VIII

FLORAL AND FAUNAL ANALYSIS

A. INTRODUCTION

A small amount of charred botanical material was derived from Site 7S-F-68. Despite its paucity, however, the identified material has qualitative interpretive value. The charred specimens recovered from the site represented five native plant types for which there is ethnographic documentation of usage by Native American populations: woodbine, sumac, sumpweed, hickory, and cherry. Woodbine was utilized by Native Americans as a medicinal herb and sumac as a dye, as a medicinal herb, for cordage and as a smoking material. There is documented ethnographic usage of cherry both for food and as a medicinal. Hickory nuts were used as food, and the shells were utilized for hot smokeless fires. All of these plant types could have provided motivation for seasonal exploitation of this site area. However, the charred sumpweed was the most significant of the botanical material recovered from the site area.

Sumpweed is an indigenous annual seed plant which played a prominent role in eastern North America in the transition from the sole dependence of human groups on hunting and gathering of wild plants to cultivation. Among the most notable artifact finds from the site were a mano and metate, and their recovery raises the question as to what was being processed with these tools. The kernels of sumpweed are not easy to extract from their surrounding pericarps and the milling stones may have provided the technology to process sumpweed into a palatable food.

The floral and faunal data suggest that the site area could be functionally categorized as a procurement site. The limited amount of charcoal and fire-cracked rock is not indicative of prolonged and sustained use of hearth areas, which would be consistent with intermittent site use. The scant recovery of faunal material does not suggest hunting to have been the primary purpose or focus of this procurement site. The charred floral specimens exhibit a pattern of autumn use of the site. Overall, the data suggest that this location was utilized as a procurement site during the months of September and October for collection of seasonally available botanicals.

B. SAMPLES STUDIED

The floral investigation of Site 7S-F-68 was conducted in two phases, and involved a total of 50 samples (Table 23). In the initial, exploratory phase of analysis, a total of 23 flotation samples were examined from a total of 44 liters of soil, primarily originating from non-feature contexts. In the second phase of analysis, an additional 27 flotation samples were examined. The samples examined include all prehistoric features that provided sufficient soil, and a variety of non-feature contexts representing the North Excavation Block, the South Excavation Block, and outlying units. The fifteen features provided samples ranging from 1.0 liter to 23.0 liters in size, comprising a total volume of 65.1 liters. Five 2.0-liter control samples were also examined from off-site contexts to provide a mechanism for examination of potential vegetational differences between the prehistorically exploited area and the nonexploited area.

No faunal material was recovered from flotation samples. However faunal specimens, as well as additional floral specimens, primarily charcoal, were recovered during excavation.

C METHODOLOGY

1. *Floral*

Soil samples were removed from selected contexts and air-dried prior to processing. The samples were processed in a specially designed drum that provides a continuous froth of water to dissolve the soil, yielding a light fraction and a heavy fraction. The recovery of cultural and biological material during flotation processing is dependent on the size of the mesh used. A fine-mesh polyester "bridal veil" was used for the heavy fraction and an even finer-meshed silk screen fabric was used for the bags to collect the light fraction.

As a control, 100 charred and 100 uncharred poppy seeds were added to one sample prior to flotation. A poppy seed recovery test was used to test effectiveness and consistency of flotation procedures. Poppy seeds range in size from 0.7 mm to 1.4 mm and are of an appropriate size to test the effectiveness of micro seed recovery. The recovery rate is a measure of seed loss, damage, and inter-sample contamination. No contamination was noted and recovered control seeds were not fragmented. The control seed recovery rate was 16 percent for a two liter sample. The low recovery of control seeds might suggest that small seeds are not well represented within the samples. However,

Table 23: Flotation Samples Examined

CAT. NO.	UNIT	STRAT.	LEVEL	QUAD.	FEAT.	SIZE (l)	AU
309	E.U. #28	.	2	SW	18	2.0	M
311	E.U. #28	.	.	.	16	2.0	M
332	E.U. #25	B	3	NE	17	2.0	M
361	E.U. #35	B	2	NE	.	2.0	M
365	E.U. #35	B	3	NE	.	2.0	M
369	E.U. #35	B	4	NE	.	2.0	M
373	E.U. #35	B	5	NE	.	2.0	E
377	E.U. #35	B	6	NE	.	2.0	E
381	E.U. #35	B	7	NE	.	2.0	E
385	E.U. #35	B/C	8	NE	.	2.0	E
389	E.U. #35	C	9	NE	.	2.0	E
479	E.U. #38	.	4-6	.	19	2.0	E
508	E.U. #42	.	.	.	22	2.0	E
541	E.U. #48	.	.	.	21	3.0	E
545	E.U. #21	B	2	NE	.	2.0	M
549	E.U. #21	B	3	NE	.	2.0	M
553	E.U. #21	B	4	NE	.	2.0	M
557	E.U. #21	B	5	NE	.	2.0	E
561	E.U. #21	B	6	NE	.	2.0	E
566	E.U. #21	.	.	.	23	4.0	M
567	E.U. #21	B	7	NE	.	2.0	E
586	E.U. #47	A	1	.	20	13.0	L
649	E.U. #29	.	.	.	26	23.0	L
737	E.U. #49	.	.	.	24	3.0	M
765	E.U. #39	B	2	NE	.	2.0	M
769	E.U. #39	B	3	NE	.	2.0	M
773	E.U. #39	B	4	NE	.	2.0	E
780	E.U. #39	B	6	NE	.	2.0	E
784	E.U. #39	B	7	NE	.	2.0	E
786	E.U. #39	B	5	NE	.	2.0	E
787	E.U. #39	.	.	.	28	2.0	E
909	E.U. #45	.	.	.	25	4.3	M
1002	E.U. #52	B	5	.	31	6.0	E
1114	E.U. #18	B	.	.	8	2.0	NA
1156	E.U. #23	.	.		7	2.0	NA
1227	E.U. #49	.	.	.	24	2.0	E
1310	E.U. #41	B	2	NE	.	2.0	M
1312	E.U. #41	B	3	NE	.	2.0	M
1316	E.U. #41	B	4	NE	.	2.0	E
1320	E.U. #41	B	5	NE	.	2.0	E
1324	E.U. #41	B	6	NE	.	2.0	E
1328	E.U. #41	B	7	NE	.	2.0	E
1332	E.U. #41	B	8	NE	.	2.0	E
1334	E.U. #41	B	9	NE	.	2.0	E
1336	E.U. #41	B	10	NE	.	2.0	E
OFF-SITE CONTROLS							
9991	STP #C1	C	.	.	.	2.0	NA
9992	STP #C2	C	.	.	.	2.0	NA
9993	STP #C3	C	.	.	.	2.0	NA
9994	STP #C4	B	.	.	.	2.0	NA
9995	STP #C5	B	.	.	.	2.0	NA
TOTAL NUMBER OF SAMPLES: 50				TOTAL VOLUME:		144.3	

carpetweed seeds are smaller than poppy seed and are well represented within the site. Carpetweed seeds were found in abundance in many samples and were identified in three fourths of the analyzed soils samples.

Examination of biological materials was made with a binocular dissecting microscope. Each of the samples was systematically scanned and floral specimens were identified and charred specimens counted. Uncharred specimens were identified and noted as present but were not counted because of their limited analytical significance. Each charred floral specimen was given a count value of one. When possible, charred wood specimens were counted and weighed in grams. Unfortunately most charred wood fragments were so small that weighing and counting were not feasible. Catalog sheets indicate the count value of charred specimens recovered from both phases of analysis. The tables and text discuss charred as well as uncharred specimens recovered from both phases of analysis.

Floral material was identified to the species level where possible. Confirmation of species was aided by the use of an extensive type collection of floral material and reference materials (Cox 1985; Fernald 1970; Gunn 1970; Lawrence and Fitzsimons 1985; Martin 1972; Martin and Barkley 1961; Mohlenbrock 1980,1981; Peterson 1977; Renfrew 1973).

a. *Quantification of Floral Data*

Quantifying botanical data by absolute counts of plant types in each sample is problematic because absolute frequencies may reflect preservation, sampling, or other factors. Absolute frequencies must be viewed with particular caution at this site because so few charred, potentially prehistoric seed specimens were recovered.

A ubiquity analysis was performed for the site area under study. A ubiquity analysis disregards the absolute count of a recovered plant type and instead looks at the number of samples in which the plant type appears within a group of samples. Each botanical species is scored as present or absent in each sample (Popper 1988:60-64). The species is considered present whether the sample contains 1 or 500 specimens. The Ubiquity Score of a plant type is the number of samples in which the plant type is present, expressed as a percentage of the total number of samples in the group. Although 50 flotation samples were examined, 2 of those samples contained no biological material. Other botanicals, including charcoal and material produced during excavation, were recovered from 11 additional excavation contexts, but they were not included in the ubiquity analysis. Therefore, 48 samples is the base number on which the scores are based. For example, charcoal fragments were observed in 35 of the 48 samples, giving charcoal fragments a Ubiquity Score of 73 percent. Uncharred sedge seeds were recovered from 13 of the 48 sample, giving that species a Ubiquity Score of 27 percent. Table 24 lists the Ubiquity Scores for the site.

In a ubiquity analysis, the score for of one genus does not affect the score for another, and therefore the scores for different plant species may be evaluated independently. The scores may suggest the relative importance or abundance of plant types, and the Ubiquity Scores of uncharred plant types can suggest their prominence within the "site landscape." The Ubiquity Scores for charred specimens suggest their importance in prehistoric utilization as well as their botanical prominence within the "site landscape." The assumptions made for a ubiquity analysis are that all samples in a group are independent. Since sample sizes are not constant, variation in sample size does not inflate the frequency scores of the botanical families in larger samples.

b. *Delineation of Prehistoric Specimens*

Distinguishing prehistoric specimens from historic specimens or natural seed rain was the first focus of analysis. To be given consideration as a potential prehistoric floral specimen, two important criteria have to be met. The first and foremost criterion is the botanical history of each plant recovered. Plants which are not native to America obviously were not available to prehistoric populations.

The second important criterion is that seed specimens have to have been modified in a manner that allows preservation of what is really a biodegradable material. Investigators generally consider only charred seed specimens as useful and legitimate constituents of a prehistoric archaeological floral assemblage (Minnis 1981:147; Quick 1961:94-99) because, given normal soil conditions, seeds will either fulfill their reproductive function or will decay. The dormancy period for most plants is rarely more than 100 years (Harrington 1972); therefore, in order for a seed to survive in the archaeological record it must short-circuit the reproductive function, i.e., by charring. Although desiccation is another way in which seeds can circumvent decomposition, the environment of the northeastern United States makes the desiccation of seeds a very unlikely occurrence.

All factors that influence preservation must be considered because archaeological plant remains are neither a large nor representative sample of the diet. At an open site in a temperate environment, very little plant material is ever preserved. As discussed above, the material must become charred in order to evade microbial action, a process that requires special circumstances and rarely happens. The specimen must first find its way into a fire and ignite. Then it must be withdrawn from the flames quickly before it turns to ash, or it must be buried so deeply in the coals that there is insufficient oxygen for complete combustion (Keene 1981:183; Wetterstrom 1978:111-112). Following charring, the specimen must be protected from the elements and from other disturbance in order to remain intact for succeeding centuries. Finally, it must endure the excavation process and the flotation procedure. Clearly, hard items such as nutshell are favored whereas soft items are not.

TABLE 24: UBIQUITY INDEX OF FLORAL SPECIMENS

CAT. NO.	Carpetweed	Purslane	Chickweed	Oxalis	Knawel	Thistle
309	X	.	.	.		.
311	X	.	.	.	X	.
332	.	.	.	.	X	.
361	X	.	.	.	X	.
365	X	.	X	.	.	.
369	.	.	.	.	.	.
373	X	.	.	.	X	.
377	X	.	.	.	.	.
381	X	.	.	.	.	.
385	.	.	.	.	X	.
389	.	.	.	.	X	.
479	X	.	.	.	.	.
508	X	.	.	.	X	.
541	X	.	.	.	.	.
545	X	.	.	.	X	.
549	X	.	.	.	.	.
553	X	.	.	.	.	.
557	X	.	.	.	.	.
561	X	.	.	.	.	.
566	X	.	.	.	.	.
567	.	.	.	.	.	.
586	X	.	.	.	.	.
649	.	.	.	.	.	.
737	.	.	.	.	X	.
765	X	.	.	.	X	.
769	X	X	.	.	X	.
773	X	.	.	.	X	.
780	.	.	.	.	.	.
784	X	.	.	.	X	X
786	X	.	.	X	X	.
787	X	.	.	.	X	.
909	X	.	X	.	X	.
1002	X	.	.	.	X	.
1114	X	.	.	.	X	.
1156	X	.	.	.	X	.
1227	X	.	.	.	.	.
1310	X	.	.	.	.	.
1312	X	.	.	.	.	.
1316	X	.	.	.	.	.
1320	X	.	.	.	.	.
1324	X	.	.	.	X	.
1328	X	.	.	.	X	.
1332	X	.	.	.	X	.
1334	.	.	.	.	.	.
1336	X	.	.	.	X	.
9991	X	.	.	.	.	.
9994	.	.	.	.	.	.
9995	.	.	.	.	.	.
INDEX	63%	2%	3%	2%	39%	2%

X: specmen present; *X* : charred specimen

TABLE 24--CONTINUED

CAT. NO.	Chenopodium	Amaranthus	Knotweed	Pokeweed	Sedge	Chufa
309	.	.	.	.	.	.
311	.	.	.	.	.	X
332	.	.	.	.	X	.
361	X	.	X	.	.	.
365	X	.	.	.	.	.
369	X	.	.	.	.	.
373	.	.	.	.	.	.
377	.	.	.	.	.	.
381	X	.	.	.	X	.
385	X	.	.	.	.	.
389	.	.	.	.	.	.
479	.	.	.	.	.	.
508	.	.	X	.	.	.
541	.	X	.	.	.	.
545	.	.	.	.	X	.
549	.	.	.	.	.	.
553	.	.	.	.	X	.
557	.	X	.	.	.	.
561	.	.	.	.	.	.
566	.	.	.	.	.	.
567	.	.	.	.	.	.
586	.	.	.	.	.	.
649	.	.	.	.	.	.
737	.	.	.	.	.	.
765	X	.	.	X	X	.
769	.	.	.	X	.	.
773	.	.	.	.	.	.
780	.	.	.	.	X	.
784	X	.	.	.	.	.
786	.	.	.	.	.	.
787	.	.	.	.	.	.
909	.	.	.	X	.	.
1002	X	.	.	.	X	.
1114	.	.	.	.	.	.
1156	.	.	.	.	X	X
1227		.	.	.	X	.
1310	X	.	.	.	X	.
1312	X	.	.	.	.	.
1316	.	.	.	.	.	.
1320	X	.	.	.	.	.
1324	.	.	.	.	.	.
1328	.	.	.	.	X	.
1332	.	.	.	.	X	.
1334	.	.	.	.	.	.
1336	.	.	.	.	.	.
9991	.	.	.	.	.	.
9994	.	.	.	.	.	.
9995	.	.	.	.	X	.
INDEX	19%	3%	3%	5%	22%	3%

X: specmen present; *X* : charred specimen

Table 24--Continued

CAT.NO.	Flatsedge	Grass	Spurge	Blackberry	Deerberry	Paspalum	Doveweed
309	X	X	.	.	.	.	.
311	X	X	.	.	.	.	.
332	.	X	.	.	.	.	.
361	X	.	X	.	.	X	.
365	X	.	.	X	.	.	.
369	X	.	.	.	.	.	X
373	.	.	.	.	.	.	.
377	.	X	.	.	.	.	.
381	X	X	.	.	.	.	.
385	.	X	.	.	.	.	.
389	.	X	.	.	.	.	.
479	.	X	.	.	.	.	.
508	.	.	.	.	.	.	.
541	X	.	.	.	.	.	.
545	X	X	.	.	X	.	.
549	X	X	.	.	.	.	.
553	.	.	.	.	.	.	.
557	X	.	.	.	.	.	.
561	X	X	.	.	.	.	.
566	X	X	.	.	.	.	.
567	X	.	.	.	.	.	.
586	.	X	.	.	.	.	.
649	.	.	.	.	.	.	.
737	.	X	.	.	.	.	X
765	X	X	.	.	X	.	.
769	X	X	X	.	.	X	.
773	X	X	.	.	.	X	.
780	.	X	.	.	.	.	.
784	.	X	.	.	.	.	.
786	X	X	.	.	.	.	.
787	X	X	.	.	.	.	X
909	X	X	.	.	.	.	X
1002	X	X	.	.	.	.	.
1114	X	.	.	.	.	.	.
1156	X	X	.	.	.	.	.
1227	.	X	.	.	.	.	.
1310	.	X	.	X	.	.	.
1312	.	X	.	.	.	.	.
1316	.	X	.	.	.	.	.
1320	X	X	.	.	.	.	.
1324	.	X	.	.	.	.	.
1328	X	X	.	.	.	.	.
1332	X	X	.	.	.	.	.
1334	.	X	.	.	.	.	.
1336	.	X	.	.	.	.	.
9991	.	.	.	.	.	.	.
9994	.	.	.	.	.	.	.
9995	X	.	.	.	.	.	.
INDEX	44%	58%	3%	3%	3%	5%	7%

X: specmen present; *X* : charred specimen

TABLE 24--CONTINUED

CAT.NO.	Cress	Chokecherry	Dodder	Woodbine	Sumac	Sumpweed	Charcoal
309	.	.	.	.	.	.	*X*
311	.	.	.	.	.	.	*X*
332	.	.	.	.	.	*X*	*X*
361	.	.	.	.	.	.	*X*
365	.	.	.	.	.	.	*X*
369	.	.	.	.	.	.	.
373	.	.	.	.	.	.	.
377	.	.	.	.	.	.	*X*
381	.	.	.	.	.	.	.
385	.	.	.	.	.	.	.
389	.	.	.	.	.	.	.
479	.	.	.	.	.	*X*	*X*
508	.	.	.	.	.	.	*X*
541	.	.	.	.	.	.	*X*
545	.	.	.	X	.	.	*X*
549	.	.	.	.	.	.	*X*
553	.	.	.	.	.	.	*X*
557	.	.	.	.	.	.	*X*
561	.	.	.	.	.	.	*X*
566	.	.	.	*X*	.	.	*X*
567	.	.	.	X	.	.	*X*
586	.	.	.	.	.	*X*	*X*
649	.	.	.	.	*X*	*X*	*X*
737	.	.	X	.	.	.	.
765	.	.	.	.	.	.	*X*
769	.	.	.	.	.	.	*X*
773	.	.	.	.	.	.	*X*
780	.	.	.	.	.	.	*X*
784	.	.	.	.	.	.	*X*
786	.	.	.	.	.	.	*X*
787	.	.	.	.	.	.	*X*
909	.	.	.	.	.	.	*X*
1002	.	.	.	.	.	.	*X*
1114	.	.	.	.	.	.	*X*
1156	.	.	.	.	*X*	.	*X*
1227	.	.	.	.	.	.	*X*
1310	.	.	.	.	.	.	.
1312	.	.	.	.	.	.	*X*
1316	.	.	.	.	.	.	*X*
1320	.	.	.	.	.	.	*X*
1324	.	.	.	.	.	.	*X*
1328	.	X	.	.	.	.	*X*
1332	.	X	.	.	.	.	.
1334	.	.	.	.	.	.	
1336	X	.	.	.	.	.	.
9991	.	.	.	.	.	.	.
9994	X	.	.	.	.	.	.
9995	.	.	.	.	.	.	.
INDEX	3%	3%	2%	5%	3%	7%	75%

X: specmen present; *X* : charred specimen

Plant parts can be categorized into three types: (1) dense inedible parts such as nutshell or fruit pits that might be discarded in or near a fire; (2) moderately dense parts such as small seeds which might be consumed and would only be burned or buried accidentally; and (3) parts with no density and a high water content, such as tubers and greens, which would be consumed and which are unlikely to carbonize under normal circumstances (Keene 1981:183).

It cannot be assumed that carbonized plant remains accurately reflect the diet of the site occupants, because charring is a fortuitous event. While it may be assumed that the uncharred specimens within the samples are not prehistoric in origin, charring alone does not impart unequivocal prehistoric status to a seed specimen. All charred seeds within a sample are not necessarily of prehistoric origin, as it is not uncommon for modern seeds to become incorporated into prehistoric assemblages. Vertical seed dispersion can occur from plowing, root holes, drying cracks, downwashing, and from earthworms and other burrowing animals (Keepax 1977; Minnis 1981:145; Smith 1985). These processes crosscut cultural depositional processes.

c. *Sources of Prehistoric Seeds*

There are several sources of prehistoric seeds recovered from archaeological contexts. The most widely considered source is direct utilization of the seeds. Many botanical artifacts are the result of the collection, processing, and use/consumption of plant resources. Accidents in processing, burning of debris, and the burning of stored materials are the most common actions which result in the direct evidence of seed use (Minnis 1981:145). Few plant parts will be deliberately burned in a fire, because most plant refuse is too wet to burn readily, or it may smoke or smell if burned. However, the medicinal utilization of plants whereby the leaves or roots were sprinkled on hot stones or boiled or steeped in water could result in charred seed remains. The lining of cooking pits with large leaves could also result in charred seed remains.

Another potential source of archaeological seeds is the accidental preservation of the prehistoric seed rain that is unrelated to any cultural use of the seeds or plant. Naturally dispersed seeds can blow into hearths or be burned on trash middens. Plants can also become carbonized when vegetation is burned off by man or by natural means. Day (1953) has documented that many aboriginal groups in eastern North America manipulated local vegetation by the use of fire. Intentional burning of forest cover and second growth to clear land for agricultural or hunting purposes was done to clear campsites, increase visibility, facilitate movement, eliminate rodents, enhance soil productivity, and promote the growth of certain plants.

The amount of plant food used by a prehistoric population may be poorly represented in the archaeological record (Keene 1981). Because of the vagaries of survival for plants brought to open sites, quantitative summaries should be viewed with this in mind.

2. *Faunal*

Bones and bone fragments from the site were identified anatomically and speciated with the aid of a comparative faunal collection and reference materials (Chaplin 1971; Cornwall 1956; Gilbert 1973; Morris 1975; Olsen 1964, 1968, 1979; Ryder 1969; Schmid 1972). Each bone fragment was counted and weighed in grams. Bone modification by burning was noted according to whether the specimen was charred to a black, gray, or white condition. Bones were measured according to von den Driesch (1976). Measurements were recorded in millimeters or centimeters.

a. *Variables Affecting Bone Survival*

Bone, horn, teeth, antler, and shell are the most abundant faunal remains recovered in archaeological investigations. Bone is made up of calcium phosphate, lesser quantities of calcium carbonate, and other trace elements and compounds. The mineral salts impart a rigidity and hardness to the bone, while the organic compounds give it resilience and toughness (Carbone and Keel 1985:1-19). Because of bones' organic content, it is subject to insect, fungal, and rodent attack, both in and out of the soil (Carbone and Keel 1985:1-19). Since microorganisms have been shown to be one of the primary causes of decay, it stands to reason that an analysis of the environmental tolerance of these organisms will give insight into the kinds of situations that are favorable to preservation of animal remains. The conditions that are favorable to preservation are those that are reflected in daily kitchen rounds. Boiling, freezing, pickling, and salting inhibit decay.

Soil acidity also has an impact on bone preservation. If the environment is acidic then the mineral content will be removed. Neither bone nor shell will survive under conditions where the pH is lower than 6.3, and samples from the site had mean pH value of 5.0. In considering the preservation of bone the effects of humans must be taken into account, because culturally modified bone, whether boiled or cracked, will be more susceptible to environmental forces (Carbone and Keel 1985:14). The effect of the chemical environment on teeth will be somewhat muted since dentine, although chemically similar to bones, contains less organic matter and more phosphate and carbonate.

Enamel, which is the hardest component of teeth, contains the least organic matter and is still more resistant. Teeth will be affected by acidic conditions in the soil but are more likely to be found preserved; generally, however, they will be somewhat etched (Carbone and Keel 1985:14).

Fire is an agent which can impact faunal material, not only because it can cause damage directly but also because it interacts with other agents to enhance destruction. Fire can alter chemical properties of soils such as pH, and the content of nitrogen, potassium, and sulfur (Wildesen 1982:68). Burning of bones may result as a byproduct of roasting, or from disposal in a hearth. Accidental or purposeful exposure of bone to fire alters the calcium content of bone. If a fresh bone is burned it does not necessarily become altered in shape, but it does lose weight and becomes very friable. The destruction of organic material in bone through burning can shrink it from 5 percent to 15 percent and reduce its weight by 50 percent (Wing and Brown 1979:109).

b. *Bone Modification*

Of the faunal elements recovered from Site 7S-F-68, a total of 106 were charred. Burned bone indicates direct contact with fire or coals. Heat can result in the blackening of bone. Deeply blackened bone may suggest that flesh was still present during the burning (Brothwell 1971:19). Charring of bone during roasting is confined to the exposed ends of the bone not protected from the fire by meat. Burning at high temperatures for prolonged periods can leave the bone pure white, friable, soft, and porous, suggesting complete oxidation. Some burned bone that is not completely calcined does not reach the fragile state and although light in weight, may be quite strong (Carbone and Keel 1985:7).

Burned bone ranges in color from white through grays and blues to black, depending on the completeness of combustion (Wing and Brown 1979:109). Approximately one half of the bones of the assemblage were not charred at all, and the remainder were whitened. One bone specimen was blackened. A bone assemblage diverse in charred color might suggest uneven exposure of the bone to the fire. Bones exposed to repeated and prolonged fires would exhibit more modification than bones left in the hearth area for a short period of time. The color variations of the burned specimens at this site do not suggest a pattern of successive fires.

3. *Computer Entry of Data*

The cataloging procedures for data were such that the first delineation of data was made in the category called "Specimen." Latin species nomenclature for floral data was entered. This category indicates the level of identification, according to whether the precise species and family could be determined. Charcoal fragments were listed as Floral in this category. Faunal specimens was listed as mammal, bird, or mammal/bird. These general categorizations were used because the specimens could not be identified more precisely. The next data entry category is "Element." The range of entries in this category includes the precise skeletal element ,such as phalanx fragment ,or a less precise element definition, such as longbone fragment. Nondiagnostic appears in this category when the skeletal element of the specimen could not be determined.

Each entry includes both a count and weight, with weights expressed in grams. Charring was recorded for both floral and faunal specimens; for bone, the color the bone turned after charring was recorded in this field. Measurements of longbone length were recorded in centimeters. Other information was recorded in a "Remark" field, including the notation "SL," indicating that the bone was split longitudinally, and whether the specimen was derived from excavation or flotation samples.

D. FLORAL ANALYSIS

A total of 27 plant species were recovered from the samples under study (Table 24). Nearly the entire recovered floral assemblage, with the exception of charcoal, consisted of material in the uncharred state which disallows consideration for prehistoric status. The uncharred assemblage was comprised of ground cover (grass, sedge, carpetweed, flatsedge, paspalum, thistle, and chufa) and plants commonly found in open woods, thickets, and clearings (knotweed, knawel, chenopodium, deerberry, pokeweed, purslane, spurge, doveweed, oxalis, dodder, sumac, chickweed, woodbine, cress, chokecherry, Amaranthus, and blackberry). The charred specimens included charcoal fragments, woodbine, sumac, and sumpweed. Cherry, hickory, and unidentified nutshell fragments were recovered in the charred state from excavation. These items are not included in Table 24, which delineates the specimens derived from flotation, but are discussed in the text.

1. *Off-Site Samples*

Five off-site samples were examined from an area south of the site to provide a control during analysis. Two of the five samples contained no biological material (STP 2 and STP 3), a finding which was in sharp contrast to the site samples, which all contained biological material. In one of the off-site samples (STP 1), only carpetweed was identified, and carpetweed was prevalent within the site area. Flatsedge and sedge were recovered from STP 5, and both of these plants were also identified in samples taken from within the site. Cress was identified from STP 4 and from one context within the site boundaries. The most striking contrast between the off-site controls and the site samples was that the off-site controls contained fewer species.

2. *Uncharred Non-Native Species*

The floral assemblage contained five seed types which are not native to America. One additional seed type was identified to the genus level but has both native and introduced species.

a. *Carpetweed*

Carpetweed *(Mollugo verticillata)* is an annual weed with a deep taproot which became naturalized throughout North America from tropical America (Cox 1985; Fernald 1970). It is not an early spring plant; germination usually occurs later in the season when conditions are more like those of its warmer native habitat. Its late start is compensated for by a very rapid rate of growth in summer and fall, when it becomes a nuisance in cultivated areas. It is a common weed in a variety of environmental settings. Although the plant can be cooked and eaten as a potherb, it was not available to native populations. This combination of being uncharred and not native provided a fairly straightforward elimination of this plant type from consideration for potential prehistoric utilization. Carpetweed had a Ubiquity Score of 77 percent.

b. *Purslane*

It is widely believed that purslane *(Portulaca oleracea)* became naturalized after its introduction to this continent from Europe (Fernald 1970; Knap 1979; Peterson 1977). Botanists generally believe that purslane, a native plant of India, was adopted as a choice vegetable in Europe and was brought to America with the first settlers. It was apparently adopted by native North Americans, who used the ground seeds as a breadstuff and meal. However, it is interesting to note that *Portulaca* is mentioned in an Icelandic medical manuscript of 1475 as a medicinal plant. Yarnell (1964) reported finding *Portulaca* in North American archaeological contexts from 3000-2500 BC and considers that it spread to North America by Indian use. Erichsen-Brown states that despite "all of this evidence the leading eastern American taxonomic botanists today still refuse to recognize Portulaca as an indigenous plant" (Erichsen-Brown 1979: viii). The recovered purslane specimens were not in the charred state, and, based on that factor rather than its botanical history, it will not be considered prehistoric in origin. Purslane was found only in one context and has a Ubiquity Score of 2 percent.

c. *Chickweed*

Chickweed *(Stellaria media)* was introduced from Europe and is now a common plant in North America. Presumably, chickweed gets its name from the fact that domestic chicks as well as doves, quail, and sparrows favor it as a dietary item. Seeds maintain their viability after passing through the digestive tract; therefore, birds and mammals that eat the plant serve as agents of dispersal. It is likely that while importing desired plants, the colonists also imported some weeds. In fact, a traveler in 1740 reported that old English garden weeds such as motherwort, froundsel, chickweed, and wild mustard had clung to the Englishman wherever he trod (Earle 1974). Chickweed thrives in a variety of environmental settings. Chickweed was recovered from only two contexts and has a Ubiquity Score of 4 percent.

d. *Oxalis*

Oxalis (*Oxalis* spp.) is a biennial thoroughly established in eastern North America but is a native of Europe and Asia (Cox 1985:240). Oxalis is sometimes called wood sorrel. The leaves are edible and have a pleasant acidity (Hedrick 1972:400-401). Oxalis is widespread in open woods, moist woods, and banks (Peterson 1977:104). Oxalis was recovered from only one context and has a Ubiquity Score of 2 percent.

e. *Knawel*

Knawel (*Scleranthus annus*) is a branched spreading weed introduced from Europe. It is found in woods, fields, roadsides, and waste places (Fernald 1970:612). Knawel was recovered from 23 samples and has a Ubiquity Score of 48 percent.

f. *Thistle*

It could not be ascertained if the thistle recovered within the site was a native or introduced species. Of the twelve species of thistle in North America, only one is a native species. Thistle (*Cirsium* spp.) is a biennial with prickly leaves. With the spines removed, the young leaves can be eaten raw or cooked as greens. The pithy young stems are excellent peeled and eaten raw or cooked. The raw or cooked roots of the first year plants are good. Young leaves, young stems, and roots would be available at their best in the spring and fall (Peterson 1977:126). Thistles are adaptable and found in numerous environmental settings. There are references to thistle being eaten by historic Native American populations. In fact, *Cirsium edule* is referred to as Indian Thistle (Medsger 1966:200). The Ubiquity Score for Thistle was 2 percent.

3. *Uncharred Native Specimens*

The uncharred specimens in the site assemblage are considered modern in origin and representative of the present-day environmental conditions. Despite the fact that the following native species were recovered in the uncharred state, it is possible that some of these plant species would have been present in the prehistoric landscape and utilized by the prehistoric populations exploiting this area. Many of the recovered uncharred native botanicals have been found in archaeological contexts in the eastern United States.

a. *Chenopodium*

Chenopodium is a diverse, worldwide genus of which some 20 species occur in the eastern United States and Canada (Hatch 1980:206). Opportunistic weeds such as Chenopodium, knotweed, and Amaranthus were potentially important plant food for Late Archaic populations (Asch and Asch 1977; Asch et al. 1972; Baker 1980; Ford 1977, 1985; Wilson 1976; Winters 1969). In the spring, weedy genera are available for greens and in the late autumn they are prolific seed bearers. Indians harvested Chenopod seeds by pulling up the entire plant and placing it in a sack. After the plant dried, the seeds fell to the bottom of the sack and were then parched for storage and later crushed in a mortar. The meal was added to breads or cooked in a porridge (Wetterstrom 1978:110). Chenopodium *(Chenopodium* spp.*)* has been recovered in archaeological contexts in eastern North America in situations suggesting utilization and perhaps even cultivation. Chenopodium was recovered from 11 contexts and has a Ubiquity Score of 23 percent. None of the recovered Chenopodium specimens were charred.

b. *Amaranthus*

Like Chenopodium, Amaranthus (*Amaranthus* spp.) or pigweed has been recovered in archaeological contexts in eastern North America in situations suggesting utilization and perhaps even cultivation. Gilmore (1931) examined quantities of dry-preserved material from rock-shelters in southwestern Missouri and northwestern Arkansas and identified corn, squash, and seeds of sunflower, chenopods, marsh elder, canary grass, giant ragweed, and amaranth, all in situations suggesting that they had been stored.

Despite this finding, the use of Amaranthus (pigweed) by aboriginal peoples is still not fully understood. Peterson and Munson (1984:317-337) present a comprehensive explanation and summary of the problems surrounding the inclusion of pigweed as a prehistorically utilized food. There are numerous questions associated with the identification, productivity, availability, and usage of Pigweed. There are some 60 species of Amaranthus, and it is difficult to distinguish between them utilizing only the seed. Nor can pollen analysis differentiate amaranth pollen to the species level. Further, it is not possible to distinguish the family Amaranthaceae from *Chenopodiaceae* (except with an electron microscope). There is debate as to whether all species are native to America (Tucker and Sauer 1958:259-60). There is also disagreement as to the economic attractiveness of amaranth to aboriginal gatherers/cultivators. Uncharred seeds were recovered from two context giving Amaranthus a Ubiquity Score of 4 percent.

c. *Knotweed /Smartweed*

There are about 150 species of *Polygonum* which occur in the United States alone (Hatch 1980:207). Knotweeds are members of the buckwheat family and are liabilities as weeds, but they provide a valuable source of wildlife food (Martin 1972:40). Knotweeds *(Polygonum punctatum)* are sometimes called smartweeds because they contain an acrid juice which can sting the skin. They are partial to moist soil, cultivated fields, and ditches. Knotweed *(Polygonum erectum)* is thought to have been a possible minor cultigen. Knotweed seeds are commonly found in flotation samples from contexts as early as 500 AD (Cowan 1985:217).

Polygonum punctatum is also called water smartweed and favors waterlogged ground (Hatch 1980:208). There are numerous ethnographic references to the medicinal use of water smartweed. In *Virginia Indians* it is stated that the juice of the leaves was used for dressing wounds (Erichsen-Brown 1979:218-219). The Meskwaki, Potawatomi, and Ojibwe made a tea from the leaves and stems (Erichsen-Brown 1979:218-219).

Knotweed *(Polygonum erectum)* seeds are the most commonly encountered seed in flotation samples from sites in the lower Illinois River Valley (Cowan 1985:217). Few seeds have been found in pre-Middle Woodland archaeobotanical assemblages (Asch and Asch 1985:183), and investigators are puzzled as to why Knotweed is not present in Archaic contexts. Asch and Asch (1985:186) point out that Archaic sites such as Koster bear evidence of occupations as intensive and nearly as sedentary as those of Woodland times. If Woodland habitation sites were abundant with Knotweed, so too should have been some Archaic habitations. Evidence of Archaic harvesting of Iva and Ragweed indicated some interest in utilizing small edible seeds (Asch and Asch 1982), and it is unlikely that knotweed would have been overlooked for exploitation (Asch and Asch 1985:186). The hypothesis of knotweed cultivation is consistent with evidence concerning its prehistoric economic status and with information about its modern natural distribution and abundance. However, the differences between the Archaic and Woodland period archaeobotanical recovery are the subject of continued study (Asch and Asch 1985:1860). Uncharred Knotweed was recovered from two samples and has a Ubiquity Score of 4 percent.

d *Pokeweed*

Pokeweed *(Phytolacca americana)* is a native perennial whose young shoots can be cooked as greens. The root, the mature plant, and the seeds are poisonous. The Pamunky Indians of Virginia used a tea made by boiling the berries (Cox 1985:242). The Mohegan of Connecticut mashed the berries to make a poultice. They also used the juice from the berries to make a dark blue stain (Tantaquidgeon 1977:75). Pokeweed is a common weed found in pastures, fields, and waste places. Two uncharred seeds were recovered. Pokeweed was recovered from three samples and has a Ubiquity Score of 6 percent.

e. *Sedge*

Sedge *(Cyperaceae spp.)* is a grasslike or rushlike herb with fibrous roots. Sedge is a large widely dispersed family found in damp sandy soil (Peterson 1977:230). Small nutlike tubers radiate from the base of the plant. The tuber can be cooked, ground into flour, or used in beverages. Uncharred sedge was identified in 13 samples and has a Ubiquity Score of 27 percent.

f. *Chufa*

Chufa *(Cyperus esculentus)* is a grasslike tuber belonging to the sedge family. The culms or stems grow from one to three feet tall (Medsger 1966:171). It is found in damp sandy soil. Slender, scaly runners terminated by small nutlike tubers radiate from the base of the plant. The tubers, which are edible, are sweet and have a nutty flavor. The tubers can be eaten raw, cooked, or ground into a flour (Peterson 1977:230). The most important aspect of assessing the chufa in a prehistoric diet is that it was available all year long. Uncharred chufa was recovered from two contexts and has a Ubiquity Score of 4 percent.

g. *Flatsedge*

Flatsedge *(Cyperus* spp.) is a low to medium-height, erect, grasslike herbaceous plant which grows eight to 40 inches tall (Tiner 1987:177). Its habitat is inland marshes, swamps, and wet shores (Tiner 1987:177). Flatsedge is similar to Chufa in that it has a tuberous rhizome. It is likely that it was utilized in the same manner as Chufa. Uncharred flatsedge specimens were recovered from 26 samples, giving it a Ubiquity Score of 54 percent.

h. *Grass*

All grasses (*Graminae* spp.) have stems with solid joints and two-ranked leaves, one at each joint. Grasses have a wider range than any other plant family and can endure extreme environmental conditions (Chase 1948:8-15). Uncharred grass seed was recovered from 34 contexts and has a Ubiquity index of 71 percent.

i. *Spurge*

Spurge *(Euphorbia* spp.) is a native perennial (Cox 1985:206). As a food source, the seeds are important to several species of game and song birds. There are about 36 species in North America. Flowering spurge is found in old fields, pastures, waste areas, along roadsides, and in open woods. In herbology several species are recommended for the initiation of vomiting and as purgatives. However, the milky juice of these plants contains toxic compounds. The sap may cause blistering and inflammation of the skin in sensitive individuals.

There is extensive documentation that the ground leaves and flowers of spurge were used for snake bites by the Navaho, Shoshone, and Pima; as a urinary aid by the Cherokee; as a lip balm by the Hopi; and as a worm expellant by the Fox (Moerman 1986:184-187). The roots were used as a cathartic by the Meskwaki and the Ojibwa (King 1984:111). A total of two contexts contained uncharred spurge seeds. The Ubiquity Score is 4 percent.

j. *Blackberry*

Blackberry *(Rubus* spp.) bushes grow from three to nine feet high. The blackberry is one of the most valuable wild fruits. It grows in some form over almost the entire eastern United States (Medsger 1966:29). Shrub communities are fast to colonize newly opened forest. Shrub communities with a high proportion of fruit bearers would be expected in intermediate stages of succession of lowland forests. Not only were the fruits eaten but also a bark tea was made by the Potawatomi and Ojibwa for coughs and colds (King 1984:154).

Various species of *Rubus* were stored by Native American groups for use during the winter months

(Keene 1981:80). The Iroquois used the dry fruit as a cooking condiment and as a trail food. The effort involved in preparing fruit for storage would have been minimal. Rogers (1973:69) reports that the Cree dried berries by boiling them down, spreading the mixture on bark trays, and setting the tray in the sun. This produced a flat cake which could be sliced and eaten. Waugh (1973:127) notes that the Iroquois dried berries both in the sun and on racks spread over fires. Uncharred blackberry seeds were recovered from two contexts. The Ubiquity Score is 4 percent.

k. *Deerberry*

Deerberry (*Vaccinium* spp.) include some 15 or 20 species comprising the blueberry family in the United States. The exact species are often difficult to determined, but none of them is poisonous (Medsger 1966:71). Deerbeery or squaw huckleberry has fruit that is round or slightly pear shaped, sometimes half an inch in diameter, and is sour and not good to eat raw. When cooked, they are considered quite good. Uncharred deerberry was recovered from two samples and has a Ubiquity Score of 4 percent.

l. *Paspalum*

Paspalum (*Paspalum* spp.) is a genus of approximately 200 species. Paspalums are perennial or annual grasses that range in height from a few inches to more than four feet (Martin 1972:21). Uncharred paspalum was recovered from three contexts and has a Ubiquity Score of 6 percent.

m. *Doveweed*

Doveweed (*Croton* spp.) is a genus of about 600 species with about a dozen occurring in the United States (Martin 1972:78). Doveweeds belong to the Spurge family. Some species are low-growing and compact, and others grow tall and openly branched. Gamebirds favor the seeds. Uncharred seeds were recovered from four samples; the Ubiquity Score was 8 percent.

n. *Cress*

Marsh Yellow Cress (*Rorippa islandica*) is an annual with a thick taproot. This is a genus of about 40 species with worldwide distribution. There are eight species in the Northeast, four of which are native to North America. Most species occur in moist to wet substrates. *R. Islandica* is highly variable, with several varieties based on leaf characteristics. Marsh Yellow Cress has edible greens (Cox 1985). Uncharred cress was identified in two samples and has a Ubiquity Score of 4 percent.

o. *Chokecherry*

Chokecherry (*Pyrus* spp.) is a common shrub found in wet to dry thickets and swamps. Chokecherries are edible and produce fruit from August until October (Peterson 1977:220). Uncharred chokecherry was recovered from two contexts and has a Ubiquity Score of 4 percent.

p. *Dodder*

Dodder (*Cuscuta gronovii*) is an annual parasite with root-like structures that penetrate the conductive system of a host plant. Seeds germinate in the soil and the seedlings soon come into contact with host plants. Contact with the soil is then broken, and they become totally dependent on the hosts. The 12 native and 3 introduced species of this genus in the Northeast are very similar and distinguished from one another on rather technical characteristics. Dodders have been declared noxious weeds in the seed laws of 42 states and by the Federal Seed Act (Cox 1985:304). *Cuscuta gronovii* is the most common species of dodders and is found on a great variety of host plants in wet areas. Uncharred dodder was found in only one sample and has a Ubiquity Score of 2 percent.

4. *Charred Specimens*

Charcoal is the charred remains of a plant's woody structures and is predominantly from trees and shrubs. Wood and charcoal fragments are not direct elements of the diet but can be a floral artifact resultant of cultural mechanisms. Small charcoal flecks were observed in 35 of the 50 flotation samples studied. The flecks were too small to extract or weigh. Larger charcoal fragments were recovered from excavation. A total of 18 charred wood fragments were recovered from excavation and had total weight of 28.4 gm.

Burning does not ensure wood preservation. Some wood can burn completely, leaving ash rather than charcoal. Charred wood is resistant to decay and therefore preserves well. Charcoal is commonly found in prehistoric contexts (Carbone and Keel 1985), and large concentrations can suggest the presence of a hearth or fires. Wood, of course, was burned as fuel for fires. Yarnell (1964:27; 1965) discussed the effects of selective firewood-gathering and differential self-pruning of various trees.

Charcoal flecks were present in 73 percent of the samples; however, only 15 charred seed specimens were recovered from the flotation samples. Woodbine, sumac, and sumpweed were recovered in the charred state from the flotation samples. During excavation, three unidentified charred nutshell fragments, one charred hickory nutshell fragment, one charred cherry pit, and one charred sumac seed were recovered.

a. *Woodbine (Root: Medicinal Herb)*

Woodbine (*Parthenocissus quinquefolia*) is also commonly called Virginia Creeper (Fernald 1970:995). Woodbine is commonly found in woods and thickets and flourishes between June and August. A single charred woodbine specimen was recovered from Feature 23 in Unit 21. Uncharred woodbine was also recovered from two non-feature contexts in Unit 21. Woodbine has a Ubiquity Score of 6 percent.

There is no documentation that Woodbine was utilized prehistorically as a foodstuff. However there is documentation that Woodbine was used medicinally by the Cherokee as an infusion for jaundice (Moerman 1986:325). Woodbine was used by the Fox to cure diarrhea. The Iroquois used Woodbine in poultices, compounds, and decoctions for swellings and wounds and to counteract poison sumac (Moerman 1986:325).

b. *Sumac (Leaves, Root-Smoking Material, Dye, Medicine, and Basket Making; Fruit-Beverage)*

Sumac (*Rhus* spp.) is a small tree or shrub with dense clusters of small fruit. Poison Sumac is easily distinguished from other varieties of sumac because the poisonous berries are white and all others are red (Medsger 1966:214). There is extensive documentation of the medicinal utilization of numerous species of Sumac by the Navaho, Ojibwa, Delaware, Chippewa, Fox, Pawnee, Ponca, Iroquois, and Potawatomi. The uses ranged from elimination of worms to healing snakebites and sores (King 1984:74; Vogel 1970:376). The fruit, when soaked in water, makes a delicious beverage (Peterson 1977:186). The beverage has been dubbed "Indian lemonade" (Medsger 1966:213).

Sumac leaves and roots were used to make a ceremonial tobacco mixture, and the split stems were used in basket making (Moerman 1986:402-407). According to a historical dictionary of 1813 (as quoted in Kavasch 1979:165), Sumac berries became so esteemed in Europe for smoking that they were preferred to the best of the cured Virginia tobacco. It was reported by an early writer in 1779 that:

> An Indian carries pouch and pipe with him wherever he goes, for they are indispensable. For state occasions they may have an otter skin pouch or a beaver-pouch . . . In the pouches they carry tobacco, fire material, knife and pipe. Sumac is generally mixed with tobacco or sumac smoked without tobacco [as quoted in Erichsen-Brown 1979:115].

It is further reported in 1778 that:

> Sumac likewise grows here in great plenty; the leaf of which, gathered . . . when it turns red, is much esteemed by the native. They mix about an equal quantity of it with their tobacco, which causes it to smoke pleasantly [Carver 1778:30 as quoted in Erichsen-Brown 1979:115].

Byrne and Finlayson (1974) report that staghorn sumac made up 15.6 percent of the wild plant seeds found at the Crawford Lake Site in Ontario. They were found in 39.3 percent of the examined features, pits, ovens, and middens. They were the only seeds identified to species (Erichsen-Brown 1979:115). At the Draper Site in Ontario, sumac seeds archaeologically represented the fourth largest amount of all seeds recovered (Erichsen-Brown 1979:115).

A report written by Harriot in 1590 entitled *Virginia Indians* says about sumac:

> Dyes of divers kindes. There is Shoemake well knowen, and used in England for blacke. . . The inhabitants use them only for the dyeing of hayre; and colouring of their faces, and Mantles made of Deare skinnes; and also for the dying of ushes to make artificial workes withal in their Mattes and Baskettes" [as quoted in Erichsen-Brown 1979:115].

Sumac fruits from August through October. The leafstalks and roots would be available all year.

A single charred sumac seed was recovered from Feature 18 in Unit 28; this single recovery gave sumac a Ubiquity Score of 2 percent. One additional charred sumac seed was recovered during excavation from Feature 26 in Unit 29.

c. *Sumpweed (Kernels: Food)*

Sumpweed (*Iva annua*) is an oily-seeded annual whose appearance is similar to a tiny sunflower seed. Technically the seed is called an achene and it consists of a kernel (the true seed) attached at one place to a thin dry shell which is called the pericarp. Sumpweed achenes have been found in numerous prehistoric contexts which has led investigators to believe that it was an important native seed singled out for extensive exploitation. Asch and Asch (1978, 1985) have done extensive research on sumpweed and present persuasive arguments concerning its economically significant attributes which will be summarized here.

Sumpweed seeds are a concentrated source of food energy because of their high fat and low moisture content. On a per gram basis, they provide an equivalent number of calories as sunflower kernels and more than Chenopodium and acorns. Sumpweed is also an excellent source of vitamins, minerals, crude fiber, and protein.

Asch and Asch (1985:302) point out that unprocessed achenes are unpalatable because of an objectionable odor and taste of the shell and because the tough, fibrous, indigestible shell makes up about 45 percent of the total achene weight. They experimented with roasting and boiling the achenes and found that these methods of processing eliminated the objectionable odor and flavor (Asch and Asch 1985:302-303). The separation method that Asch and Asch found successful was as follows: (1) boiling the achenes for several minutes, which causes many shells to split open partially and weakens the rest; (2) drying the boiled achenes to reharden the kernels; (3) rubbing the material between the hands to separate kernels from shells; and (4) winnowing the shells. None of the seed fragments from Site 7S-F-68 exhibit attached pericarps. The absence of pericarp residue suggests that pericarp removal occurred prior to parching or at the location of exploitation, rather than as a result of inadvertent thermal degradation.

Habitats of sumpweed include a variety of wetland settings: alluvial soils along streams, borders of ponds and sloughs, river bottoms, meadows, low fields in valleys, and areas which are flooded in the spring and often wet throughout the growing season. Sumpweed grows where there is a cover of short grasses but it is less successful where it competes with other weeds and tall grasses. Sumpweed is an edge species occurring between permanently wet and somewhat better drained soils. Sumpweed commonly occurs in dense stands in which it is the tallest plant. The seasonal growth pattern is such that germination occurs during April culminating in flowering at the end of August. Achenes are ripe and ready to drop around October. The effective harvest season for sumpweed is probably no more than two weeks. Figure 38 provides an illustration of sumpweed.

Asch and Asch (1978) did extensive experimentation on harvesting procedures and yields. The return for one hour of harvesting meets an adult's daily energy requirement. They estimated that during the two-week harvest season a 120-day total energy supply could be obtained. From the viewpoint of energetics it is feasible to harvest dense stands of wild sumpweed with yields similar to other wild plants that were taken into cultivation as dietary staples.

Asch and Asch (1978) suggests that after prehistoric gathering of wild sumpweed began some achenes undoubtedly were lost at campsites, resulting in volunteer plants. However, they assert that it seems unlikely that the beginnings of sumpweed cultivation can be accounted for as a gradual shift from a gathered plant to a "weedy camp follower" to a "door garden" or "dump heap" cultigen. Sumpweed is more appropriate as a field crop than as a small crop in a garden. Other early eastern North American cultigens are different in this respect.

The major value of sumpweed was presumably as a storable source of food energy. Its economic potential depends on its attractiveness in relation to competing species, on the overall demand for food, on the organization of the settlement system, and on other cultural variables. Asch and Asch (1985) compared the collection of sumpweed with the collection of acorns and hickories because they believe that these nuts were the major pre-agricultural source of plant-derived food energy in eastern North America. They explain that hickory nuts are seasonally available before sumpweed. Therefore the need to collect sumpweed may depend on the success of the nut harvest. They suggest that it is unlikely that collectors would forego harvesting nuts in the expectation of collecting sumpweed.

Sumpweed was recovered only in the charred state. A total of 13 sumpweed seeds were recovered from the site area. The Ubiquity Score was 8 percent. Two were recovered from Feature 26 in Unit 29; seven were recovered from Feature 20 in Unit 47; three were identified in Feature 17 in Unit 25; and one was recovered from Feature 19 in Unit 38. Sumpweed was present in contexts dating to 2460 $\pm$ 130 years BP (Feature 19), 1020 $\pm$ 70 years BP (Feature 17), and 310 $\pm$ 80 years BP (Feature 20).

Archaeobotanical documentation of gradual increase in sumpweed achene dimensions provides evidence of a domestication of the plant in eastern North America (Asch and Asch 1978; Yarnell 1978). Asch and Asch (1978) have compiled data on sumpweed measurements from archaeological contexts and have compared those measurements to modern achene size. Modern sumpweed achenes measured from a variety of wild populations in the lower Illinois Valley rarely exceeded 3.0 mm in length. To estimate original sumpweed achene dimensions from a carbonized sample, a common procedure is first to add 0.7 mm and 0.4 mm, respectively, to the observed length and width if the specimen is a naked kernel, and then to make a correction for 10 percent shrinkage due to

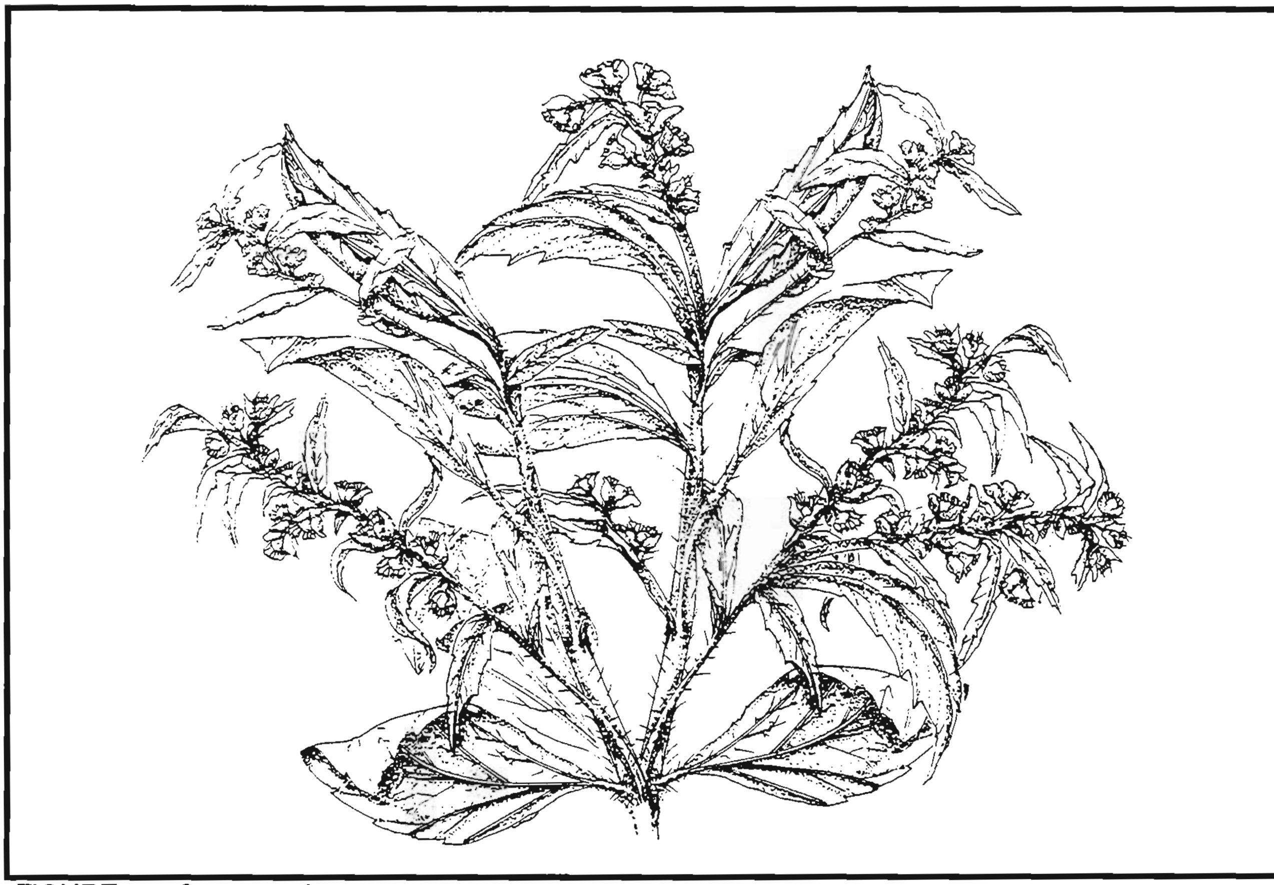

FIGURE 38: Sumpweed.

carbonization (Yarnell 1972:336-337). Asch and Asch compared modern lengths to specimens collected from prehistoric contexts and found that the smallest prehistoric achenes were larger than the mean size from any wild stands they had observed.

Table 25 lists the dimensions for the nine whole charred sumpweed specimens recovered from the site. Using Yarnell's procedure to estimate seed size, the mean length is 5.3 mm and the mean width is 3.2 mm. These values are comparable to those observed at Middle to Early Late Woodland sites in Illinois, Kentucky, and Mississippi (Yarnell 1978:295). Although Site 7S-F-68 has provided only a small sample from which to estimate a change in achene dimensions, the recovered data do suggest that the seeds are more comparable to prehistorically utilized achene assemblages than to modern achene samples from noncultural contexts.

d. *Hickory (Nuts: Food; Shell: Fire Enhancer)*

Hickory (*Carya spp.*) was also represented within the site area. Hickory trees grow best in well-drained soils and well-drained hillsides. Hickory bears consistently; however, yearly yields vary, with a good crop expected at least once every three years (Keene 1981:66). Hickory is an important wildlife food for which there is great competition from animals. Squirrels, for example, tend to remove the unripened green nuts from the trees. However, hickory is not subject to the extensive damage or production of immature seed observed in acorns (Keene 1981:66). Hickory nuts generally are at their peak in October.

Hickory nutshells seem to be the one item remaining from food preparation that is consistently burned. Apparently Indians in eastern North America discovered that Hickory shells make an excellent, hot, virtually smokeless fire for cooking (Smith 1985:121). The proportion of Hickory shell far outweighs other shell types in prehistoric sites of the East. The occurrence of Walnut shell in eastern prehistoric sites is much more sporadic and less consistent. A charred fragment of Hickory nutshell weighing 1.3 grams was recovered from Unit 15, Strata B, Level 2.

Ethnographic accounts dating from the contact period are useful in determining how people may have prepared these nuts. According to early travelers, Indians collected hickory nuts mainly for their oil, although they also ate the nut meats (Swanton 1946:364). An early historian described how the oil was extracted:

> At the fall of the leaf, they gather a number of hiccory-nuts, which they pound with a round stone, thick and hollowed for the purpose. When they are beat fine enough, they mix them with cold water, in a clay bason, where the shells subside. The other part is an oily, tough, thick white substance, called by the traders hiccory milk, and by the Indians the flesh, or fat of hiccory-nuts, with which they eat their bread [Adair 1775:408, quoted in Swanton 1946:365].

Three charred nutshell fragments which could not be identified to species were also recovered from excavation.

e. *Cherry (Berry: Food; Bark: Medicine)*

A single charred cherry pit fragment was recovered from Unit 45, Stratum B, Level 6. Cherry (*Prunus* spp.) trees prefer rich moist soils but will also grow well in sandy soils. Cherry trees are shade intolerant and would not be expected in significant numbers within mature forests. Cherry saplings may often compose a large proportion of the understory trees in xeric and mesic forests but their densities decrease as the stands age and the forest canopy develops (Keene 1981:81). Cherry trees are likely to grow along riverbanks or in relatively open areas.

Cherry fruit was extensively exploited in prehistoric and historic times in the eastern United States and is well documented (Yarnell 1964:62). The wild cherry produces a small fruit that is available between August and September. The trees are relatively consistent producers, generally bearing some fruit every year (Keene 1981:81). Cherries are subject to heavy animal predation both in the trees and after they have dropped. Keene (1981) suggests that as much as 80 percent of the crop is lost to wildlife and insects. Cherries would be more costly in terms of time expended to harvest than other plant foods. The trees grow to substantial heights, and the fruit is often located on upper limbs. The fruit grows in clusters but is not easily shaken loose. Beyond collection, processing costs would have been minimal because the fruit can be eaten raw or dried for later use (Keene 1981:82).

The bark of the cherry tree was also used medicinally by historical Native American populations. A warm infusion of the bark was given to Cherokee women in the first pains of childbirth. The Ojibwas used the inner bark of cherry, boiled, bruised, or chewed as an application to external sores (Vogel 1970:388-389).

5. *Seasonality*

The recovered charred floral specimens exhibit a definite pattern of seasonality, suggesting use of the site during the autumn months. Hickory nuts are at their peak at the end of September and beginning of October. Sumac fruits between August and October, although the root and stemstalk would be available all year. Cherry trees produce fruit in the early fall, from the end of August through September. Sumpweed achenes ripen around the middle of October. Ordinarily, some hickory nuts will still be available but in declining abundance when sumpweed is ready to harvest. Woodbine, which is in profusion from June through August, is the only one of the analytically significant botanicals recovered that deviates from the pattern of autumn procurement.

TABLE 25: METRICS FOR RECOVERED SUMPWEED SPECIMENS

CONTEXT/DATE	LENGTH	WIDTH	ESTIMATED LENGTH	ESTIMATED WIDTH
Feature 17	4.2	2.7	5.2	3.2
1020 ± 70 years BP	4.3	2.7	5.3	3.2
(Beta-56043)	4.0	2.6	5.1	3.1
Feature 19	5.0	3.1	6.1	3.7
2460 ± 130 years BP				
(Beta-56045)				
Feature 20	5.0	2.8	6.1	3.3
310 ± 80 years BP	4.1	2.6	5.1	3.1
(Beta-56048)	4.0	2.5	5.0	3.0
Feature 26	4.0	2.7	5.1	3.2
Late AU	4.1	2.6	5.1	3.1
MEAN	4.3	2.7	5.3	3.2

All measurements expressed in millimeters; estimates derived according to procedure given by Yarnell (1972:336-337).

E. FAUNAL ANALYSIS

A total of 192 bone fragments with a combined weight of 98.9 grams was recovered from the site area. Three-fourths of the faunal assemblage was nondiagnostic bone fragmentation. These nondiagnostic fragments were categorized as "Mammal/Bird" because it could not be determined whether the bone fragments were derived from mammal or bird. Four percent of the assemblage was identified as Mammal/Bird longbone fragmentation. Nineteen percent of the assemblage could be identified as bird bone and 2 percent of the assemblage could be identified as mammal bone.

Fifty-five percent of the recovered faunal assemblage was charred. A total of 105 specimens were charred to the white state, and 1 was charred black. The color pattern of the burned specimens at this site exhibited a homogeneity that does not suggest a pattern of successive fires. Hearth areas utilized for long periods of time would be more likely to exhibit a mix of charred bone colors, ranging from blacks, to grays, to whites. Hearth areas are normally raked or cleaned; and if the hearths were intensively used, they should receive discarded bone. Bone waste would likely show a diversified charred color pattern as a result of these activities. Based on the bone waste, it is suggested that the hearths at this site were not utilized for prolonged periods of time.

1. *Mammal*

Only three specimens could be positively identified as mammal. One mammal tooth enamel fragment was recovered from Unit 15, Stratum B, Level 2. One small fragment (2.3 cm long) of longbone was recovered from the plowzone of Unit 21. One tarsal/carpal fragment from a small mammal was recovered from Unit 34, Stratum B, Level 3.

2. *Bird*

A total of 37 specimens were identified as bird. A scapula fragment was recovered from Unit 42, Stratum B, Level 2. A phalanx was recovered from Unit 36, Stratum B, Level 2; 1 phalanx fragment was recovered from Unit 35, Stratum B, Level 5; and 3 phalanx fragments were recovered from Unit 36, Stratum B, Level 2. A digit was recovered from Unit 36, Stratum B, Level 2. A total of 30 longbone fragments ranging in length from 0.1 to 2 cm were recovered from various units throughout the site. The size of the unidentified bird fragments suggests that they were from small birds rather than large waterfowl. Two small birds which would have been locally available and abundant are pigeons and quail. While the recovered bird fragments could not be positively identified to these species, it is assumed that some of the bird fragmentation may be representative of these species, given the documented importance of these species in the prehistoric diet.

There is extensive ethnographic documentation regarding utilization and collection methods for pigeon. A good description of the gathering of passenger pigeons to nest along the Genesee River in New York in 1782 is described by Horatio Jones who lived among the Seneca:

> Word of the annual nesting of pigeons was spread though out the Seneca territory. The Indians gathered in the locality of the pigeon woods. The Indians cut down the roosting trees to secure the birds and each day thousands were killed. Fires were made and dressed birds were suspended to dry in the heat and smoke. When properly cured they were packed in bags or baskets to the home towns [Harris 1903:450].

Pigeons were also taken by the Iroquois in the 1600s. Instances have been reported of more than 1,500 being taken at one time with the aid of nets are known (Keene 1981:114). The Delaware are known to have hunted pigeons by chopping down the trees in which the pigeons roosted, many of the pigeons being killed when the tree toppled (Keene 1981:114).

Mass migrations of pigeons usually appeared in northern states as soon as the ground was bare of snow. Pigeons were colonial animals and remained together during the spring and fall roost. It has been reported that the densities of pigeons in these roosting places was so great that trees were toppled from the sheer weight of the pigeons sitting in them (Keene 1981:112-113).

Squabs were the preferred take. Approximately two weeks after hatching, the young were abandoned by the adults. At this time the squab was apparently a mass of fat and equaled, or exceeded, the weight of the adult. Within three to four days, it could fly well enough to escape capture (Keene 1981:112). Pigeons were eaten fresh, smoked, or dried by Native American populations, but were particularly favored for their fat and were frequently boiled down to recover the fat (Keene 1981:114).

North American quails include the bobwhite. The quail (*Colinus virginianus*) was named after its Old World counterpart. When the first Europeans came upon a New World bird for which they had no name, they called it after the Old World bird they thought it most resembled. In Virginia this was felt to be the partridge, in New England the quail. The first name remained localized, the second was applied throughout the United States (Root 1980:390). Bobwhite Quail have large, white fleshed muscles which permit rapid flight, but in brief spurts only. They lack the rich blood supply necessary for sustained flight.

F. CONCLUSION

The recovered faunal specimens were highly fragmented and lacking in diagnostic properties. The paucity of identifiable faunal material precludes interpretation of animal food utilization in the site area, although the data suggest that small birds the size of pigeon and quail may have been exploited at the site area.

Only 16 seeds, one fruit pit, three unidentified nutshell fragments, and one fragment of hickory nutshell were recovered in the charred state. These charred specimens represented five native plant types. Although only a small amount of analytically significant floral material was recovered from this site, the floral assemblage has important interpretive value. There is documented ethnographic usage of both woodbine as a medicinal herb and sumac as a dye, medicinal herb, for cordage and as a smoking material. There is documented usage of cherry both for food and as a medicinal, and hickory nuts were used as food and as a fuel for hot, smokeless fires. The distribution of the analytically significant floral assemblage according to analytical units is given in Table 26.

The charred sumpweed *(Iva annua)* was the most significant botanical material recovered from the site. Sumpweed is an indigenous annual seed plant which played a prominent role in eastern North America in the transition from the sole dependence of humans on the hunting and gathering of wild plants to cultivation. The question of why populations in eastern North America abandoned an economic pattern of hunting and gathering that had sustained them for almost 7,000 years remains unanswered (Cowan 1985:206). It is likely that changes in subsistence systems more often involve shifts in emphasis than conscious species replacement. Foragers possess extensive knowledge of the productive capabilities of plants and actively employ this knowledge to manipulate the life cycles of plants to improve their reproductive capacities (Cowan 1985:222). Cowan (1985:222-224) discusses burning, irrigation, intentional propagation, and ritual as methods by which hunters and gatherers actively sought to increase or maintain the productivity of their environment.

Asch and Asch (1985:334) have addressed the question as to why sumpweed fell into disuse. They suggest that perhaps it was never regarded as a primary food source, since it had reached a plateau of utilization prior to the establishment of maize as the staple cultigen and even before the native complex of starch seeds became well established. The Late Woodland decline in nut utilization may be indicative of a general reduction in dependence on oil seeds relative to starchy seeds. The uses of sunflower are most similar to sumpweed and it would have competed most directly with sumpweed as a food source. Yarnell (1972) suggests that as sunflower developed domesticated characteristics such as large achenes and a single large disk, it may have replaced sumpweed because it became a superior cultigen. Further, the development of a polycultural crop system in eastern North America may also have played a part in the declining use of sumpweed.

The recovery of a mano and metate at this site raised the question as to what plant food or foods were being processed with these tools. The results of the flotation analysis suggest that sumpweed was the primary resource being processed at this procurement site. It is also important to note that other important starchy grains were recovered from the site area. Chenopodium, Amaranthus, and knotweed were all present within the studied samples. Although they were not recovered in the charred state and thus are not considered prehistoric in origin, it is possible that they were present during the prehistoric utilization of the site area. Considering the total sample of recovered botanicals, charred and uncharred, there was a diverse assemblage of starchy grains, herbs, nuts, and fruits available in the site area which could have been exploited by a prehistoric population.

TABLE 26: DISTRIBUTION OF CHARRED NATIVE SPECIMENS IN ANALYTICAL UNITS

ANALYTICAL UNIT	FLORAL SPECIMENS
Early (Paleoindian and Early Archaic)	Cherry (*Prunus* spp.) Sumac (*Rhus* spp.)
Middle (Late Archaic/Early Woodland)	Sumac (*Rhus* spp.) Sumpweed (*Iva annua*) Woodbine (*Parthenocissus quinquefolia*)
Late (Late Woodland)	Sumpweed (*Iva annua*)