attempts to use physical measurements of midden shells to present additional information about past life in the Lower Hudson Valley. In addition, the implications of more than 40 radiocarbon dates will be evaluated. The Hudson oyster beds were exploited for at least five thousand years. The time frame for this study lies approximately between two radiocarbon dates: Brennan's Giant Oyster of 5650 ± 200 B.P. and the shell date of 3590 ± 80 B.P. from Wickers Creek.

A total of 360 oyster shell samples from seven locations at the Lower Hudson were measured. They include Wickers Creek (222), Requa (95), Various (24), Hastings-on-Hudson (9) (Table 2); Dobbs Ferry Railroad (5), Dogan Point (3) and two from Georges Island. The Wickers Creek sample consisted of 144 valves from one column while the other 78 shells were taken from four other spots at the site (a processing midden, a smaller heap under a fallen tree, etc). The 95 shells excavated at the Requa Site were stored in the laboratory in Tarrytown, but the midden origin is unknown. The batch of 24 shells are unprovenienced items collected from Lower Hudson sites by the writer over a number of years. The Hastings specimens surfaced during recent construction of the new Public Works building. Because enormous shell volumes are involved-many of them unavailable for research-only small quantities from shell middens can actually be tested. The resulting measurements are accordingly subject to sampling bias.

The shell middens along the Lower Hudson vary in size from a few square meters to large deposits covering several acres like Dogan Point, Piping Rock, or Hellgate (Brennan 1972:6; Finch 1909:73; Harrington 1909:170). All of these could have also sufficed for assemblies of macrobands. The shell remains on the western side of the river are considerably smaller although there too the white debris could be found from Keyport to Hook Mountain and Stony Point (Harrington 1909; Parker 1922).

For the purposes of this discussion the term "kitchen midden" is applied to left-overs of meals from single or extended camping episodes. They often contain bone, antler, or lithics. They can also be expected to be close to habitation as at the Twombly Landing Site (Brennan 1968). The term "processing midden" is used here for deposits which are large, mostly devoid of faunal or lithic artifacts, and can rarely be shown associated with habitation. They constitute stations for a special-purpose activity: oyster meat preparation. The "models of midden function are concerned with a number of hypotheses for which there is presently no consensus. They include the length of occupation, season(s) of occupation, and number and kinds of activities that occurred" (Lavin 1991:83).

Large quantities of oysters had to be gathered to provide a meal because the shell of calcium carbonate and conchiolin constitutes about 90% of the total weight and only 10% is edible. The close proximity of known midden sites indicates that oyster beds were not far apart. The transport of heavy oyster loads probably influenced midden locations.

Some middens originate from a single camping episode of short duration when, as Brennan suggested, basketsful of shucked shell were dumped at a convenient spot. Many others became complex accumulations as successive occupiers tossed their shell on top or off center during time spans of various duration, possibly associated with different activities (Lavin 1991:83). Frequently shell heaps on the same site appear in different stages of dissolution ranging from flake/soil mixtures to compacted walls of intact shells (Wickers Creek, Tellers Point). They also "do not contain discrete and easily-followed strata that run from one end of the site to the other. Rather, the profiles reveal a confusing array of shell lenses dipping at various angles and seldom continuing for more than a few meters" (Sanger 1981:40). The column samples are likely to cut across individual shell deposits of considerable temporal variation.

> Shell middens do not comprise a single, narrowly defined settlement type but instead show considerable variability. This variation in location, size, age, internal structure and composition reflects varying roles of shell middens in particular settlement systems as well as different pathways to site formation [Funk 1991:55].

Wickers Creek Site

This archaeological site of almost one acre (0.4 ha) was investigated by contract archaeologists in response to SEQRA requirements (Roberts 1991). Since that time new evidence has emerged suggesting the need to explore this archaeological site as a major shell midden location. Due to substantial pothunting, the overburden of some middens was removed exposing sizable accumulations and processing stations. None of the middens has yet been measured by augering or other testing. The major shell concentration is at the southwestern part of the site, but other middens were located at the site elsewhere. A matter of great concern is that the major shell area is being severely impacted by erosion even more than by pothunting activity (Boesch 1990).

These shell accumulations are the second largest remaining in the Hudson Valley. Here, too, the large diversity of middens as to volume, density, random accumulation, deterioration, artifacts, and age is striking. One large deposit, which showed up during trenching, is a layer of approximately 40 cm depth and 15 m length (unknown width) in an east/west direction. A radiocarbon date of 3590 ± 80 years B.P. on shell (Table 1) verified the Archaic use of a nearby midden. At one of the newly exposed processing middens oysters measuring between 10 and 12.5 cm constitute about 50% of the total within a few square meters. The valves are closely packed and show little deterioration. Few artifacts and bones were encountered within this mound. Small fire-cracked pebbles (3-4 cm) were present within 15 cm of the yellow sand floor. An uprooted tree in the mid-section of the site exposed a smaller midden of mostly 7.5-cm oysters with a fair portion of lithic debitage.

> Large scale processing (possibly for storage or transport elsewhere) is quite a different cultural activity than procurement for immediate consumption. Evidence from flotation of column samples strongly indicates that both activities were being undertaken at Wickers Creek [Moeller 1988:73].

This sizable shellfish site at the Hudson would seem a prime location for a shift of emphasis from hunting and foraging to fishing. Previous excavations and flotation tests indicated some evidence of fish bone at Wickers Creek (Moeller 1988; Roberts et al. 1988). Several netsinkers were excavated. Three stone gouges were reported found suggesting the fashioning of dugouts. Two possible cultural manifestations resembling fish effigies are still under investigation.

Despite the abundance of aquatic life from shad to sturgeon, the evidence for fishing in the lower Hudson is poor (Brumbach 1986). No canoes, nets, weirs, nor harpoons have so far been found. Identification of netsinkers is often debatable. There is a general lack of fishbone in shell heaps which has been attributed to scavenger activities or the use of large grid screens by excavators. The variable preservation of bone in shell middens may be an additional factor, for while "the organic and inorganic constituents are highly susceptible to decomposition in acidic environments ...the inorganic component is also soluble in alkaline environments" (Linse 1992:327). The archaeological record is too scanty to support the premise of a predominantly fishing community at Wickers Creek.

Can the faunal remains be associated with oyster processing? More than 650 bones and fragments were found in close proximity of the processing middens. This is more than one-third the number recovered at the SEQRA excavations from the entire site. Among them were a 15-cm cutting anvil of heavy antler and two bone perforators. Most of the other bones had been crushed-presumably to remove the marrow (Brennan 1981:47). Many fragments of longbones measured about 1.5-2 in which may indicate their use in cooking baskets. The low incidence of cranial parts, teeth, and vertebrae suggests that hunted and trapped mammals were often dismembered on the spot and only the preferred edible parts were brought back to camp. The bones (mostly white-tail deer) may have escaped taphonomic destruction due to the adjacent shell deposits which raised the soil pH (Amorosi 1984). Was this a food-preparation spot used during processing activity or was it a separate activity area? Unfortunately the lithic tools and antler tines were removed by pothunters and not available for analysis.

A limited sample of shells tested for seasonality suggested that oysters had been collected during all seasons though predominantly in fall (Custer 1988:75). These data would agree with several others cited by Lavin who concluded that "different geographic regions may promote distinctive cultural adaptations with different scheduling cycles" (Lavin 1991:84).

Settlement Considerations

Permanent human presence in the Archaic Hudson Valley has not yet been demonstrated with certainty. Aboriginal dwellers subsisted on fishing, hunting, and gathering, but the proportional role of these activities is still unclear. Abundant oyster beds and wildlife combined with a moderate climate may have favored a form of sedentary lifeways which does not require agriculture nor take the form of a village (Flannery 1972:24). A prehistoric no-man's land rests between Archaic sites at Dobbs Ferry and Staten Island. The numerous recorded shell deposits on Manhattan seem to belong to later periods (Finch 1909). At Wave Hill in the Riverdale section two shell midden sites yielded Archaic projectile points (De Carlo 1989, personal communication; Lenik 1992). At the foot of Dyckman Street in Manhattan a large shell site that contained in its lowest layers unpolished stone implements, bear, and elk bones was excavated by Skinner (Bolton 1934:6). Other large shell accumulations were found by the Dutch at an abandoned Indian locus on Manhattan at Canal Street and the Bowery which they named Kalch-Hook or shell-point (Finch 1909:67). These two sites have not been definitely shown to be of Archaic origin.

The shift from shell disposal in large middens to dumping of shells into pits probably signified the increasing sedentary life of Hudson Indians. The shell pits contained bones, potsherds, and

Table 1. Lower Hudson Valley Sites.

Ref.	Site	Lab No.	C-14 BP	S.D.	Calib. Mean BP	Test Material	Test Year
1	Dogan Pt.	L1381	6950	100	7748	shell	1973
2	Bannerman	R177	6150	120	7088	shell	1971
3	Croton Pt.	Y1315	5850	200	6723	charcoal	1963
4	Dogan Pt.	L1036E	5650	200	6445	shell	1966
5	Piping Rk.	QC115	5325	100	6144	charcoal	
6	Piping Rk.	QC108	5175	105	5942	shell	1975
7	Dogan Pt.	GX1918	5155	120	5935	shell	1970
8	Piping Rk.	GX3238	5135	135	5925	shell	1973
9	Piping Rk.	QC110-1	5110	75	5783	shell	1975
10	Dogan Pt.	GX2324	5095	130	5789	shell	1971
11	Dogan Pt.	GX1919	5075	160	5797	shell	1970
12	Dogan Pt.	QC101-1	5010	100	5735	shell	1975
13	Piping Rk.	QC110-2	4955	120	5690	shell	1975
14	Piping Rk.	QC139	4940	100	5700	shell	
15	Wickers Cr.	B.24388	4840	140	5591	charcoal	1988
16	Dogan Pt.	QC101-2	4765	115	5526	shell	1975
17	Twombly Ldg.	Y1761	4750	120	5531	charcoal	1966
18	Piping Rk.	QC109	4750	140	5531	shell	1975
19	Piping Rk	QC113	4735	100	5536	charcoal	1975
20	Piping Rk.	GX2999	4730	140	5463	shell	1973
21	Twombly Ldg.	GX0762	4725	80	5342	charcoal	1966
22	Wickers Cr.	B.24392	4720	90	5330	charcoal	1988
23	Piping Rk.	QC270	4695	85	5357	shell	
24	Wickers Cr.	B.24393	4620	60	5317	charcoal	1988
25	Piping Rk.	—	4600	80	5309	shell	
26	Dogan Pt.	QC105-1	4560	80	5293	shell	1975
27	Piping Rk.	QC106	4560	100	5293	shell	1975
28	Piping Rk.	--	4490	85	5122	shell	
29	Dogan Pt.	QC105-2	4475	100	5218	shell	
30	Wickers Cr.	B.24391	4470	140	5195	charcoal	1988
31	Wickers Cr.	B.24394	4430	90	5014	charcoal	1988
32	Piping Rk.	QC140	4365	90	4947	shell	
33	Wickers Cr.	B.24398	4050	90	4500	charcoal	1988
34	Wickers Cr.	B.24799	3900	120	4406	charcoal	1988
35	Piping Rk.	QC107	3765	90	4103	shell	1975
36	Piping Rk.	GX3371	3750	150	4110	shell	1975
37	Wickers Cr.	B.37212	3590	80	3896	shell	1990
38	Wickers Cr.	B.24390	3330	80	3577	charcoal	1988
39	Dogan Pt	QC103	2500	100	2616	shell	1975
40	Piping Rk.	QC142	2480	340	2605	charcoal	
41	Wickers Cr.	B.24397	1960	100	1905	charcoal	1988
42	Wickers Cr.	B.24396	1480	70	1354	charcoal	1988
43	Wickers Cr.	B.24389	570	70	552	charcoal	1988

Table 2. Oyster Shell Heights from Lower Hudson Middens.

Shell Height (cm)	Wickers Creek	Requa	Various	Hastings
12.5-15.0	——	2%	—	——
10.0-12.5	3.5%	14%	4%	
7.5-10.0	20.5%	44%	63%	45%
5-7.5	60.0%	40%	33%	55%
0-5.0	16.0%		—	——
Total No. 350	222	95	24	9

sometimes burials of men or dogs. They were located close to habitation and, when filled up, new pits had to be dug (Bolton 1976:118). Some sites have the earmarks of a transition period; across the Sound from Pelham Bay Park at Port Washington a large shell heap measured approximately 200 ft in diameter while 101 pits were nearby-some overlain by the shell mound (Bolton 1976; Finch 1909; Harrington 1909).

Further inland some Indians helped themselves occasionally to oysters. At the Ossining Rockshelter 3 km east of the river, "About 120 more or less intact oyster valves...were found .... These shells must have been carried from the Hudson River to the rockshelter" (Fiedel 1986:41). There is, however, no evidence for such behavior on a scale rivaling the activities at processing middens. Not all Archaic sites in the area contain any shell, as for example the Winterich Site about 4 km south of Croton (Brennan 1956:12). Such sites may have been base camps or the recipients of smoked oyster meat through trading or tribute.

Ordinarily shellfishers consumed or processed their catch near the source but some bivalves have been excavated upriver at the Bannerman Site far from the oyster beds at Haverstraw Bay (Ceci 1984:70; Ritchie 1958:65). Ten kin away at the North Bowdoin rockshelter another oyster shell deposit was excavated (Funk 1989:71). Similar to those in the Ossining Rock shelter, these deposits seem relatively small. The Archaic dwellers may, have journeyed in dugouts to the oyster grounds to engage in fishing or obtained the oysters through trading. There is no certainty that the salinity of Hudson waters north of Bear Mountain was ever adequate to pen-nit formation of oysterbeds.

The impressive number of shell accumulations at the Hudson led many observers to believe that early Indians thrived mainly on this food item. However, this view has been challenged both by calorie estimates and as an overrepresentation of shellfish in the archaeological record (Glassow 1988; White 1974). Other critical arguments cite studies of areas containing "some of the largest and most densely concentrated prehistoric shell mounds in the world" where the "relative annual contribution of shellfood ranges between less than 5 percent to no more than 20 percent" (Bailey 1978:39).

Hudson oysters were a dependable year-round food supply but probably collected with varying intensity as other food sources became available. Many small plant foods or small bodied animals could be regularly obtained with relatively little effort provided that adequate traps, nets, baskets, or weirs were available (Butzer 1982:302; Speck 1946). The Hudson River had been a well-stocked food pantry:

> Each spring, as soon as the water temperature reached 40 shad and other anadromous fish entered the river to spawn. Sturgeon grew to enormous sizes, judging from the scutes found on Indian sites; indeed, early records tell of sturgeon measuring fourteen to eighteen feet in length [Kraft 1983: 12]

It could be argued that oysters in the rich Hudson Valley biome may have been more important to diet variety and trading than for subsistence.

Processing Middens

The processing middens probably developed in tandem with increasing sedentary life and fishing activities. "These shell heaps are not piles of general camp refuse. They are the accumulated discards of one activity only, the shucking of oysters" (Brennan 1974:85). There were at least five such accumulations which can at present be classified as processing stations: at Wickers Creek, Kettle Rock, Hellgate, Piping Rock and Dogan Point. They may have had a dual function. Indians could have supplied base camps further inland with shucked and smoked oyster meat, thus avoiding the transport of 90% of the weight.

But processing stations may also be evidence for exchange activities or tribute (Figure 1). Both objectives could have been effective at various times. While there is no hard evidence for trading of perishable material like foods in the Northeast during the Archaic, there is ethnographic precedence for barter of oysters among some West coast inhabitants (Kroeber 1960:110).

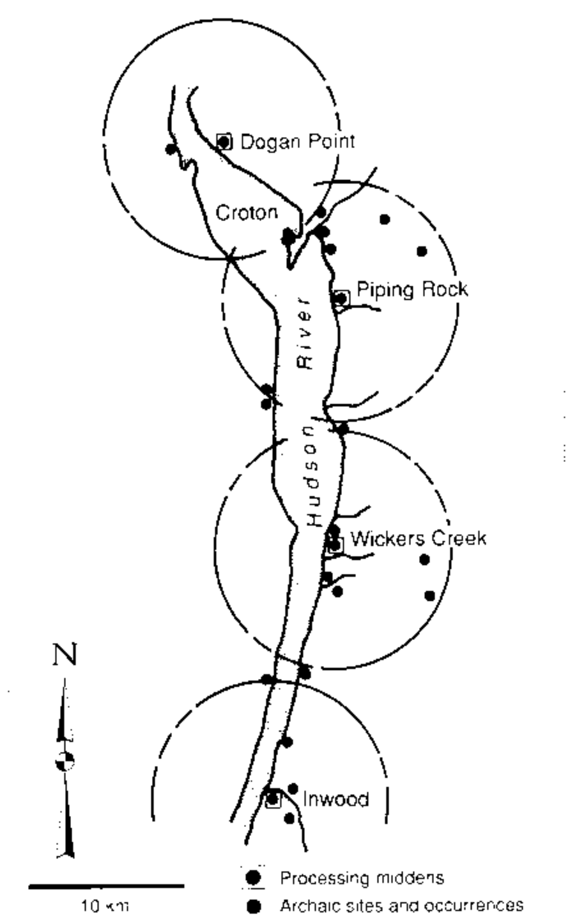

Figure 1. Sites in the Lower Hudson Valley. Schaper. July 1991.

On Long Island the Shinnecock Indians seemed to have paid oyster meat as tribute to the Iroquois (Skinner 1909a:4). Black offers some evidence "which suggests that native people preserved shellfish for trade to the interior" (Black 1988:24), and Salwen reports on eastern Massachusetts that

> Shellfish-particularly oysters, hard- and soft-shell clams, and scallops-were an important food resource.... Parties of inland people made summer visits to the shore, where they collected and dried shellfish to be carried home for winter consumption [Salwen 1978:162].

The archaeological record displays very little evidence for shellfish preservation in the Northeast. The post holes excavated at Wickers Creek have not been definitely identified as traces of drying racks (Roberts 1991:137-138). By comparison,

> prehistoric preservation and storage on the Northwest coast are inferred from indirect archaeological evidence such as large site volumes, evidence of high population densities, the presence of species known to have been preserved during the ethnographic period, and the presence of artifacts such as ground-slate knives [Black 1988:23].

Shellfish processing is probably the earliest year-round mass production practiced by prehistoric hunter-gatherers. It seems plausible that the processing of large quantities of oysters (collecting, shucking, smoking) could have affected work techniques or the division of labor. For example a fairly equal number of right and left valves occur in shell heaps although the valves of the same oyster are rarely found together, but the second layer of one column sample at Wickers Creek contained 34 valves of which 10 were left hand and 24 were right hand-a substantial difference. The variance at the other four layers (120 valves total) was from 2 to 4 units. Does this lopsidedness indicate a working method? Were valves removed for use as tools, or was it a fluke?

C-14 Dating and Habitation

Prior to the development of scientific dating methods, any contacts between Archaic groups could only be surmised. However, more than forty radiocarbon dates suggest that such contacts were feasible and likely (Table 1, Figure 2). For example the overlapping periods between 5342 B.P. and 5293 B.P. attest that social and economic relations were possible between inhabitants of four locations: Dogan Point, Piping Rock, Wickers Creek, and Twombly Landing (Figure 3). Croton may also qualify as the fifth locus because it possessed abundant oyster supplies and lies geographically snug between Dogan Point and Piping Rock. Unfortunately, past archaeological digs from Croton produced only few C-14 dates.

The scientific tests produced narrow time ranges rather than precise dates to indicate simultaneous use of sites. The actual site occupations could therefore have taken place at identical times whenever the C-14 ranges overlap, but this condition also allows for occupations to occur some years apart. The feasibility that the same groups may have utilized the various sites can also not be discounted. None of these events has yet been tested (Ottaway 1987).

The acceptance of an Archaic age for Lower Hudson middens troubled Custer who questioned the necessary accuracy of radiocarbon testing of oystershell (Custer 1991:28). However,

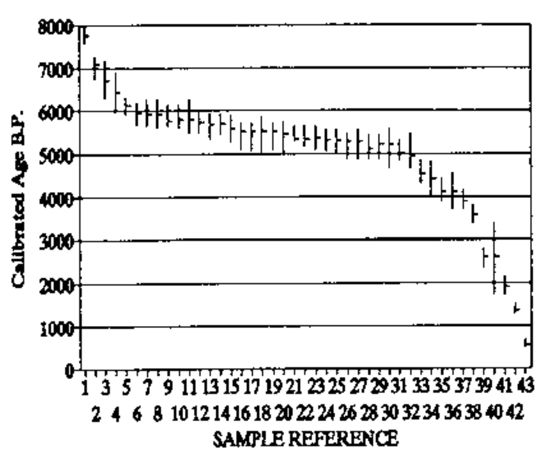

Figure 2. Hudson Valley radiocarbon dates - 3SD. Calibration based on Stuiver, and Becker, 1987.University of Washington Radiocarbon Calibration Program.

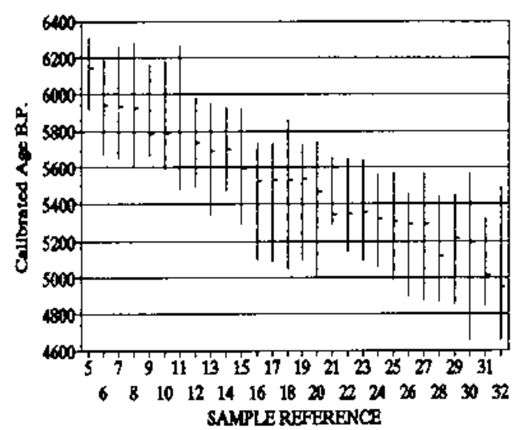

Figure 3. Hudson Valley radiocarbon date, - 2SD. Calibration based on Stuiver, and Becker, 1987. University of Washington Radiocarbon Calibration Program.

an Archaic date of 7170 B.P. ± 225 years on shell in context with a Neville point, excavated by Funk at the North Bowdoin Rockshelter (Funk 1989:68-71), would back up Brennan's date of 6950 B.P. from Dogan Point.

It was noted earlier that "extensive changes must be made in the archaeologist's concepts of the Archaic Period. All Archaic cultures are older than the carbon-14 dates have indicated many by more than 600 years" (Dragoo 1974:27).

Height-Length Ratio

How did Hudson Indians gather oysters? Sand and bed oysters would probably be handpicked at low tide or scooped up. Channel oysters could be harvested from a dugout or by diving. Reef oysters may be dislodged with stone tools. These oyster types were classified by their differential height/length ratios (Kent 1988:30) and would generally reflect the corresponding collecting techniques.

A sample of 360 midden shells from seven locations at the eastern Hudson shore were measured. The resulting ratios for 95% of the total samples ranged between 1.3 and 2.0 and are appropriate for bed oysters living on mixed muddy sand (Kent 1988:30). The oyster shells from Wickers Creek which had been analyzed previously varied within their three contexts but in these lots more sand than bed oysters were present (Custer 1988). Such oysters "thrive well on shore rocks and underwater structures which are left exposed at low tide" (Galtsoff 1964:399).

The predominance of sand and bed oysters -probably also indicative of shore conditions at the Lower Hudson River suggests collecting by hand or scooping.

The Puzzling Height Discrepancies

The height of oyster shells varies widely within each midden. The 355 valve samples averaged from 6.7 cm to 8.2 cm in height (Table 2, Figure 4). At Dogan Point the 572 shells averaged about 7.6 cm (Claassen 1987) and at Tellers Point between 7.7 and 10.3 cm (Fiedel 1991:50). Thus the height of about 1,000 valves registered below 12.5 cm. However, the bivalves that Brennan excavated from the bottom horizon of the Kettle Rock and Parham sites measured IS-20 cm (Brennan 1962:138). Although he nicknamed them "Giant Oysters," they are not genetically different but merely surprisingly larger than the rest of excavated midden shells.

Likewise, Reginald Bolton found in 1932 at Throg's Neck that "the shells of oysters increased in size in the lower part of the pits, some specimens near the bottom being upwards of seven inches in length" (Bolton 1976:119). The question beckons why these sizes only appeared at a few bottom strata and not also at higher levels of Hudson middens.
Oyster growth is influenced by the changes of estuarian environment, salinity, and nutrients. The sea level appears to

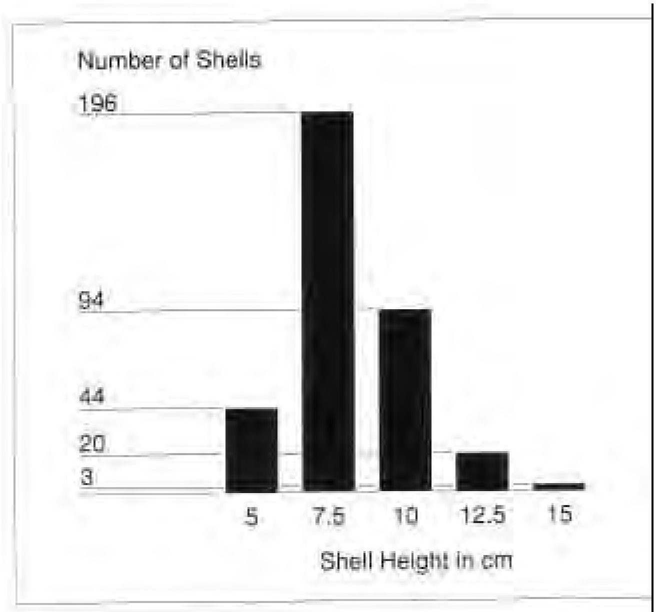

Figure 4. Shell height distribution in middens. Lower Hudson Valley, 1991.

have risen about 3 m/1000 years between 8000 B.P. and 2500 B.P. in the Hudson-Long Island area and only 1 m/1000 years after that to the present (Kellogg 1988; Oldale 1986). There probably could have been some local variations; "different shorelines were affected in quite different, or sometimes even in opposite, ways" (Goldsmith 1992:29). The Hudson water level may therefore have risen only about 3 mm/year which would hardly be noticeable at the river banks as the tides came and receded. Apparently the rise did not upset either oysterbeds or shellfish collection since five C-14 dates on shell indicate continuity (Table 1).

Oysters feed by opening their valves and permitting circulating water to supply nutrients but they perish if covered by mud or sediment. While several hurricanes caused such devastation of oysterbeds in the Long Island Sound (Galtsoff 1964:440), the Hudson River is no such exposed body of water. The fact that oysters were still harvested in the Hudson throughout the Woodland periods would argue against a substantial decrease of nutrients lasting during several millennia of the Archaic.

The salinity levels even today range from about 20 per thousand at the river mouth to about 5 per thousand around Peekskill. It would normally provide a viable habitat for oysters were it not for pollution and other benefits of civilization.

> Only in exceptional cases is the circulation in an estuary so impeded that stagnation and oxygen deficiency develop and render the area unsuitable for oyster growth and reproduction [Galtsoff 1964:404].

The investigation must then turn to the biggest and most successful predator: human beings.

Collecting the Oysters

Ancient gatherers are believed to have waded onto the shallow river edges to pick up oysters by hand or scoop them up. They may also have employed dugouts. Such boats were used by Indians for oyster fishing in Connecticut:

> Without a load, such log dugouts would float in three inches of water...and they drew only nine inches loaded with a ton of oysters in the shell [Gardner 1969:58].

Although scoops, baskets or nets have not been found, their perishable material probably did not survive (Speck 1946). A few small shells (3-4 cm) found could account for such equipment (Brennan 1981:45), although they may have been brought to shore attached to larger valves. At Dogan Point many of "these oyster valves were clustered when alive, as indicated by smooth areas on an otherwise highly textured surface. Some oysters were removed still attached to each other" (Claassen 1987). But the shells in the middens are generally found unattached.

Fortunately, Brennan pursued forcefully his "Giant Oysters" as important markers.

> There can be no doubt that valves size, when it is average for the oyster population being exploited is chronologically meaningful.... Fluctuations in size may have been due to aboriginal exploitative practices or to climate and geology [Brennan 1977a:1 27].

A decade later Fiedel proposed similar causes for variations of shell sizes (Fiedel 1987:93).

The glaring discrepancy of two inches between shell heights from middens and shell heights expected from undisturbed oyster lifecycles appears to be the result of human activity. It is suggested here that prehistoric River Indians concentrated on the

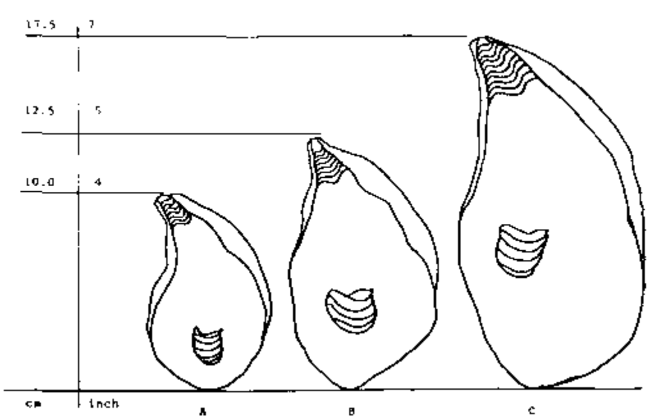

Figure 5. Oyster shell height in the Lower Hudson middens. A. lour inch average; B. five inch largest (maximum); C. seven inch or larger excavated by Brennan and Bolton.

largest oyster specimens when they collected them in the lower Hudson. This practice may have become predominant soon after the last "Giant Oysters" had been harvested.

The shell middens of Denmark reflect similar practices.

> Examination of the mollusc shells has shown that the biggest and most nourishing of these species were deliberately chosen [Andersen 1989:21].

An investigation of human-oyster interaction at St. Mary's City in Maryland noted:

> Humans were having a pronounced effect on oyster stocks by harvesting large numbers of oysters. Under this scenario there would be an inverse correlation between human population densities and oyster size [Kent 1988:51].

The human population registered a marked increase toward the end of the Archaic period.

> In the two millennia following 3000 B.C., numerous Late Archaic phases have been defined in New York, New England, and other parts of the Northeast. During this period the evidences of occupancy (such as number and size of sites and amount of refuse) are quantitatively far greater than those of the Early and Middle Archaic periods [Funk 1978:27].

Just four bands of Indians camping or living 15 km apart along the Hudson could have collected all bivalves exceeding 45 in (10-12.5 cm) and thus kept the number of larger specimens to zero. It seems reasonable to assume that the oysters could have continued to grow had they not been removed from their habitat. There are a fair amount of shells in middens measuring 12-14 cm which might otherwise have joined Brennan's Giant Oyster category (Figure 5).

The argument for selective gathering practice could be supported by the following tests. If both - oysterbeds and people - had been a continuous feature at the Hudson, then selective harvesting of the shellfish could have kept valve sizes to those now prevalent in the middens. The same result would have been achieved if oyster beds waned and waxed but people were in the Lower Hudson Valley on a permanent basis.

On the other hand, if intermittent migrations had been the prevailing pattern of occupation, then shells ranging 6-8 in (1620 cm) in height could be expected to show up in a variety of midden strata. However, none has been reported found except those at the bottom layers.

Conclusions

The shell mounds retain information which suggests certain aspects of Archaic lifeways although "we have no direct knowledge of anything at all from the remote past. All that we do know, has to be wrested from the relics of that past by a process of inference" (Renfrew 1984:4).

It has long been surmised that Algonquin-speaking bands in the Hudson Valley had contacts with each other. The radiocarbon data lends scientific relevance to such probability. The data replace assumptions with specific narrow time ranges within which such contacts could have taken place.

Hunter-gatherers are often thought to have been egalitarian groups that included equal access to resources and participation in common decisions (Flanagan 1989; Paynter 1989). The large community fireplaces of later settlements at Inwood and Throg's Neck may stem from cultural inertia of an egalitarian past (Bolton 1976:116).

The oyster-processing sites probably had a dual purpose. They could have functioned as "activity areas" for their base camps or for production of oyster meat as an object of barter.

Selective gathering of shellfish appears to have been practiced among the Archaic inhabitants o f the Hudson Valley landscape. This could reflect an adaptation superior in technique to mere collecting of shellfish for survival. Selectivity in collecting may also have tended to prevent over-harvesting-whether or not it resulted from deliberate human planning.

The comparative shell measurements can present only indirect evidence, but if selective oyster harvesting persisted for a lengthy period, then the figures suggest a permanent human presence rather than sporadic visits by mobile hunter-gatherer bands during the last two millennia of the Archaic.

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Redefining Iron Awls and Vent Picks

Donald A. Rumrill, Van Epps-Hartley Chapter

Reviews of artifact assemblages coupled with new information and insight occasionally reveal changes in artifact typology and utilization. This paper explores the possibility that some iron objects previously identified as awls probably were originally intended for other specific uses. These objects are known in snaplock-firearm studies as vent picks, tools essential to constant weapons maintenance. Various configurations of other similar iron articles are also described with probable applications for each.

When a snaplock-firearm mechanism is fired, the spring-levered action of the cock causes its gunflint to strike a steel frizzen, and the resulting sparks ignite the powder in the priming pan. The fire travels through a hole known as the "vent" in the breech of the gun barrel, exploding the main powder charge and sending the contained projectile load on its way. After several loads have been fired in this manner, the barrel begins to foul, i.e., has a build-up of black powder residue. If the barrel is not then scoured of this constriction by the use of water and a tool attached to the ramrod, another fired ball could become wedged, sometimes with damage to the barrel and sometimes too to the shooter.

The vent requires maintenance at the same time with the use of a vent pick, a four-sided piece of iron tapering to a point. If the vent fouls shut, the priming powder ignites but does not set off the barrel charge. This aborted gunfire is the origin of the phrase "flash in the pan" given to any circumstance or person that creates initial attention without any appreciable result. This writer became aware of vent picks upon purchasing a versatile flintlock tool known as a "gun hammer" (Figure 1 a-e) at the colonial village at Williamsburg, Virginia. Its various combinations include a worm to extract wedged lead balls (Figure 1a), a screwdriver

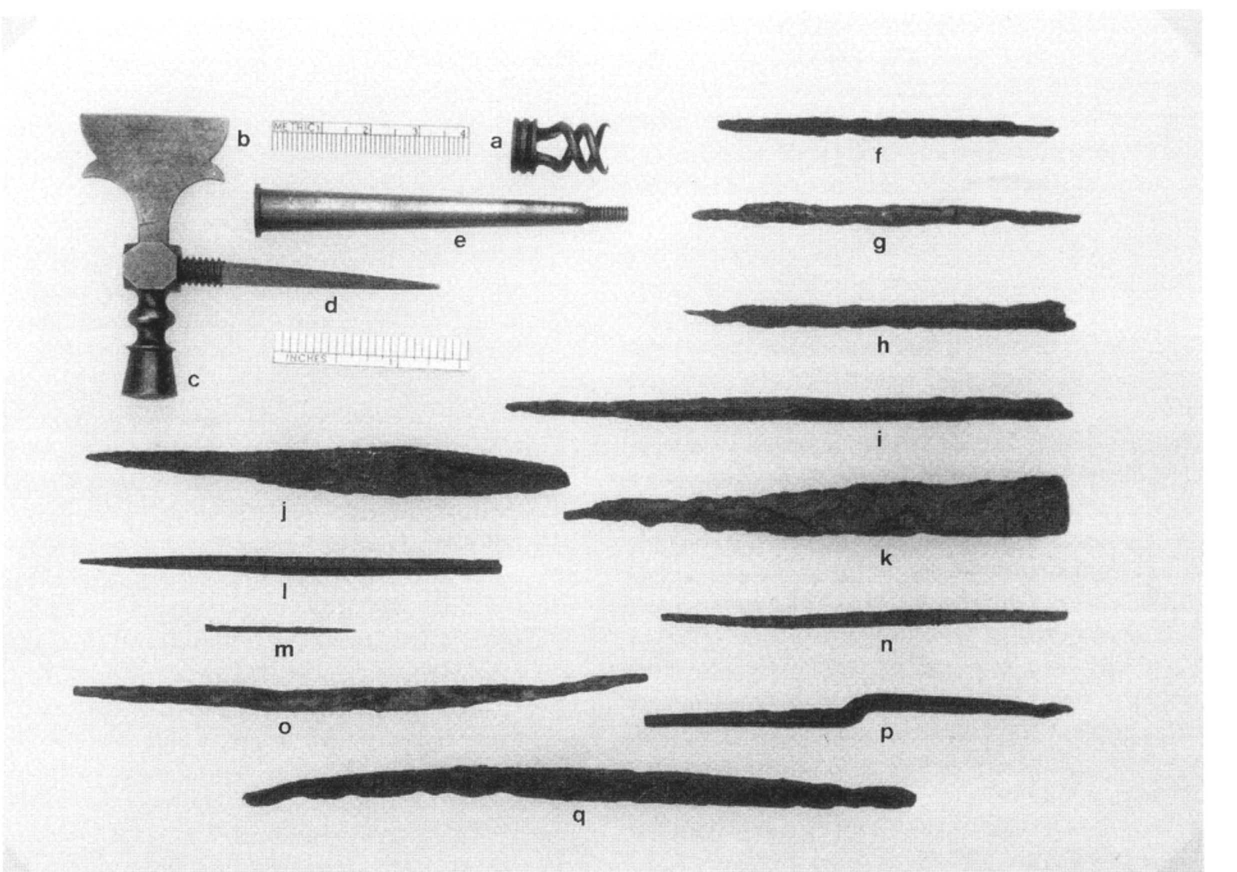

Figure 1. a-e. gun hammer; f-k. awls; I. needle; m. straight pin; n-q. vent picks.

(Figure 1b), a hammer for reworking gunflints, etc. (Figure 1c), and a vent pick (Figure 1d).

In May 1992, the writer was invited to meet with Jan Piet Puype, Curator at the Leger Museum in Delft, The Netherlands. at the Rochester Museum & Science Center and bring along the more significant seventeenth-century firearms artifacts from his Mohawk Indian site collection. Also in attendance were four prominent avocational archaeologists from the Norwich, New York, area: Richard Hosbach, Daryl Wonderly, Gerald Hayes, and Francis Hailey with their collections from Oneida Indian sites for the same time period. Jan Puype identified each artifact as to firelock type, the probable country of origin, nomenclature, etc. The most astounding result of the meeting, at least to this writer, is that the Mohawk material had a few pieces from Spanish and English locks but the majority were Dutch; the Oneida material was preponderantly French.

The author also brought along several select examples of iron "awls" with the specific intention of questioning Jan Puype as to the possibility that they were not awls at all but vent picks, since they had been collected from sites that were liberally sprinkled with firearms parts. Earlier dated sites without artifacts showing possession and/or use of firearms did not, in fact, produce iron items of these specific configurations. Jan Puype did agree that they could very well have been originally intended for use as vent picks.

References to vent picks are scarce except in catalogs for modern black powder firearm enthusiasts. T.M. Hamilton (1980:123, Figure 75, #6 and #7) depicts two offset vent picks from a gunsmith's cache which he labels "inletting floats." Jackson and Whitelaw (1923:60-62), commenting on hand-held firearms, state that "the extremity of the [gun] butt is usually fitted with a steel picker to clear the touch hole."

On seventeenth-century Iroquois Indian sites across New York State, fairly common finds have been iron artifacts previously cataloged as iron awls. This category then was subdivided into types such as tapered, double tapered, and offset, and configured as square and diamond shaped in cross section (Rumrill 1985, 1986). Iron tools that probably could be designated as awls from sites that do not have firearms evidence have distinctly different shapes than vent picks. There are those with round shanks and tapered, pointed ends (Figure lf-i) and others with flattened shanks and tapered, pointed ends (Figure 1j, k). There are also iron needles (Figure 1i) that are distinguished by their flattened diamond shape cross section, if the eye is missing for identification purposes.

As an example of artifact assemblage differentiation, on the Rumrill-Naylor Site (Cnj 102) c. 1632-1646 (Rumrill 1985, 1988, 1991), a total of 350 small pointed iron artifacts were collected of which 312 were nails with heads. 16 nails without heads which without question were not awls, 2 iron awls, 5 iron needles, 1 iron straight pin (Figure 1m) and 24, in my opinion, vent picks. Commonly, vent picks are 3-5 in long and 1/8 to 5/32 in at their widest point regardless of whether they are single tapered (Figure 1n), double tapered (Figure lo), or offset (Figure 1p). Larger vent picks up to 6 in long and 1/4 in in width (Figure 1q) are conjectured as serving the same purpose with larger ordnance. Double-tapered offset vent picks appear to have been heated to a high enough temperature to have two close, opposing 90° ends made at a center point rather than to have been two separate pieces fuse-welded together.

There is little doubt that these tools probably saw multiple uses by the Indians as awls, drills, reamers, perforators, gravers, and other utilizations of earlier lithic and bone adaptations. It is this writer's opinion that the iron tool in question was manufactured with the intent of purpose that they be used as vent picks for snaplock-type firearms.

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