HORTICULTURAL HUNTERS: SEASONALLY ABUNDANT ANIMAL RESOURCES AND GENDER ROLES IN LATE PREHISTORIC IROQUOIAN SUBSISTENCE STRATEGIES

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Iroquoian subsistence has been interpreted as a strategy that relied heavily on deer and corn. Recent archaeological investigations in western New York State, however, have produced diverse faunal and floral assemblages that allow a more complex picture of Iroquoian subsistence to emerge. This paper discusses the faunal remains from the Spaulding Lake site (UB2497), located in the town of Clarence in Erie County. This single-component Iroquoian site on the Onondaga Escarpment was occupied seasonally between ca. A.D. 1450 and 1550. It was excavated between 1989 and 1991 by the Archaeological Survey of SUNY-Buffalo. This paper discusses 1) the ethnohistoric and archaeological evidence for animal procurement among Iroquoian and Great Lakes Indian groups, 2) the Spaulding Lake faunal material compared to other Iroquoian faunal assemblages from two nearby sites, the Nursery site (UB227) and the Piestrak site (UB2581), recently excavated, and 3) implications for interpretations of Iroquois settlement and subsistence systems, gender roles, and socio-political organization.

Key words: gender roles, Iroquois, recovery techniques, seasonality, subsistence

Prehistoric Iroquoian subsistence has been interpreted as a strategy relying heavily on deer and corn (e.g., Pendergast 1966; Pratt 1976; Ritchie and Funk 1973; Tuck 1971, 1978). The dominance of deer and corn in many Iroquoian archaeological assemblages reflects recovery techniques, soil preservation, and an emphasis on palisaded villages rather than other types of sites. Recent archaeological investigations in western New York State, however, have found more diverse faunal and floral assemblages, allowing a more complex interpretation of subsistence strategies with implications for reinterpreting Iroquoian gender roles and socio-political organization.

This paper discusses faunal remains from the Spaulding Lake site (UB2497), located in western New York State within the town of Clarence, north of Ellicott Creek. This single-component Iroquoian site on the Onondaga Escarpment was occupied seasonally from ca. A.D. 1450 to 1550. There was no lake at the time of occupation; the present artificial lake is the result of flooding a limestone quarry. The site was excavated between 1989 and 1991 by the Archaeological Survey of SUNY-Buffalo (Perrelli et al. 1995) and interpreted as a small (0.5 acre) agricultural hamlet occupied from spring to late summer or early fall (Perrelli et al. 1995:233-234). Part of the site had been destroyed before it was investigated archaeologically. The lack of structural remains at the site may be a result of this destruction. Despite the absence of structural remains, the quantities of artifacts and subsistence remains indicate that this was a residential site: a minimum of 68 ceramics vessels (all falling into the ^{14}C date span of A.D. 1450-1550), 10 projectile points (8 of which are Madison points), numerous simple and retouched flake tools, cores, hammerstones, abrading/grinding stones, ceramic smoking pipes, and abundant faunal and floral remains (Perrelli et al. 1995:121-149, 155, 196-214, 254-311).

Following a discussion of ethnohistoric and archaeological evidence for animal procurement among Iroquoian and Great Lakes Indian groups, the paper turns to a detailed discussion of the faunal data from the Spaulding Lake site. These data are then compared to other Iroquoian faunal assemblages. Finally, there is a discussion of the implications of the findings for interpretations of Iroquoian settlement and subsistence systems, gender roles, and socio-political organization.

IROQUOIAN ANIMAL PROCUREMENT

The importance of spring fishing in the subsistence rounds of several early historic-period Iroquoian groups is documented in ethnohistoric and ethnographic records (Fenton 1978:297, 301; Heidenreich 1978:379, 382; Morgan 1962:347; Trigger 1985:92). These sources also record a variety of fishing techniques and technology: hook, line, dip nets, traps, drags, spears, harpoons, bows and arrows, stone and wooden weirs, and such

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unspecialized tools as sticks and rocks (Fenton 1978:297, 301; Heidenreich 1978:382; Martin 1989:596).

One piece of worked bone determined to be a partially completed matting or netting needle was recovered from the Spaulding Lake site (Perrelli et al. 1995). Although no bone fishhooks, harpoons, or stone net weights were recovered, evidence of these technologies was found at Chance and Garoga phase sites in New York, including the Barnes site (Tuck 1971:154, 157-160), Temperance House Fort site (Tuck 1971:164), Atwell Fort site (Tuck 1971:169), Goff site (Pratt 1976:100), and the Nichols Pond site (Pratt 1976:149) and late prehistoric Iroquoian sites along the St. Lawrence River in Ontario, e.g., the Salem and Grays Creek sites (Pendergast 1966:32-35, 57-58).

Ethnohistoric accounts of early historic Iroquoian groups note the use of nets to fish and to capture passenger pigeon (Fenton 1978:297, 301), quail, and other small fowl (Morgan 1962:345). Other means of capturing birds included bow, spear, snare, air-gun and arrow, and long poles (Fenton 1978:297-298, 301; Heidenreich 1978:382; Morgan 1962:379). These accounts also write that traps and snares were used for small and large mammals (Fenton 1978:298; Heidenreich 1978:382; Morgan 1962:345). Deer were hunted with snares, traps, bows, and in communal drives (Fenton 1978:298; Heidenreich 1978:382). Smaller mammals were hunted with bow, spear, or snare (Heidenreich 1978:382). Frogs recovered from the site were probably "gigged" (speared), although ethnohistoric accounts do not mention this.

The lithic assemblage at Spaulding Lake includes hunting implements in the form of some 10 points, most of which are small, triangular Madison points. The assemblage also includes many bifacially and unifacially retouched flakes, likely used to prepare meat and skins, among other functions.

Ethnohistoric sources generally agree that Huron and Iroquoian men conducted most of the hunting (Fenton 1978: 297-298; Heidenreich 1978: 379, 383) and fishing (Fenton 1978: 297-298, 301; Heidenreich 1978: 379-380), while Huron and Iroquoian women controlled the agriculture, usually at multiple locations (Fenton 1978: 297-298; Heidenreich 1978: 379, 382-383), and collected firewood (Heidenreich 1978: 379), roots, berries, greens, nuts, and other plant foods and products (Fenton 1978: 297-299, 301).

Among the Huron, women sometimes accompanied the deer hunts to help drive the deer, butcher them, and take the meat back to the village (Heidenreich 1978: 382). Among the postcontact Iroquois, women participated to some extent in hunting and fishing trips, in addition to horticultural tasks (Latta 1991:378). In the postcontact Upper Great Lakes, Indian women participated in fish procurement as well as fish processing (Martin 1989:596), and among the postcontact Cree and Ojibwa, women fished, hunted small game, and gathered nuts, berries, and fruits (Devens 1991:51).

There are also references to Iroquoian family groups going to fishing stations in the spring (Fenton 1978:297; Trigger 1985:92). Trigger (p.88) also interprets late precontact Iroquoian subsistence strategies as including groups of men, women, and children leaving villages for "considerable periods" in warm weather for camps that were some distance away to hunt, fish, and gather nuts.

SPAULDING LAKE FAUNAL ASSEMBLAGE

The faunal remains from Spaulding Lake were identified by the author using the comparative osteological collections of the Illinois State Museum in Springfield (Table 1). Numbers of fragments and weight in grams were recorded for all remains. Minimum numbers of individuals (MNIs) and estimates of meat weight (biomass) represented by the bones were calculated (Reitz and Scarry 1985; Reitz et al. 1987; Wing and Brown 1979), the latter of which was used to interpret the dietary importance of various species (Scott 1995:265-311). I discuss only those remains from features and undisturbed levels of the test units, which total some 12,724 fragments of bone and shell. For the most part the material will be discussed from the site as a whole, as a single-component site, although tentative evidence for slight change through time will be put forth as well.

Dietary data. One of the most striking aspects of the faunal assemblage from the Spaulding Lake site is the importance of fish, 50.4% of the total estimated meat represented by the faunal remains. Mammals were only slightly less important, comprising 40.6%. Birds contributed slightly more meat than did frogs.

In calculating the numbers of individuals represented here, I have disregarded the 147 gastropod individuals, since they probably do not represent food remains. Thus the MNI percentages here are based on a total of 107 individuals. Fish provided the greatest number of individuals (n = 52, 48.6%), with mammals, reptiles/amphibians, and birds lagging far behind.

The most important fishes in the diet were walleye and sauger, providing 9.0% of the total estimated meat weight and at least 20 individuals. Next were lake sturgeon, followed by sucker and redhorse. A variety of other fish supplemented these: pike, white bass, sunfishes

Table 1. Spaulding Lake (UB2497) fauna (MNI total excludes gastropods).

TAXON	NISP	Wt (g)	MNI		Biomass	
			no.	%	kg	%
White-tailed deer	10	25.2	1	0.9	0.48	4.2
Black bear	3	6.6	1	0.9	0.14	1.2
Dog/coyote	22	54.0	3	2.8	0.95	8.3
Cf. Dog/coyote	1	0.9			0.02	0.2
Gray fox/red fox	5	2.2	1	0.9	0.05	0.4
Cf. Gray fox/red fox	1	0.2	1	0.9	0.01	0.1
Unid. carnivore	9	2.2	1	0.9	0.05	0.4
Muskrat	3	3.5	1	0.9	0.08	0.7
Cricetidae (mouse/vole)	1	0.1	1	0.9	<0.01	<0.1
Eastern chipmunk	6	0.5	2	1.9	0.01	0.1
Cf. Eastern chipmunk	1	<0.1			<0.01	<0.1
Gray squirrel	90	18.5	5	4.7	0.36	3.1
Red squirrel	2	0.3	1	0.9	0.01	0.1
Unidentified rodent	51	4.0	4	3.7	0.09	0.8
Unidentified mammal	1077	151.5			2.41	21.0
MAMMAL SUBTOTAL	1282	269.7	22	20.3	4.66	40.6
Swans/Geese	6	1.6	1	0.9	0.03	0.3
Hawk sp. (cf. goshawk)	1	0.6	1	0.9	0.01	0.1
Ruffed grouse	2	0.5	1	0.9	0.01	0.1
Passenger pigeon	52	7.2	7	6.5	0.12	1.1
Cf. Passenger pigeon	1	0.2			0.01	0.1
Woodpeckers/flickers/sapsuckers	1	0.1	1	0.9	<0.01	<0.1
Passeriformes	1	0.1	1	0.9	<0.01	<0.1
Unidentified bird	224	28.8			0.44	3.8
BIRD SUBTOTAL	288	39.1	12	11.0	0.62	5.5
Painted turtle	23	10.3	1	0.9	0.15	1.3
Unidentified turtle	12	0.9			0.03	0.3
Frog sp.	118	3.6	15	14.0	0.25	2.2
Frog sp./toad sp.	8	0.1			0.01	0.1
REPTILE/AMPHIBIAN SUBTOTAL	161	14.9	16	14.9	0.44	3.9
Lake sturgeon	244	52.8	1	0.9	0.69	6.0
Longnose gar	2	0.1	1	0.9	0.01	0.1
Lake whitefish	4	0.2	2	1.9	0.01	0.1
Cf. Lake whitefish	1	<0.1			<0.01	<0.1
Round whitefish	2	0.1	1	0.9	0.01	0.1
Cf. Round whitefish	2	0.1			0.01	0.1
Whitefishes/ciscoes	38	1.4	1	0.9	0.04	0.4
Trouts/whitefishes/ciscoes	1	0.1			0.01	0.1
Quillback carpsucker	1	0.4	1	0.9	0.02	0.2
Redhorse sp.	36	10.6	7	6.5	0.20	1.8
Suckers/redhorses	32	7.7			0.15	1.3
Catfishes/bullheads	4	0.5	2	1.9	0.02	0.2
Cf. Catfishes/bullheads	1	0.1			0.01	0.1
Northern pike	7	3.0	1	0.9	0.07	0.6
White bass	30	8.5	5	4.7	0.16	1.4
Cf. White bass	1	0.1			<0.01	<0.1
Smallmouth bass	1	0.1	1	0.9	<0.01	<0.1
Smallmouth/largemouth bass	22	5.7	3	2.8	0.12	1.1
Rock bass	38	4.3	5	4.7	0.09	0.8
Centrarchidae (sunfishes)	1	0.2			0.01	0.1
Walleye	379	75.0	18	16.8	0.99	8.6
Walleye/sauger	17	1.7	2	1.9	0.04	0.4
Freshwater drum	2	1.1	1	0.9	0.04	0.4
Unidentified fish	7549	305.7			3.04	26.5
FISH SUBTOTAL	8415	479.5	52	48.4	5.74	50.4
Spike	3	47.1	3	2.8		
Black sand shell	1	13.5	1	0.9		
Kidneyshell	1	8.7	1	0.9		
Unidentified bivalve	152	39.7				
Unidentified gastropod	582	41.6				
Unidentified shell	1	<0.1				
Unidentified invertebrate	1	<0.1				
INVERTEBRATE SUBTOTAL	741	150.6	5	4.6		
Unidentified bone	1837	18.4				
TOTALS	12,724	972.2	107	99.2	11.46	100.4

(smallmouth and rock bass), freshwater drum, catfish or bullhead, and whitefish. Garfish, represented by only one skull fragment and one scale fragment, is probably the least important fish in the diet of the site's inhabitants. Also, several elements from minnow-sized fish were present, but time and budgetary constraints did not allow identification of these to the genus or species level.

Mammals provided the bulk of the rest of the meat diet at the site. The species providing the greatest percentage of meat was dog or coyote, 8.5% of the total, represented by at least 3 individuals. White-tail deer was next in percentage of estimated meat weight, then squirrels. Black bear, fox, and muskrat supplemented these.

Birds represent 5.5% of the total estimated biomass. The most important single bird was passenger pigeon, represented by at least 7 individuals. Grouse, hawk, and swan or goose supplemented passenger pigeons.

Frog and frog/toad species, represented by at least 15 individuals, provided 2.3% of the total estimated biomass, contributing more to the diet than did any of the individual bird species. More than half the frog remains (54.8%) are elements from the pelvis and back legs, portions with the greatest meat. Most of the rest of the elements are from front legs and upper body, but only two skull fragments were present. This suggests that removal of the heads (and probably gutting) took place either elsewhere on the site or at the place of capture.

Non-food animal remains. Although fur-bearers were most likely utilized for both meat and fur, some skeletal elements in an assemblage might best be interpreted not as food remains but as the remains of furs, pouches, or medicine bags. For example, the only bear elements at the Spaulding Lake site are one canine tooth and one foot bone. These remains might be expected from hide-skinning activities or from a pelt; that is, they are from the head and foot, and could have been left on a pelt (which has since decayed) or been cut off when the finished fur was taken. Thus the bear remains might be questioned as food remains. The only muskrat elements are from the lower leg (ulna) and head (mandible) and also might represent fur-processing activities or a pelt.

Deer, fox, and squirrel elements from the site include several parts of the skeleton, suggesting their use as food, although fur, skin, or both probably were utilized as well. Dog or coyote remains include elements from most parts of the skeleton and also many teeth. Several teeth and long bones were worked, suggesting the use of dog or coyote first as food and later as raw material for utilitarian and decorative objects (awls and pendants).

The turtle remains from the site are nearly all from one carapace and may represent food remains, but no meat-bearing skeletal elements were recovered. If turtle was a food resource, it was not an important one. Several shell fragments have been cut, although their functions could not be determined.

Seasonality. The abundance of spring-spawning fish provides strong evidence for a warm-weather occupation of the site. Except for the whitefishes, all the fish species present spawn in the spring. In addition, the most abundant bird species, the passenger pigeon, would have been in the area from spring until fall, and would have been available in large numbers during migration. This is true as well for migratory waterfowl, such as the swan or goose. Finally, the frogs would have been most abundant and most easily caught during the spring, when large numbers gather for mating.

White-tail deer and the whitefish family are the only species indicative of fall occupation, but do not occur in sufficient numbers to suggest they were significant in the diet of the site's residents. Ten deer fragments from two leg bones (radius and metatarsal) and several worn antler fragments are the only deer remains from the site. The deer radius is unfused, indicating a juvenile or subadult. Whitefish and ciscoes spawn in the fall, but this happens in the Great Lakes, distant from the site.

Ethnohistoric accounts state that Indian groups throughout the Great Lakes caught whitefish in large numbers during the spawning runs, then smoked and dried them for use through the winter (Heidenreich 1978:382; Martin 1989:596; Trigger 1985:85). Thus, whitefish would be precisely the food staple one would expect at a spring site as the last remnants of the winter's food supply. This interpretation is strengthened by the fact that, of the 48 fragments of whitefish and related species recovered at Spaulding Lake, 40 are vertebrae. Thus an abundance of skull fragments, which would suggest catching and processing fish, is not present for the fall-spawning fish, but is present for the spring-spawning species that occur in habitats near the site.

The other mammals, birds, and turtles in the assemblage could have been present in the site area year round. Fur-bearers, such as the fox, muskrat, and black bear in the assemblage, would have had their thickest furs during the winter, and might indicate winter or early spring capture. Several fish species in the assemblage can be caught with nets or spears under the ice and may represent "year round" species. Of the 52 individuals represented by the fish remains, 48 (94.3%) are from fish that spawn in the spring and are available in large numbers that are easily caught at that time.

The plant remains, analyzed by Paul Gardner (1995), point to a spring and summer occupation as well. Corn and beans are present, and most of the edible wild species present are those that ripen in late spring to early summer (strawberries), mid-summer (blackberries and elderberries), and late summer to early fall (plum/cherry, grape, and hawthorn). The few nuts present (acorn, hickory, and butternut) may, like the whitefish, represent remnants from stored winter foods.

There is some evidence of a slight change through time in food resource utilization and length of seasonal occupation at the site. Based on radiocarbon dates and ceramic cross-mends, several proveniences can be associated with a median date of A.D. 1440 and several others with a date of A.D. 1525 (Perrelli et al. 1995:158). Over time, there is a marked decrease in the importance of mammals at the site, and a marked increase in the importance of fish, in particular, walleye, sturgeon, sucker, redhorse, and bass, which increase in importance, as do deer and squirrels. The main decrease is in the importance of dog or coyote to the diet, although, even with the decrease, dog remains more important in the diet than deer at the 1525 date. Birds contribute similar percentages to the diet at both dates.

When the plant remains are added to the analysis, a clearer picture emerges. In the A.D. 1440 material, maize kernels and cupules are present, along with blackberries and elderberries, which ripen in mid-summer; acorn and butternut are present in small amounts. In the A.D. 1525 material, however, there are fruits that ripen both earlier (strawberry) and later (plum/cherry and hawthorn), in addition to blackberries and elderberries. Besides corn kernels and cupules, corn shanks are present, as are beans, suggesting harvesting of crops; small amounts of hickory and butternut also are present. All this suggests use of the site from spring until early fall by A.D. 1525. Together, then, the plant and animal remains seem to indicate that, through time, people were staying at the site longer.

Habitat exploitation. The closest source of water to the site at that time would have been a spring about 600 feet to the south (where the artifical lake is today). In addition, Got Creek, probably the closest source of fish, flows along the base of the escarpment north of the site, and a small marshy wetland area is some 800 feet west of the site (Perrelli et al. 1995). Numerous wetlands and small creeks are to be found in the flat, glaciated area below the escarpment. The large Ellicott Creek is roughly 3 miles to the south and the larger Tonawanda Creek is approximately 6 to 8 miles to the north. At the time of occupation, the site was part of a climax hardwood forest, including beech, maple, hemlock, and oak (Perrelli et al. 1995), appropriate habitat for the animal remains recovered at the site. People hunted mammals and birds in forests and open and semi-open areas, and fished in inland streams and wetlands. They also planted corn and beans, probably on lands below the bluff, and gathered wild fruits and possibly nuts from both forested and open areas. In short, they appear to have utilized all the food resources available to them.

Worked bone. A total of 85 pieces of worked bone were recovered from the undisturbed proveniences, about two-thirds of which are mammal bone and one-third of which are bird bone. Two worked fish bones are a drilled tooth and a cut/worked skull fragment. The most numerous identifiable bone artifacts are tubular beads, made from long bone shafts. Nine beads are of mammal bones, representing a minimum of four whole beads. Twenty-five specimens are of bird bones, representing a minimum of 11 whole beads, nearly three times as many as from mammal bones. Although one tubular shell bead from a bivalve also was recovered, none of the bivalve shells recovered in the assemblage showed signs of being worked. The next most numerous bone artifact category was awls, 10 made from bird and mammal long bones, four of which are from dog or coyote. Three teeth, drilled in the roots, were recovered, probably representing pendants or other items of adornment. Two were dog or coyote canines and one was a fish tooth.

Thirty-seven other mammal, bird, or fish bone fragments showed signs of being cut, incised, smoothed, sharpened, or combinations of these techniques. Several worked bone fragments appear to have been smoothed with a rodent incisor. This is apparent on the bones from long lines of scoring with the incisor, which differ in length and regularity from rodent-gnawing marks. Pendergast (1966:32-35, 57-58, 73-75) noted modified beaver or woodchuck incisors used as chisels or other tools at the Salem, Grays Creek, and Beckstead sites in Ontario. A beaver-incisor tool with a ground edge also was recovered from the Garoga site (Tuck 1978:331).

Bone artifacts similar to the Spaulding Lake material have been found at numerous late precontact Iroquois sites in New York and Ontario (e.g., Pendergast 1966:32-35, 57-58, 73-74; Pratt 1976:100, 149; Tuck 1971:117-118, 122, 125, 135, 154, 157-160, 164, 169). Absent from Spaulding Lake are worked deer phalanges, ubiquitous elsewhere, and worked antler points and flaking tools, thus lending additional support to the interpretation that the site was used during warm months.

INTERSITE COMPARISONS

Although differences in recovery and analytical techniques between the 1960s and 1990s make comparisons difficult, at the sites excavated earlier, deer and turkey remains are much more numerous than at Spaulding Lake. The Spaulding Lake site is set apart from Late Woodland Five Nations Iroquois sites and Late Woodland Huron sites (e.g., Schoff, Bloody Hill, Keough, Burke, Cemetery [Tuck 1971], Nichols Pond, Buyea, Goff [Pratt 1976]) by the presence of large numbers of spring-spawning fish, as well as waterfowl, passenger pigeon, and frogs not recovered from the other sites excavated earlier (Scott 1993).

Recently more sites in New York and Ontario have produced assemblages dominated by fish, birds, and small and medium mammals (Perrelli et al. 1993; Perrelli et al. 1995; Perrelli 1997; Thomas 1996). In particular, two contemporaneous sites in Erie County have produced well-preserved faunal assemblages useful for comparison (Perrelli 1997:67-71; Scott 1997). The Nursery site (UB227), located in the town of Lancaster, was a palisaded village encompassing 1.5 to 2.0 acres, occupied ca. A.D. 1400 (Table 2). The Piestrak site (UB2581), located in Clarence about 300 meters south of the Spaulding Lake site, was a much smaller (c. 60 x 50 m) late summer and fall camp used between A.D. 1400 and 1500, primarily by women and children, for harvesting and processing specific resources, including nuts and corn (Perrelli 1997:67-72) (Table 3).

Faunal assemblages at all three sites were dominated by small and medium mammals and fish with little evidence that large mammals contributed to the diets there (Table 4; Fig. 1). At the Nursery site, large mammals (deer) contributed 11.8% of the total estimated biomass, while small and medium mammals contributed 27.5%. At the Piestrak site, large mammals (probably elk) contributed only 3.9% of the total biomass, while small and medium mammals contributed 22.2%. At the Spaulding Lake site, large mammals (deer and black bear) contributed only 5.4% of the total biomass; small and medium mammals contributed 14.2%. At the Nursery site, nearly one-quarter of the estimated meat weight came from small mammals, mostly squirrels.

Three groups of spring-spawning fish were most important at all three sites: walleyes and saugers, lake sturgeon, and suckers. At the Spaulding Lake site they provided 18.3% of total estimated meat weight; at the Nursery site 18.4%; and at Piestrak, where fish were less important, 10.3%. Walleyes and saugers were most important at the Spaulding Lake and Piestrak sites; suckers were most important at the Nursery site.

Spaulding Lake, where fish were more important than mammals in terms of both biomass and MNIs, also had the greatest variety of fish species. It is possible that the more limited variety of fish species at the Nursery site is related to the fact that it was a palisaded village rather than a hamlet, thus a more permanent site than Spaulding Lake.

Birds were slightly more important at the Nursery site than at Spaulding Lake, and hardly present at all at Piestrak. Passenger pigeon was the most important bird species at Spaulding Lake, while at the Nursery site turkey, present only at that site, and passenger pigeon dominated the bird assemblage.

DISCUSSION

The faunal assemblages from the Spaulding Lake, Nursery, and Piestrak sites differ markedly from those of Late Woodland Five Nations Iroquois sites and Late Woodland Huron sites. Faunal assemblages suggest seasonal occupation with implications for interpretations of gender roles in Iroquoian society as well.

One explanation of the different subsistence strategies between the three western New York State sites and the Five Nations Iroquois or Huron sites is that the Spaulding Lake, Nursery, and Piestrak sites may have been occupied by Neutral, Erie, or Wenro Iroquoian groups, rather than Five Nations groups (Perrelli et al. 1995:238-240), although only a few Neutral, Erie, or Wenro Iroquoian sites have been excavated in western New York (e.g., Lennox and Fitzgerald 1990). It also might be the case that Spaulding Lake, Nursery, and Piestrak represent different types of Five Nations Iroquois sites from the traditional palisaded hilltop village occupied year round or in the cold months. To address this uncertainty, scholars have called for regional surveys that might reveal such camps or hamlets occupied for exploitation of specific resources (e.g., Trigger 1985:72-73).

Settlement type and settlement location. The Spaulding Lake site provided access to multiple natural resources: fish and other aquatic species from creeks and wetlands; passenger pigeons from nesting areas in the beech trees of the nearby forests (Fenton 1978:301); probably sugar from the maple trees there; numerous berries; suitable land below the bluff for corn and bean agriculture; and Onondaga chert deposits from the escarpment itself (and there is evidence of fairly intensive chert exploitation). Although no structures were found, the artifactual and subsistence remains indicate a residential occupation. There is at least one palisaded

Table 2. Nursery site (UB227) fauna.

TAXON	NISP	Wt (g)	MNI no.	MNI %	Biomass kg	Biomass %
White-tailed deer			1	1.5	0.83	11.8
Unid. large mammal					0.12	1.7
Bobcat/lynx			1	1.5	0.01	0.1
Raccoon			1	1.5	0.05	0.7
Unid. carnivore					0.02	0.3
Woodchuck			3	4.6	0.22	3.1
Eastern gray squirrel			13	19.7	0.72	10.3
Fox squirrel			2	3.0	0.06	0.9
Eastern gray/fox squirrel			3	4.6	0.66	9.4
Red squirrel			1	1.5	0.02	0.3
Eastern chipmunk			3	4.6	0.02	0.3
Sciuridae (squirrels)					0.01	0.1
Muskrat			1	1.5	0.08	1.1
Cricetidae (New World rats and mice)			1	1.5	<0.01	<0.1
Unidentified rodent					0.04	0.6
Snowshoe hare			1	1.5	0.02	0.3
Leporidae (hares and rabbits)					<0.01	<0.1
Unidentified mammal					1.40	19.9
MAMMAL SUBTOTAL	1568	213.2	31	47.0	4.28	60.9
American bittern			1	1.5	0.02	0.3
Anatinae (ducks)			2	3.0	0.05	0.7
Accipitridae (hawks and eagles)			1	1.5	0.03	0.4
Ruffed grouse			1	1.5	0.01	0.1
Turkey			1	1.5	0.22	3.1
Phasianidae (turkey and grouse fam.)					<0.01	<0.1
Passenger pigeon			4	6.1	0.11	1.6
Columbidae (pigeons and doves)					0.01	0.1
Pileated woodpecker			1	1.5	0.01	0.1
Woodpecker sp.					<0.01	<0.1
Passeriformes			2	3.0	<0.01	<0.1
Unidentified bird					0.07	1.0
BIRD SUBTOTAL	144	28.8	13	19.6	0.53	7.4
Unidentified snake			1	1.5	<0.01	<0.1
Frog sp.			2	3.0	0.04	0.6
Unidentified frog/toad					<0.01	<0.1
REPTILE/AMPHIBIAN SUBTOTAL	11	0.5	3	4.5	0.04	0.6
Lake sturgeon			1	1.5	0.32	4.6
Cf. Whitefish group			1	1.5	<0.01	<0.1
Cf. River redhorse			1	1.5	0.01	0.1
Cf. Golden redhorse			1	1.5	0.01	0.1
Cf. Northern shorthead redhorse			2	3.0	0.06	0.9
Redhorse sp.					0.16	2.3
Catastomidae (suckers)			2	3.0	0.32	4.6
Rock bass			1	1.5	0.01	0.1
Walleye			4	6.1	0.15	2.1
Walleye/sauger			1	1.5	0.26	3.7
Freshwater drum			1	1.5	0.07	1.0
Unidentified fish			2	3.0	0.80	11.4
FISH SUBTOTAL	1567	109.0	17	25.6	2.17	30.9
Unidentified bivalve	102	29.8	2	3.0		
Unidentified gastropods	22	0.8				
INVERTEBRATE SUBTOTAL	124	30.6	2	3.0		
Unidentified bone	1730	10.9				
TOTALS*	5144	393.0	66	99.7	7.02	99.8

*NISP total excludes 2 human teeth; MNI total excludes gastropods.

Table 3. Piestrak site (UB2581) fauna.

TAXON	NISP	Wt (g)	MNI		Biomass	
			no.	%	kg	%
Cf. Elk			1	3.2	0.12	3.9
Dog/coyote			2	6.5	0.19	6.1
Gray fox			1	3.2	0.24	7.7
Canidae (wolf and fox family)					<0.01	<0.1
Unid. carnivore					<0.01	<0.1
Muskrat			1	3.2	0.05	1.6
Gray squirrel			1	3.2	<0.01	<0.1
Squirrel sp. (cf. gray squirrel)					0.01	0.3
Squirrel sp.					0.02	0.6
Woodchuck			2	6.5	0.12	3.9
Eastern chipmunk			1	3.2	<0.01	<0.1
Sciuridae (squirrels)					<0.01	<0.1
Short-tailed shrew			1	3.2	<0.01	<0.1
Unidentified rodent					<0.01	<0.1
Opossum			1	3.2	0.06	1.9
Unidentified mammal					1.47	47.3
MAMMAL SUBTOTAL	1577	124.6	11	35.4	2.28	73.3
Anatinae (ducks)			1	3.2	0.01	0.3
Unidentified bird			1	3.2	0.03	1.0
BIRD SUBTOTAL	108	1.9	2	6.4	0.04	1.3
Unidentified snake			1	3.2	<0.01	<0.1
Frog sp.			2	6.5	0.01	0.3
REPTILE/AMPHIBIAN SUBTOTAL	4	0.2	3	9.7	0.01	0.3
Lake sturgeon			1	3.2	0.08	2.6
Gar sp.			1	3.2	<0.01	<0.1
Whitefishes/ciscoes			1	3.2	<0.01	<0.1
Catastomidae (suckers)			2	6.5	0.09	2.9
White bass			1	3.2	<0.01	<0.1
Centrarchidae (sunfishes)			1	3.2	0.01	0.3
Walleye			3	9.7	0.13	4.2
Sauger			1	3.2	<0.01	<0.1
Walleye/sauger					0.02	0.6
Unidentified fish			1	3.2	0.45	14.5
FISH SUBTOTAL	2798	44.2	12	38.6	0.78	25.1
Unidentified crustacean	21	<0.1	1	3.2		
Unidentified bivalve	5	<0.1	2	6.5		
Unidentified gastropod	857	4.1				
Unidentified shell	10	<0.1				
INVERTEBRATE SUBTOTAL	893	4.1	3	9.7		
Unidentified bone	4026	18.4				
TOTALS*	9406	193.4	31	99.8	3.11	100.0

*MNI total excludes gastropods.

Late Woodland village in Clarence, about 2 miles west of the site, which could have been the fall and winter home for the Spaulding Lake residents.

The faunal assemblages for these three sites also reflect differences in site types. The Spaulding Lake site was a warm-weather agricultural hamlet, occupied intermittently throughout the clearing and growing season. The Piestrak site was a smaller site, used to extract and process particular plant resources; the less diverse faunal assemblage reflects short-term resource extraction. The Nursery site was a palisaded village occupied only in the warm months; the village was not as close to the variety of micro-environments that characterized the Spaulding Lake site, and its fauna is less diverse.

Garden hunting. Originally used by Linares (1976) for tropical environments, the term "garden hunting"

refers to the opportunistic hunting of animal species that are attracted to gardens or to the clearings in which horticultural plots are located. Garden hunting is a strategy that serves the dual needs of horticulturalists: 1) it provides a meat source that can be obtained while attending to the requirements of agricultural crops (clearing, planting, weeding, harvesting), and 2) it rids the gardens of animal pests that feed on the plants or crops. Archaeologists in temperate areas have only recently begun to look for evidence of garden hunting among the Hohokam (Szuter 1994, 2000), Anasazi (Neusius 1996a), Iroquoian groups (Neusius 1990; Scott 1994), and southeastern Mississippian groups (Neusius 1996b).

In the woodlands of the midwestern and eastern U.S., detection of garden hunting is complicated by the fact that sites often are located at intersections of several microenvironments, including streams, forests, swamps, marshes, clearings, and the ecotones between (and it is likely that prehistoric peoples intentionally settled in those intersecting locations) where the species that would be attracted to garden areas were already present within a kilometer or so of the site. Evidence from ethnographic sources in the southwestern and southeastern U.S. suggests that much incidental hunting was carried out in the course of other activities, such as gathering firewood, hauling water, or collecting wild plant resources, not only by men and boys, but also by women and girls (Holt 1996; Szuter 1994:60, 2000:200-203). With these caveats, it is useful to consider the evidence for possible garden hunting and incidental hunting at the Spaulding Lake, Nursery, and Piestrak sites. The overwhelming majority of mammal and bird species present in the faunal assemblages are those that frequent gardens or the cleared areas surrounding them (Table 5). Since garden hunting and incidental hunting are opportunistic, there should be a high degree of diversity in assemblages where these are the primary methods of hunting (Neusius 1996a). When the Shannon-Weaver index of diversity (Reitz and Scarry 1985:20) is calculated for each site, the assemblages are found to be moderately to highly diverse (Table 6). Based on MNIs, all three assemblages have a similar degree of diversity. There is much more

Table 4. Intersite comparisons (% Total Site Biomass).

Animal class	Spaulding Lake	Nursery	Piestrak
Mammal	40.6	60.9	73.3
Bird	5.5	7.4	1.3
Reptiles & amphibians	3.9	0.6	0.3
Fish	50.4	30.9	25.1
Total site biomass (kg)	11.46	7.02	3.11
Total site MNIs (N)	107	66	31
Total NISP	12,724	5,144	9,406
Total bone/shell weight (g)	972.2	393.0	193.4

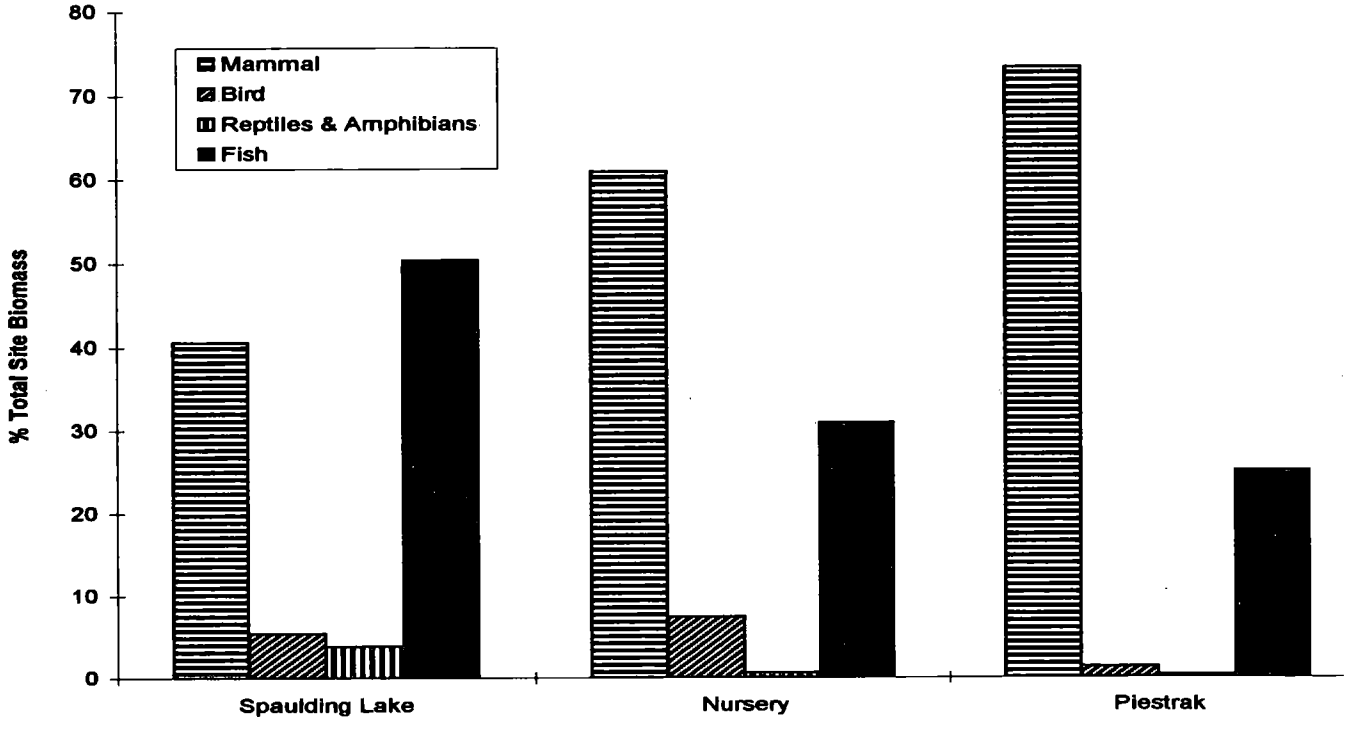

Figure 1. Intersite comparisons.

Table 5. Garden taxa present in Spaulding Lake, Nursery, and Piestrak assemblages.

White-tailed deer (*Odocoileus virginianus*)
cf. Elk (cf. *Cervus elaphus*)
Black bear (*Ursus americanus*)
Gray fox (*Urocyon cinereoargenteus*)
Red fox (*Vulpes vulpes*)
Woodchuck (*Marmota monax*)
Gray squirrel (*Sciurus carolinensis*)
Fox squirrel (*Sciurus niger*)
Eastern chipmunk (*Tamias striatus*)
Opossum (*Didelphis virginiana*)
Snowshoe hare (*Lepus americanus*)
Hawk spp. (Accipitrinae)
Ruffed grouse (*Bonasa umbellus*)
Turkey (*Meleagris gallopavo*)

variation when diversity is based on biomass figures, with Spaulding Lake having the highest index (4.55 out of a possible 4.99), Piestrak having the lowest index (1.93), and Nursery falling in the middle (2.77).

Gender roles and subsistence. The faunal data from these recent sites have implications as well for the archaeological evidence of gender-based roles in subsistence. One interpretation of the Spaulding Lake site is that it was occupied, at least intermittently, by entire family groups, with men, women, and children present at the same time; this would explain the artifacts that seem to be related to men's, women's, and children's activities. The presence of children is seen particularly in eight "juvenile" ceramic vessels recovered at the site (Perrelli et al. 1995:192). Another interpretation is that the site was used by men and women sequentially, at different times of the year and for different purposes (Perrelli et al. 1995:233-237, 241-245). Ethnohistoric records indicate that early historic-period Iroquoian men cleared the fields for planting. Men may have occupied the Spaulding Lake site in the early spring while clearing the fields and procuring chert and other local resources (Perrelli et al. 1995:242-244). If so, they subsisted on abundant spring-spawning fish, small mammals, and possibly the first flocks of passenger pigeons arriving in the area. In contrast, ethnohistoric records reveal that women took care of horticulture for the rest of the year, including planting, tending, weeding, and harvesting (Perrelli et al. 1995:244-245). This would mean that some women, and probably children, would have to stay near the fields to keep away (or capture) pests, including animal pests that would be attracted to the growing corn and beans. They likely would have relied on other nearby food resources, such as fish and passenger pigeons. Both scenarios bring us back to the likelihood that women and children, as well as men, captured the animals whose remains we find at the Spaulding Lake site.

The shift to agriculture. Besides the lack of any quantity of deer remains, the Spaulding Lake, Nursery, and Piestrak sites were identified as warm weather occupations because of the presence of large numbers of spring-spawning fish, spring and summer berries, and agricultural remains. It is likely that more fish and berries would be found on more late Iroquoian sites if fine-screened mesh and flotation were used more frequently. The biases introduced by recovery techniques can have far-reaching effects on interpretations of subsistence and other archaeological data (Popper 1988; Szuter 1994; Wing and Quitmyer 1985). More warm weather sites of the fifteenth and sixteenth centuries might indicate heavier reliance on fishing and hunting activities, especially in spring and summer. Perhaps the shift toward horticulture and away from seasonally abundant resources in the Late Woodland northeast was not as dramatic or as widespread as generally thought.

Subsistence data and socio-political organization. In addition to the dominance of small mammals and fish at these sites, the warm-weather occupation of the Nursery site palisaded village is also unexpected, with implications for understanding Iroquoian socio-political organization. Archaeologists traditionally view matrilocal residence and women's control of village-related activities as a consequence of the absence of men from the village for long periods of time (e.g., Trigger 1985:89).

The evidence from these three sites in western New York suggests that Iroquoian social and political organization was more complex and perhaps more variable from group to group than has been thought. Whether or not different gender and age groups occupied the Spaulding Lake site at the same time or sequentially, it is clear that women and children, as well as men, were highly mobile between a village and various agricultural hamlets and short-term resource processing sites such as Piestrak. Were men and women away from the village at different times of the year? Did whole family groups move from the village to a residential hamlet in warm months to utilize a wide variety of resources? Or did whole villages move elsewhere for the cold months?

SOME CLOSING THOUGHTS ON RECOVERY TECHNIQUES

The abundance of faunal remains at the Spaulding Lake site may be attributed to two things: 1) excellent bone preservation provided by the limestone substrate of the

escarpment and significant quantities of charcoal and ash in the deposits, and 2) the use of flotation in addition to 1/4-inch screening. Approximately 60 to 70% of the faunal remains were recovered by flotation, and usually between 50 and 100% of the soils in each feature or test unit was floated.

In 1992, when I began looking for Iroquoian faunal data to compare with the Spaulding Lake material, I mostly encountered reports or species lists enumerating the bones of larger animals, such as deer and turkey, and plant remains that were clearly visible, such as corn kernels and cobs. Throughout much of the area where Iroquoian sites are located, soil preservation and recovery techniques had not allowed for the inclusion of small animal or plant remains. I was reminded that, until the late 1970s and early 1980s, the prevailing interpretation of prehistoric subsistence in the southeastern U.S. was one of heavy reliance on those species with large remains: deer, catfish, and corn. Beginning in the late 1970s, what changed in the study of southeastern U.S. archaeological sites, however, were recovery techniques. Through their insistence on fine-gauge recovery techniques, the work of Elizabeth Wing and her students revolutionized the picture of subsistence among prehistoric southeastern Indian groups.

Until we have samples from well-preserved sites, such as at Spaulding Lake, Nursery, and Piestrak, and similar use of fine-screening and flotation, we will be hampered in our attempts to clarify the overdrawn (and incorrect) traditional picture of an Iroquoian diet dominated by deer and corn. If we had such assemblages from year-round or winter village sites available for comparison, we could begin to understand Iroquoian peoples' use (or non-use) of additional resources at the time of year when deer were readily available. It may be that small mammals continued to be important to the diet in winter, even with the addition of greater amounts of deer meat. Whitefish and lake trout spawn in the fall and several fish species available near these sites may be taken through the ice. It would be useful to know what role these fish might have played in the fall and winter diet, and how important they were compared to the deer. Without assemblages recovered with fine-gauge techniques, however, we will not know whether the minimal number of bones from small mammals and fish at fall and winter villages truly reflects food choices or simply reflects the effect of hand screening or large-gauge screening of deposits. Hopefully future excavations will provide fine-screened assemblages, so that we will be able to better understand the varieties and complexities of Iroquoian subsistence and settlement in the late prehistoric period.

Table 6. Diversity indices.

	MNI			biomass	
taxon	diversity	no.	taxa (n)	diversity	kg
Spaulding Lake	3.06	107	33	4.55	11.46
Nursery	3.16	66	30	2.77	7.02
Piestrak	3.11	31	21	1.93	3.11

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