TEN

Early Floridians and Late Megamammals

Some Technological and Dietary Evidence from Four North Florida Paleoindian Sites

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Some of the most informative Paleoindian sites in North America are places where late Pleistocene peoples lived—their habitation or campsites. In general, Paleoindian campsites provide a more complete picture of lifeways because they reflect the shared, day-to-day activities of the men, women, and children rather than the out-of-camp, often gender-, age-, and/or task-specific activities. For example, a greater diversity of information has been obtained from the Lindenmeier, Colorado (Wilmsen and Roberts 1978), and Hanson, Wyoming (Frison and Bradley 1980), campsites compared to the view gained from Folsom-age bison kill sites.

In addition, habitation sites promise to provide a more complete picture of paleo-nutrition because specialized sites such as the kill-butcher locations of large Pleistocene animals (e.g., mastodons) are often biased toward a single species. Conversely, sites of small animal captures are more likely to be archaeologically invisible. Therefore, specialized animal procurement sites may exclude a significant portion of a culture's overall diet. Depending on carcass size and cultural practice, all or part of the bones from collectively shared prey animals are likely to have been brought back to the campsite. However, a problem that has impeded the greater potential for interpreting Paleoindian campsites east of the Mississippi River has been poor organic preservation. The occurrence of bone is typically nonexistent at open-terrain campsites. In Florida, for example, the Harney Flats site (8Hi507) (Daniel and Wisenbaker 1987) represents a major base camp with lithic artifacts but no organic preservation. There are exceptions, however, and eastern Paleoindian sites located in karst caves, wetlands, or inundated locations often have surviving faunal and sometimes botanical remains.

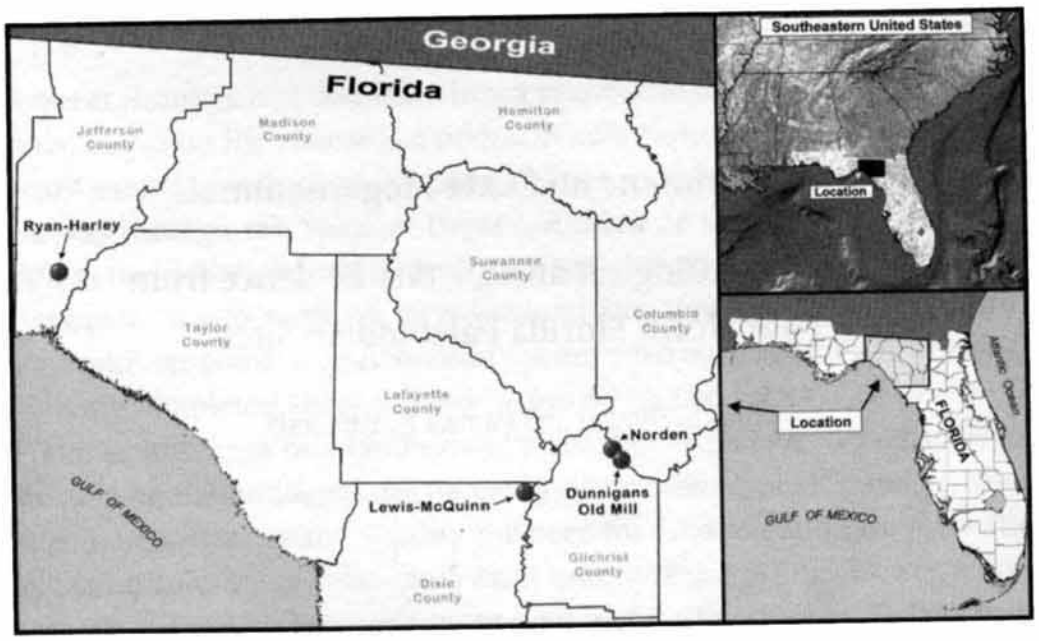

FIGURE 10.1. Location map showing the positions of the Ryan-Harley, Norden, Dunnigans Old Mill, and Lewis-McQuinn sites, North Florida.

There have been a handful of Paleoindian and Early Archaic cave (and sinkhole) sites investigated in the eastern United States. These include Dust Cave (Walker 1998) in northwestern Alabama, Modoc Rock Shelter in Illinois (Styles et al. 1983), Meadowcroft Rockshelter (Advasio et al. 1984; Advasio et al. 1999) in Pennsylvania, Stanfield-Worley Bluff Shelter (DeJarnette et al. 1962) in Alabama, Cutler Ridge (Carr 1987) near Miami, Florida, and Sheridan Cave (Tankersley et al. 1997; Tankersley and Redmond 2000) in Ohio, among others.

Open-terrain Paleoindian campsites with bone preservation, while elusive, have now been identified in submerged and wetland river basin settings in the Wacissa, Suwannee, and Santa Fe river basins in North Florida. In general, the karst river basins of Florida have long been recognized as an excellent source of late Pleistocene faunal material. As a result of archaeological investigations, four open-terrain Paleoindian campsites are now known in Florida, and will be the focus of this chapter. They are the Ryan-Harley site (8Je1004) in the Wacissa River basin, the Dunnigans Old Mill (8Gi24) and Norden (8Gi40) sites in the Santa Fe River basin, and the Lewis-McQuinn site (8Di112) in the Suwannee River basin (Figure 10.1). These sites, coupled with sites such as Dust Cave (Walker 1998, 2000) and Meadowcroft Rockshelter (Advasio et al. 1984; Advasio et al. 1999), provide evidence that Paleoindians in the eastern United States had a more varied

diet, with some sites indicative of a more generalized subsistence pattern and others more focused on mammals for subsistence. The reliance of certain cultural groups on wetland resources is well documented in Florida; however, it has never before been traced to a Paleoindian context.

Along with faunal remains, these sites have also produced stone tools and lithic debitage and, in three out of the four sites, bone tools. Because these sites also offer the opportunity to clarify aspects about the tools and tool-making debris that are associated with megafauna remains, we consider both the fauna and artifact assemblages. It is a threefold approach, taking into account the implications of the faunal and artifact assemblages in a comparative way. We not only compare the assemblages between sites, we also consider the implications of the faunal assemblage not necessarily reflected in the artifact assemblage as well as the implications reflected in both.

Ryan-Harley

The Ryan-Harley site is the first stratified Suwannee point site in the southeastern United States that meets two crucial tests of archaeological significance (Figure 10.2). First, the Suwannee point level of the site has survived uncontaminated by other cultural deposits; second, the bones of extinct and extant species have been preserved in association with numerous stone artifacts. The analysis of cultural and faunal remains (Dunbar et al. 2005) and the site's stratigraphy (Balsillie et al. 2006) are reported elsewhere. It is our intent to use the Ryan-Harley site as a baseline to compare its faunal and cultural remains to the Norden and Dunnigans Old Mill sites located in the lower Santa Fe River basin and the Lewis-McQuinn site in the lower Suwannee River basin (Figure 10.3).

The Ryan-Harley site is located in and along a relatively recently formed, low-energy, braided channel of the Wacissa River. Here the floodplain of the river is about 5 kilometers wide, and the difference in elevation between the low-river stage and the surrounding wetlands rarely exceeds about 0.5 meter. As a result, the Ryan-Harley site is located in the middle of a heavily vegetated swamp forest. A larger part of the site extends under the riverbank for an undetermined distance.

Norden

The Norden site encompasses a large area with many horizontally separated components that extend from the sandhill uplands into the Santa Fe River

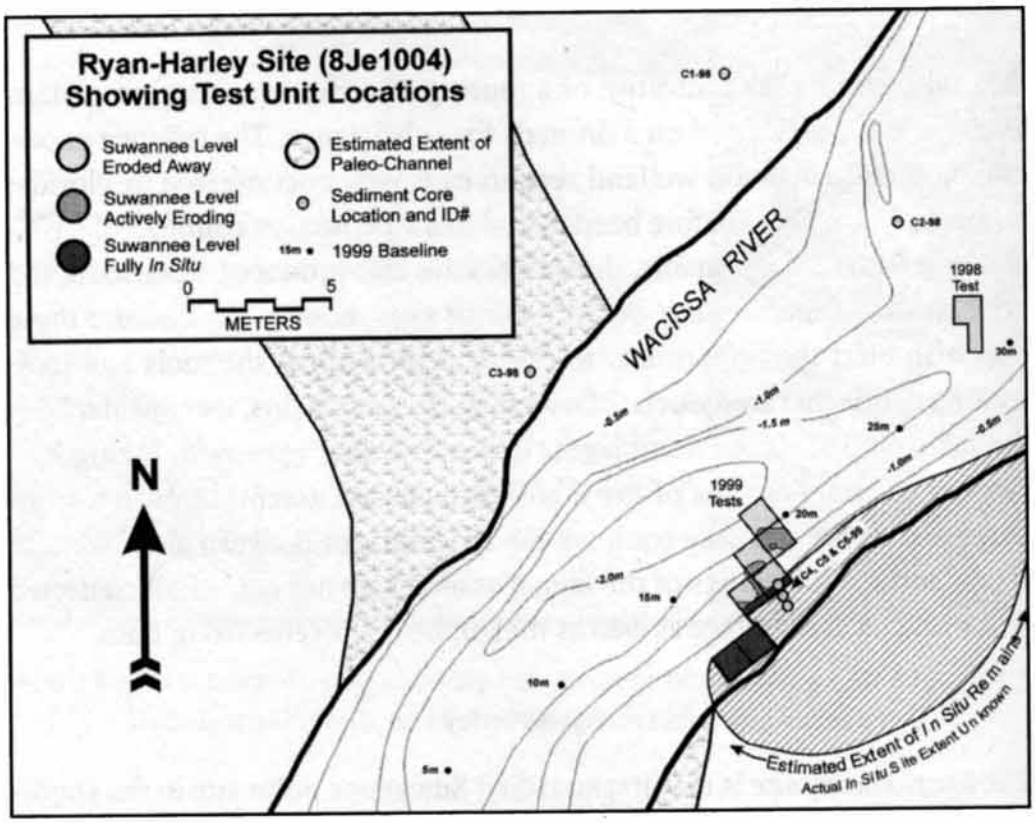

FIGURE 10.2. Ryan-Harley site test units and the estimated extent of the Paleo-channel and undisturbed site.

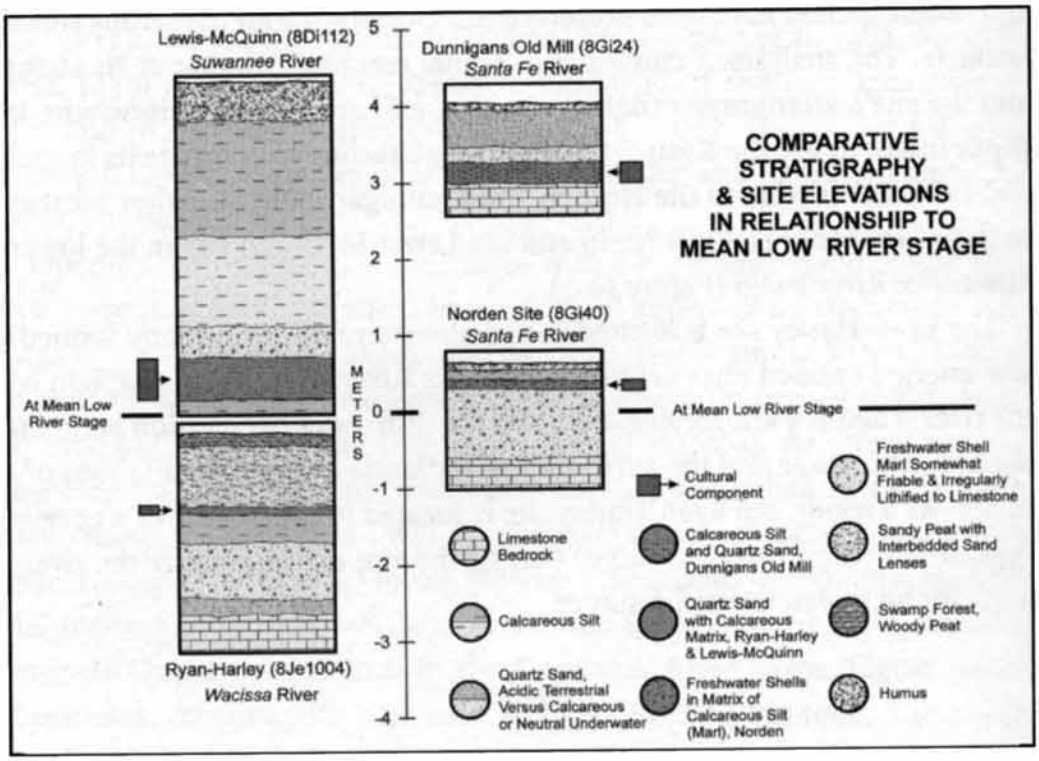

FIGURE 10.3. Stratigraphic profiles of the Ryan-Harley, Norden, Dunnigans Old Mill, and Lewis-McQuinn sites, North Florida.

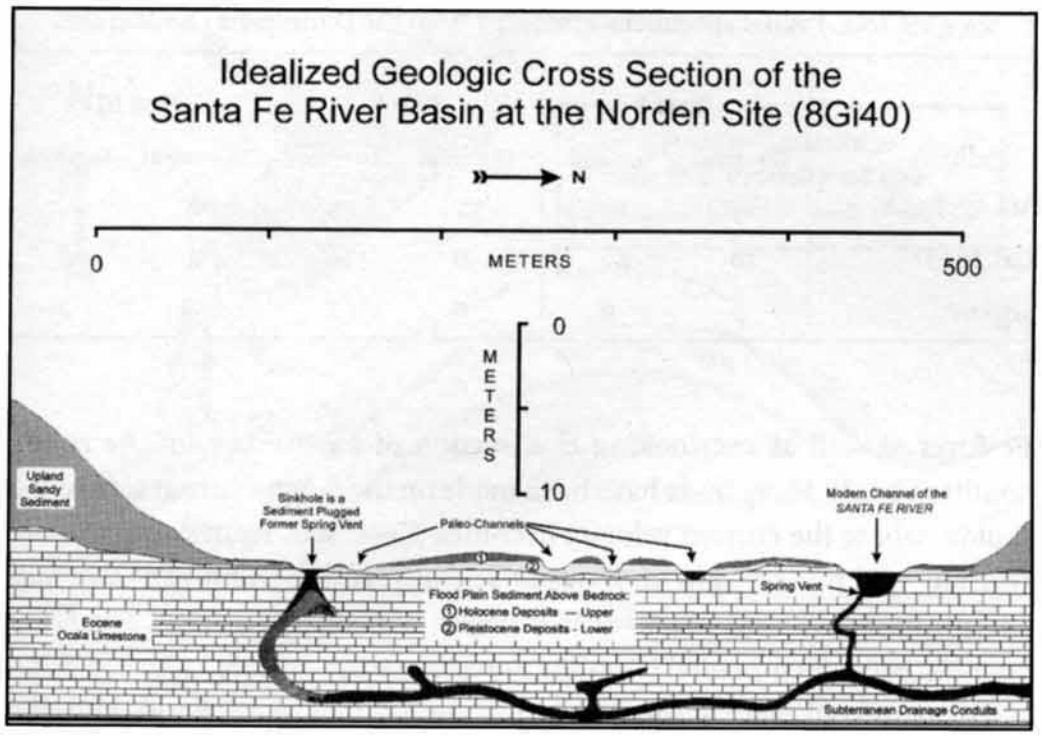

FIGURE 10.4. Norden site geologic cross section.

floodplain, and from there into the river. For this chapter, we consider only one of the components, which is distinct and encompasses no more than about 800 square meters, probably much less (Figure 10.4). This is a small subarea of the Norden site, with in-place remains buried in the floodplain and stratigraphically deflated remains in the adjacent river channel. A total of 936 stone artifacts were collected from this area, with most representing surface finds in the deflated river channel section. Two test units placed in the floodplain yielded 40 stone artifacts and 43 bone fragments, confirming the site's buried expression. In this chapter, we will refer to this component as the Norden site, but the actual site boundaries are much larger and encompass multiple cultural components ranging in age from Paleoindian to Mississippian.

Dunnigans Old Mill

Clarence J. Simpson originally discovered the Dunnigans Old Mill site when he surface collected the proximal, hafting ends of two waisted Suwannee points from the Santa Fe River and another specimen from the adjacent uplands. Subsequently, river-diver Ben Waller reported collecting two additional Suwannee points from the river. The Dunnigans Old Mill site is located above, below, and in the largest white water rapids on the Santa

TABLE 10.1. Faunal specimens discarded from the Dunnigans Old Mill site.

	Test I		Test II		Test III	
Condition	Discarded	Retained	Discarded	Retained	Discarded	Retained
Mineralized	115	25	57	29	66	34
Calcined	10	29	0	16	2	8
Gnawed	0	0	0	1	0	0

Fe River as well as overlooking that section of swift water on the river's southern bank. Many finds have been made on the down-current side of the rapids, where the current velocity becomes dispersed. Faunal remains are typically well preserved in underwater settings, and at Dunnigans Old Mill surface finds of llama, *Mammut americanum*, *Mammuthus columbi*, and *Equus* sp. have been documented (Dunbar 1991:200–201).

The results of placing three test units on top of a bluff overlooking the river produced faunal remains, including *Equus* sp. and possibly *Bison antiquus* in association with lithic artifacts. Shortly after the tests were completed, recovered specimens were cleaned and examined. Many of the bone specimens were in very poor condition and were discarded as unidentifiable fragments (Table 10.1).

Had the bone not survived in the terra rossa–like sediment at Dunnigans Old Mill, the scarcity of lithic artifacts at the site would likely have been judged to be archaeologically insignificant. Due to the scarcity of stone tools, the fauna and bone tools will be primarily considered.

Lewis-McQuinn

The Lewis-McQuinn site is located on the margins of the lower Suwannee River, where part of the site is buried under river levee deposits (Figure 10.5). Here the floodplain is wide and karstified in places. Some of the exposed limestone sinks and caves expel groundwater as springs, while others are nonflowing. The closest-known active spring is located about 350 meters from the site.

The Lewis-McQuinn site was initially discovered and surface collected by river-divers Chris Lewis and Rusty McQuinn. Both reported finding lanceolate points in and along the river, and Lewis provided an unfluted Clovis-like base and a Bolen side-notched point for the Bureau of Archaeological Research (BAR) collections (BAR Accessions 92A.63.0.1 Clovis-like and 92A.63.0.2 Bolen).

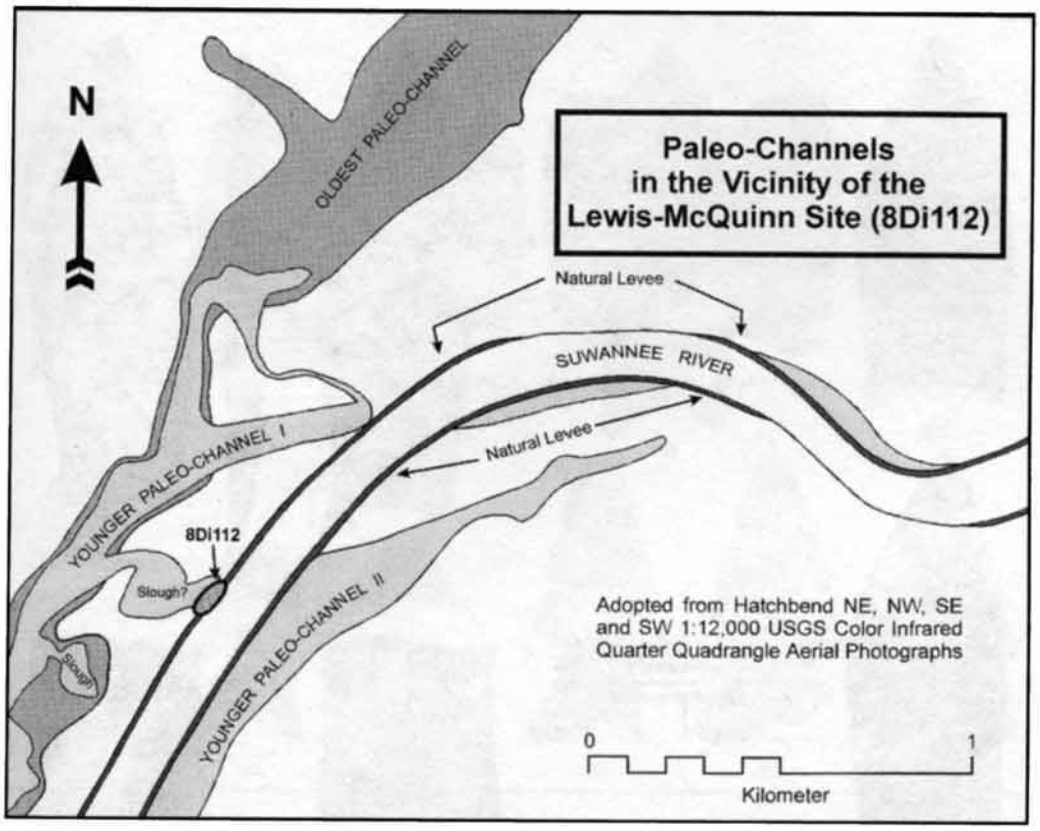

FIGURE 10.5. Lewis-McQuinn Paleo-channels.

Chronology

All four of these karst river basin sites have components that are placed relatively in time as Middle Paleoindian or earlier based on the *in situ* occurrence of Pleistocene megafaunal remains. This is in contrast to the complete absence of Pleistocene fauna in Late Paleoindian contexts at sites such as Dust Cave in Alabama, or in Early Archaic contexts at sites such as Page-Ladson (Dunbar et al. 1989; Carter and Dunbar 2006), Little Salt Springs (Dietrich and Gifford 1996), and Cutler Ridge (Carr 1987) in Florida. Furthermore, the occurrence of waisted Suwannee points at the Ryan-Harley (*in situ* and displaced; Figure 10.6) and Norden (displaced; Figure 10.7) sites and an unfluted lanceolate point base at Lewis McQuinn (displaced) support a Middle to Early Paleoindian temporal context. None of the four sites has been radiometrically dated. In the southeastern United States, the Early Paleoindian is estimated to be the period of initial human occupation lasting until ca. 10,900 BP, the Middle Paleoindian from ca. 10,900 to ca. 10,500 BP, and the Late Paleoindian from ca. 10,500 to ca. 10,000 BP (Anderson et al. 1996; Goodyear 1999).

Attempts to acquire radiocarbon dates from six bone samples at the Ryan-Harley site failed because the bone was too mineralized. Attempts to

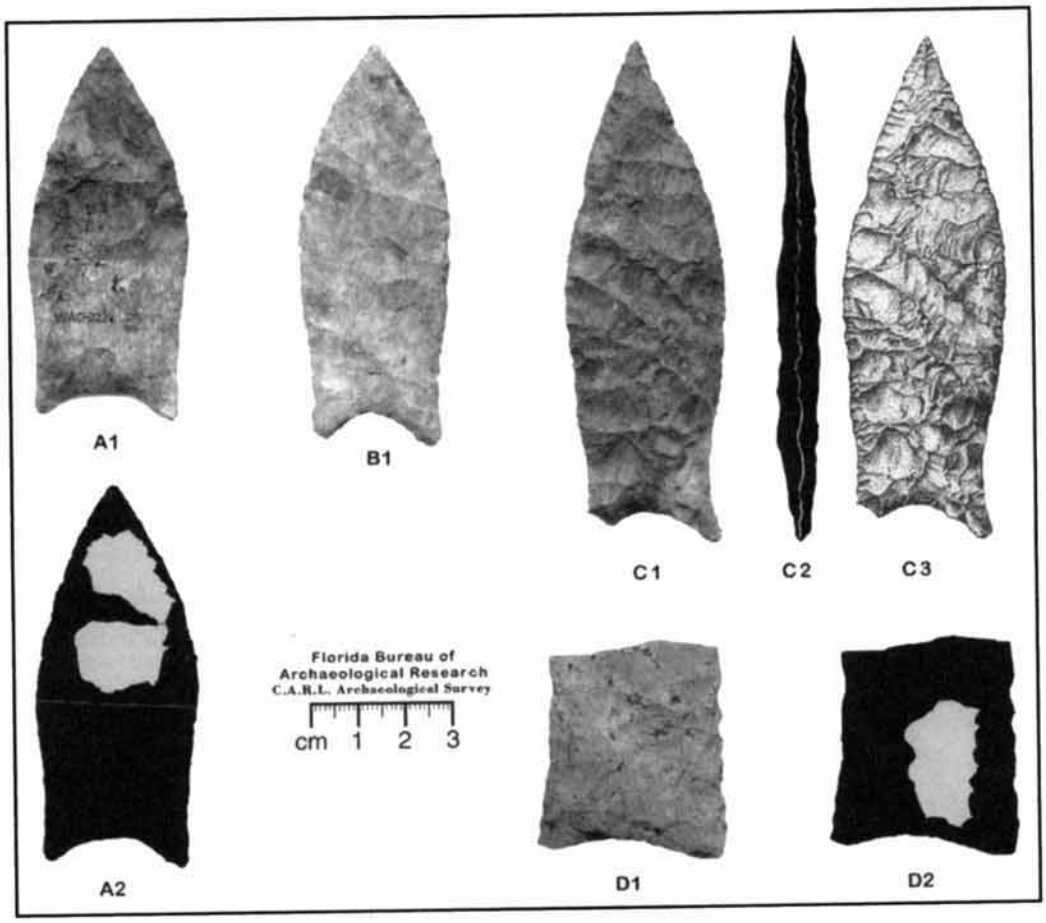

FIGURE 10.6. Ryan-Harley site Suwannee points and preform.

radiometrically date the other sites have not been attempted, in part because the only available specimens are bones that also appear mineralized, and because investigations at the other sites have been less intensive. Bone specimens from the Norden and Lewis-McQuinn sites are not as well preserved compared to specimens from the Ryan-Harley site. In general, the bone from Dunnigans Old Mill was the least well preserved, and 238 bone specimens were discarded prior to accessioning because they represented deteriorated, unidentifiable fragments.

Due to the lack of organic datable material, we are left to date these sites by relative means. The Ryan-Harley site is judged to be on the earlier end of the Middle Paleoindian time frame, which would place it closer in time to the onset of the Younger Dryas. This evaluation is based on the assumption that Suwannee points are post Clovis, not its contemporary, and that there are a sufficient number of Clovis and Clovis-like traits present in the Suwannee tool kit from the Ryan-Harley site. The Norden site is the other waisted Suwannee site among the four being considered. The notched, expanding-stem, auriculate-based point from the Norden site (see Figure

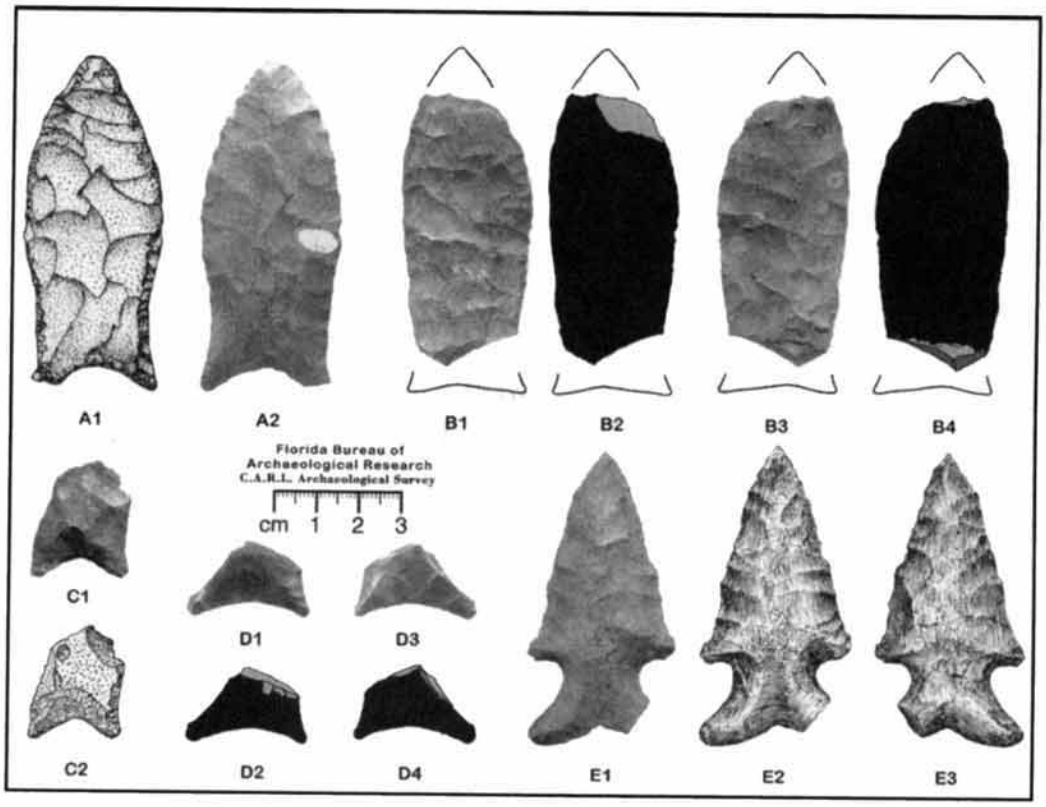

FIGURE 10.7. Norden site projectile points.

10.7) shares some traits with Suwannee points. Therefore, the Norden site might be indicative of a transitional late Middle Paleoindian occupation mostly dominated by Suwannee tools, but also having a few tools indicative of the developing Late Paleoindian continuum. If this is true, the Norden site is significant because it will have produced evidence of some of the latest known Pleistocene megafauna in context. The Norden site may contain evidence of the beginnings of a changing hunting strategy from a Pleistocene to Holocene faunal reliance. If the Norden site represents a late Middle Paleoindian occupation, it most likely dates to the latter part of the Younger Dryas cold phase prior to ca. 10,400 BP.

Placing the Lewis-McQuinn and Dunnigans Old Mill sites in chronological context is much more a matter of speculation. At the Lewis-McQuinn site, several lanceolate points were found in displaced context, and the deepest artifact-bearing level of that site has produced Pleistocene faunal remains and lithic artifacts. The Lewis-McQuinn paleo point base most closely resembles an unfluted Clovis or parallel-sided Suwannee-like point. The Dunnigans Old Mill site is even more equivocal. Other than a graver similar to those found elsewhere in Paleoindian context, there were no lithic artifacts suggestive of age. In fact, this site is remarkable for its lack of lithic artifacts

versus its abundance of bone. One nondiagnostic bone point was recovered but was not suggestive of chronological placement. However, the presence of Pleistocene fauna suggests a Middle Paleoindian or earlier time range.

Faunal Analysis

Ryan-Harley Fauna

The faunal sample from Ryan-Harley was collected from seven 1-by-1-meter test units. Artifacts were piece plotted in place or were recovered from a water-screen with a 1/8-inch mesh. All of the samples were recovered from a single stratum that represents the Suwannee point level. Therefore, for quantitative purposes, all of the samples were combined to form a total sample for the site. The faunal remains from Ryan-Harley have been reported elsewhere (Dunbar et al. 2005), and only a brief overview will be presented here.

The Ryan-Harley site has been the subject of the most intensive testing of the four sites being considered and has the best-preserved faunal material of the four. The site has produced a total of 368 bone fragments collectively weighing 871.0 grams from *in situ* deposits. The taxa recovered are shown in Table 10.2. By weight, reptiles contributed the most, accounting for 48.53 percent of the total in-place deposit. They were followed closely by mammals, which accounted for 44.07 percent. Unidentified vertebrates contributed 4.35 percent, with fish contributing 2.15 percent, birds contributing 0.7 percent, and amphibians contributing 0.15 percent. The majority of the species represent wetland or mixed wetland and upland habitats. By weight, wetland resources account for 51.72 percent of the faunal assemblage, followed by mixed resources with 48.13 percent. Upland resources, represented by a single gopher tortoise, account for 0.15 percent of the total. The large number of wetland species may be an indication that the site's inhabitants utilized most extensively the catchment areas closest to the site. Based on the *in situ* faunal remains, the environmental picture that emerges is that of a shallow, freshwater stream, or perhaps pond, as a permanent, nearby water source (Dunbar et al. 2005).

One of the more interesting aspects of the Ryan-Harley faunal assemblage is the inclusion of the American mink (*Mustela vison*). The remains of at least two individuals were recovered from the in-place deposits, and additional specimens of mink are known to be included in the out-of-place deposits. However, because the analysis of the out-of-place deposits is incomplete, the total minimum number of individuals (MNI) for this species at the site

TABLE 10.2. Taxa recovered from the Ryan-Harley site in-place deposits.

Class	Taxon	Name	NISP	MNI	Weight (gms)
Fish	*Lepisosteus* spp.	gars	3	1	0.4
	Amia calva	bowfin	6	2	2.5
	Ictaluridae	bullhead catfishes	2	2	2.6
	Lepomis microlophus	redear sunfish	1	1	1.8
	Micropterus salmoides	largemouth bass	5	1	4.3
	Centrarchidae	sunfishes	1	-	0.3
	UID Osteichthyes	unidentified bony fishes	20	-	6.7
	Subtotal		38	7	18.6
Amphibian	*Siren lacertian*	greater siren	1	1	0.1
	Amphiuma sp.	amphiumas	3	1	1.2
	Anura	frogs and toads	1	1	0.1
	UID Amphibia	unidentified amphibian	1	-	0.1
	Subtotal		6	3	1.5
Reptile	*Apalone ferox*	softshell turtle	2	1	10.2
	Kinosternidae	mud and musk turtles	19	2	11.0
	Trachemys scripta	slider	26	1	127.3
	Emydidae	subaquatic turtles	7	-	39.3
	Gopherus polyphemus	gopher tortoise	1	1	1.3
	UID Testudines	unidentified turtles	45	-	80.6
	cf. Testudines	probable turtle	1	-	10.7
	Colubridae	harmless snakes	1	1	0.2
	Agkistrodon piscivorus	cottonmouth	1	1	0.4
	Viperidae	pit vipers	3	-	3.3
	UID Serpentes	unidentified snakes	1	-	0.6
	Alligator mississippiensis	American alligator	13	1	87.7
	cf. *Alligator mississippiensis*	probable American alligator	2	-	5.3
	UID large Reptilia	unidentified large reptile	7	-	35.9
	UID Reptilia	unidentified reptile	1	-	5.2
	Subtotal		130	8	419.0
Bird	UID small Aves	unidentified small birds	7	1	2.0
	UID medium Aves	unidentified medium birds	3	1	1.5
	UID medium/large Aves	unidentified medium/large birds	8	1	2.6
	Subtotal		18	3	6.1
Mammal	*Procyon lotor*	raccoon	4	2	9.1
	cf. *Procyon lotor*	probable raccoon	1	-	0.5
	Mustela vison	American mink	1	1	1.0
	Ondatra zibethicus	marsh muskrat	5	2	7.9
	Sylvilagus spp.	rabbits	3	1	5.9
	cf. Leporidae	probable rabbit	1	-	0.9
	UID Rodentia	unidentified rodent	1	-	0.1
	Odocoileus virginianus	white-tailed deer	34	2	206.2
	cf. *Odocoileus virginianus*	probable white-tailed deer	36	-	74.3
	Equus sp.	Pleistocene horse	1	1	15.2
	Tapirus veroensis	tapir	6	1	4.9
	UID small Mammalia	unidentified small mammals	6	-	2.5
	UID small/medium Mammalia	unidentified small/ medium mammals	2	-	0.1
	UID medium Mammalia	unidentified medium mammal	7	-	14.7
	UID medium/large Mammalia	unidentified medium/ large mammals	4	-	6.6
	UID large Mammalia	unidentified large mammals	7	-	12.8
	UID Mammalia	unidentified mammals	12	-	17.8
	Subtotal		131	10	380.5
Vertebrate	UID Vertebrata	unidentified vertebrates	44	-	37.6
	Subtotal		44	-	37.6
	Site Total		**367**	**31**	**863.3**

is still unknown. Kurtén and Anderson note that mink are uncommon in Pleistocene faunas (1980:151). They also note that these solitary and nocturnal animals are the American furriery industry's most valuable furbearers. Mink are aquatic and den along stream banks, where they feed on crayfish, fish, frogs, birds, muskrats, and the like (Kurtén and Anderson 1980:151).

For interpretive purposes, we are left with two possibilities: either the mink remains are part of a natural deposit or, conversely, they are part of the cultural deposit. If the mink remains are considered to be part of the natural deposit, it is also possible that some of the other species such as fish, young turtles, amphibians, birds, and muskrats might also represent the remains of captured prey animals prior to the predator's death. However, as Whitaker (1992:579) points out, mink "eat on the spot or carry prey by the neck to their dens, where any surplus is cached. They den in protected places near water, often in a muskrat burrow, an abandoned beaver den, or hollow log, or they may dig their own den in the streambank; all dens are temporary, as minks move frequently." In addition, Rattner et al. (n.d.) indicate that male mink can weigh up to twice as much as females. Due to their size, female mink have difficulty hunting large prey such as muskrats and rabbits, and as a result are more limited in their diet. Mink are generally solitary, with association occurring mostly between the female and her young. Males move frequently within their range of 1.8 to 5 kilometers. Today, mink have a typical population density of 0.01 to 0.10 mink per hectare (Rattner et al. n.d.).

The possibility that mink and potential prey animal bones were deposited as a result of a natural accumulation by mink that eventually also died on site seems unlikely. The mink and other faunal remains from the Ryan-Harley site were found within a seven-square-meter test area. Because mink are solitary and do not stay in one place, and because the males are the most mobile and take the large prey animals, it is difficult to attribute the bone assemblage to mink predation. On the contrary, the mink remains as well as the other animal bones appear to have accumulated as a result of human activity within the seven square meters excavated at the Ryan-Harley site. This is particularly true since the archaeological signature at this site is so clear and includes other, much larger fauna. We are not discounting the possibility that part of the faunal remains from Ryan-Harley may be of commensal or of natural occurrence. Rather, we believe that much of the faunal remains, regardless of animal size, accumulated as a result of cultural deposition.

If the mink remains are considered part of the cultural deposit, an interesting possibility is revealed. Mink, muskrats, and rabbits are primarily

nocturnal, being active at dusk, nighttime, and around dawn (Whitaker 1992:509–511, 578–579). Thus, the best time to successfully capture these creatures is at night when they are most likely to be active. A possible capture technique could have been the placement of unattended traps along the water's edge before dark, followed by a check of the traps the next day. Mink, for example, can be lured into traps baited with dead birds and other prey. However, this certainly does not sound like the type of Paleoindian hunting technique we are accustomed to reading about or, in this case, have we found evidence of in the Ryan-Harley artifact suite. Trapping devices may have been made from wood, sinew, fiber, and cordage, all things that rarely survive in the archaeological record. Thus, our evidence comes from the fauna and their nocturnal habits.

But why go to all of the trouble to capture such small animals? Today both mink and muskrat are prized for their furs, and muskrat for its meat. Rabbits also provide good fur. After the Younger Dryas episode began about 11,000 BP, the northern latitudes in both Europe and North America were plunged back into glacial maximum–like cold conditions (Björck et al. 1996; Lotter et al. 2000). To what degree these cold conditions were experienced at latitudes as far south as northern Florida at latitude 30° N is uncertain. However, the signature of the Younger Dryas episode is seen in tropical deep ocean sediments as far south as the Cariaco Basin at latitude 10°40' N, a location off the northern coast of Venezuela (Hughen et al. 1996). Therefore, fur might have been needed for clothing during the cold phase of the Younger Dryas. Today, mink pelts are highly valued as high-priced adornment, but it is more likely, if used in the prehistoric past, that they were used for practical reasons, such as clothing to keep an infant both warm and comfortable. It is also possible that rabbit pelts could have served a similar function. Likewise, the "durability and waterproof qualities of muskrat fur are considered extremely valuable, and it is of great importance to the fur trade" (Hughen et al. 1996). The same qualities recognized in these fur-bearing animals today may have also been important to the Paleoindians. At least one rabbit, two muskrats, and two mink were recovered from the seven-square-meter area tested, and there are probably more individuals represented in the out-of-place deposits that have not been quantified.

Norden

The Norden site is similar to the Ryan-Harley site in that it has produced waisted Suwannee points and a similar stone tool kit. Based on the con-

centration and variety of lithic tools, as well as the relative abundance of faunal remains that were recovered from two small test units, we believe the Norden site assemblage is indicative of a campsite. Our primary consideration of the Norden site faunal remains is limited to the specimens recovered from the test units conducted in the floodplain. In addition, elements of *Mammut americanum* (mastodon), *Equus* sp. (horse), *Bison* sp. (buffalo), and *Hesperotestudo crassiscutata* (giant tortoise), along with the remains of numerous extant vertebrates, came from the deflated part of the site, and the fragmentary remains of a *Mammuthus columbi* (mammoth) were found about 200 meters downstream from the site in the river channel.

The faunal remains examined from the Norden site were recovered from a single 0.50-meter sondage excavated in November 1975 and a 10-centimeter core-size test in 1992. Because sediment from the tests was not screened, the faunal remains recovered from the tests are biased toward medium-size and large bone fragments. Forty-three bone fragments, collectively weighing 189.8 grams, were examined and separated to the lowest possible taxon. At least five individuals (MNI = 5) are present in the assemblage. The remains consisted of an unidentified bird, an unidentified ungulate that was most likely either a horse (*Equus* sp.) or bison (*Bison* sp.), a white-tailed deer (*Odocoileus virginianus*), a river otter (*Lutra canadensis*), unidentified medium-size and large mammals, a cooter or slider (*Pseudemys*/*Trachemys* spp.), and unidentified vertebrates (Table 10.3). Two of the deer long-bone fragments may be green fractured. The medium-size mammal bone fragment appears to have a cutmark on it. One of the species present in the Norden assemblage is river otter (*Lutra canadensis*), an important fur-bearing animal.

The Norden site is the most biased of the four due to the extremely small sample size and limited testing of the in-place component without screening. Nevertheless, all of the faunal specimens, along with 40 lithic artifacts, came from the two test units, which suggests the undisturbed part of this site has good archaeological potential. Because of the small sample size, the faunal remains from this site cannot be characterized as either generalized or specialized foraging. Therefore, the Norden site fauna only tentatively bear a resemblance to the mixed mammalian faunal assemblage recovered from the Dunnigans Old Mill site.

Dunnigans Old Mill

The faunal specimens and artifacts from the Dunnigans Old Mill site were recovered from a 6.5-square-meter test area. The artifacts removed from

TABLE 10.3. Summary of taxa recovered from the Norden site.

Taxon	Common Name	Element	Count	Weight (gms)	MNI	Habitat
Pseudemys/ Trachemys spp.	cooter/slider	unidentified carapace fragments	2	2.0	1	W
Aves	medium bird	long-bone shaft fragment	1	1.1	1	M
Lutra canadensis	river otter	distal humerus fragment	1	2.0	1	W
Lutra canadensis	river otter	proximal femur fragment	1	2.6	0	W
Odocoileus virginianus	white-tailed deer	long-bone shaft fragment	3	2.9	1	M
Ungulata	ungulate	long-bone shaft fragments	8	163.3	1	M
Unidentified medium Mammalia	medium mammal	long-bone shaft fragment	1	2.0	0	M
Unidentified large Mammalia	large mammal	unidentified fragments	7	9.8	0	M
Unidentified vertebrata	vertebrate	long-bone shaft fragments	4	0.7	0	X
Unidentified vertebrata	vertebrate	unidentified fragments	15	3.4	0	X
Total			43	189.8	5	

Key: U = upland, M = Mixed wetland and upland, W = wetland, X = unknown

the test units were piece plotted, but the soil was not sieved. Therefore, the assemblage is heavily biased toward larger specimens. A total of 267 bone fragments, collectively weighing 891.2 grams, were recovered from the site (Table 10.4). Unidentified large mammals dominate the Dunnigans Old Mill assemblage. Large mammals include Pleistocene horse (*Equus* sp.) and bison (*Bison antiquus*). Some small and medium-size mammals are also present, but not in large numbers. Turtles (mostly unidentified) and alligator occur in the assemblage, but are relatively rare. Bird and fish remains are very rare in the assemblage. The scarcity of aquatic and avian faunal remains may reflect an actual preference for large mammals, or may be a result of the lack of screening. The majority of large-mammal remains in the assemblage belong to very large mammals, specifically bison-size and larger. The majority of species present in the assemblage inhabit mixed upland and wetland habitats. Most of the bone could not be identified beyond the class level due to the extremely poor state of preservation of the faunal remains recovered from the site (see Table 10.4).

The small sample size may represent the remains of a short-term camp occupied by a small group of people. The low counts of lithic material versus high counts of bone may also reflect a short occupation period. Nevertheless, the mixture of the small mammals with the large extinct forms and the inclusion of reptiles, birds, and fish are not reflective of the idealized big-game hunting paradigm. Although this site is most heavily

TABLE 10.4. Summary of taxa recovered from the Dunnigans Old Mill site.

Taxon	Common Name	Element	Count	Weight (gms)	MNI	Habitat
Osteichtyes	bony fish	dentary? fragment	1	0.7	1	W
cf. *Trachemys scripta*	probable slider	unidentified carapace fragments	3	3.2	1	W
Pseudemys/Trachemys spp.	cooter/slider	unidentified carapace fragments	2	9.5	0	W
cf. *Pseudemys/ Trachemys* spp.	possible cooter/ slider	unidentified carapace fragment	1	1.3	0	W
Testudines	turtles	marginal	1	1.6	0	M
Testudines	turtles	neural	1	6.6	0	M
Testudines	turtles	unidentified plastron fragment	3	15.7	0	M
Testudines	turtles	unidentified carapace fragment	1	3.3	0	M
Testudines	turtles	carapace fragment?	1	6.9	0	M
Testudines	turtles	carapace or plastron fragments	6	21.3	0	M
Testudines	turtles	plastron fragments?	2	2.7	0	M
Testudines	turtles	unidentified fragments	12	16.9	0	M
Alligator mississippiensis	American alligator	dermal scutes	2	5.2	1	W
Alligator mississippiensis	American alligator	unidentified fragment	1	12.3	0	W
Reptilia	large reptile	unidentified fragment	1	14.2	0	W
Aves	small bird	long-bone shaft fragment	1	0.3	1	M
Odocoileus virginianus	white-tailed deer	LF petrosal	1	3.0	1	M
cf. *Odocoileus virginianus*	probable white-tailed deer	long-bone shaft fragments	2	1.8	0	M
Bison antiquus	bison	proximal and medial phalanges	2	59.8	1	U
Equus sp.	Pleistocene horse	lower cheek tooth	1	1.5	1	M
Equus sp.	Pleistocene horse	unidentified tooth fragment	1	1.7	0	M
cf. *Equus* sp.	possible Pleistocene horse	possible tooth enamel fragment	1	0.1	0	M
Mammalia	large mammal	auditory bulla?	1	3.9	0	M
Mammalia	large mammal	tooth? fragment	1	0.5	0	M
Mammalia	large mammal	distal femur fragment	1	11.0	0	M
Mammalia	large mammal	long-bone shaft fragments	27	143.6	0	M
Mammalia	large mammal	possible long-bone fragment	1	3.7	0	M
Mammalia	large mammal	unidentified long-bone fragment	1	23.4	0	M
Mammalia	large mammal	unidentified fragments	50	258.9	0	M
Mammalia	large mammal	long-bone shaft fragment?	1	7.5	0	M
Mammalia	large mammal	long-bone or rib fragment	1	30.8	0	M
Mammalia	large mammal	rib fragment?	1	31.5	0	M
Mammalia	large mammal	possible proximal femur or humerus fragment	1	13.8	0	M
Mammalia	large mammal	unidentified cranial	1	5.0	0	M
Mammalia	probable large mammal	cancellous bone, unidentified fragment	1	3.4	0	X
Mammalia	probable large mammal	unidentified fragment	1	1.1	0	X
Mammalia	large mammal?	unidentified fragments	4	10.9	0	X
Mammalia	medium/large mammal	long-bone shaft fragments	8	4.1	0	M
Mammalia	medium mammal	long-bone shaft fragments	3	0.8	1	M
Mammalia	probable small mammal	long-bone shaft fragment	1	0.3	1	M
Mammalia	mammal	unidentified fragments	3	0.3	0	M
Mammalia?	mammal?	unidentified fragment	1	0.2	0	X
Unidentified vertebrata	unidentified vertebrate	cancellous tissue	1	2.3	0	X
Unidentified vertebrata	unidentified vertebrate	possible long-bone fragments	3	0.1	0	X
Unidentified vertebrata	unidentified vertebrates	unidentified fragments	107	144.5	0	X
Total			267	891.2	9	

Key: U = Upland, M = Mixed Wetland and Upland, W = Wetland, X = Unknown

TABLE 10.5. Summary of taxa recovered from the Lewis-McQuinn site, Level 1.

Taxon	Common name	Element	Count	Weight (gms)	MNI	Habitat
Amia calva	bowfin	vertebra	1	1.0	1	W
Lepisosteus spp.	gars	vertebra	1	0.1	1	W
Lepisosteus spp.	gars	unidentified cranial fragments	9	4.0	0	W
Micropterus salmoides	largemouth bass	vertebra	1	0.3	1	W
Osteichthyes	bony fishes	vertebrae	15	3.2	0	W
Osteichthyes	bony fishes	unidentified fragments	8	2.0	0	W
cf. Osteichthyes	probable bony fishes	unidentified fragment	1	0.1	0	W
Siren lacertina	greater siren	vertebra	1	0.2	1	W
Anura	frogs and toads	vertebrae	2	0.3	1	W
Kinosternidae	mud and musk turtles	carapace fragments	17	2.9	1	W
Testudines	turtles	unidentified carapace fragments	10	7.1	1	M
Testudines	turtles	unidentified plastron fragments	2	1.5	0	M
Testudines	turtles	unidentified carapace 23 or plastron fragments	4.9	0	M	
Testudines	turtles	marginals	2	0.3	0	M
Testudines	turtles	unidentified fragments	45	30.7	0	M
Colubridae	harmless snakes	vertebra	1	0.1	1	M
Aves	small birds	coracoid fragments	3	0.4	1	M
Aves	small birds	proximal humerus fragment	1	0.5	0	M
Aves	small birds	long-bone shaft fragments	13	2.1	0	M
Aves	small birds	unidentified long-bone fragments	2	1.0	0	M
Aves	small/medium birds	long-bone shaft fragments	8	1.2	0	M
Aves	small/medium birds	vertebrae	2	0.4	0	M
Aves	birds	long-bone shaft fragment	1	0.8	0	M
Didelphis virginiana	opossum	vertebra	1	0.7	1	M
Sylvilagus sp.	rabbits	maxilla fragment with teeth	1	0.6	1	M
Sylvilagus sp.	rabbits	proximal femur fragment	1	0.6	0	M
Odocoileus virginianus	white-tailed deer	unidentified tooth fragment	1	0.9	1	M
Odocoileus virginianus	white-tailed deer	long-bone shaft fragments	2	1.2	0	M
Mammalia	small mammal	metatarsal	1	0.1	0	M
Mammalia	medium mammal	LF calcaneus	1	0.1	1	M
Mammalia	medium mammal	proximal humerus fragment	1	2.1	0	M
Mammalia	medium mammal	distal humerus fragment	1	4.7	0	M
Mammalia	medium mammal	long-bone shaft fragments	7	0.8	0	M
Mammalia	large mammal	unidentified fragment	1	153.5	0	M
Vertebrata	unidentified vertebrates	unidentified fragments	264	52.3	0	X
Vertebrata	unidentified vertebrate	unidentified tooth fragments	2	0.1	0	X
Unionidae	freshwater mussels	umbo and partial shell	1	1.6	1	W
Gastropoda	unidentified univalve	apex, partial body, whorl	1	0.5	1	W
Invertebrata	invertebrate	body fragments	1	0.2	0	W
Total			456	285.1	15	

Key: U = Upland, M = Mixed Wetland and Upland, W = Wetland, X = Unknown

biased toward very large mammals, it is clear that they were not the sole source of food.

Lewis-McQuinn

The faunal remains from the Lewis-McQuinn site discussed in this chapter were recovered from three one-square-meter test units. The soil removed from these units was water-sieved through 1/8-inch screen. All of the remains were taken from Level 1 of these units. A total of 453 vertebrate fragments and three invertebrate fragments were recovered, which collectively weighed 285.1 grams (Table 10.5). At least 15 individuals are represented in this assemblage.

By weight, the largest contributors to the site's faunal assemblage were mammals, with 165.3 grams, or about 58 percent of the total, followed by unidentified vertebrates, with 52.4 grams, or about 18 percent of the total. These were followed by reptiles, with 47.5 grams, or about 17 percent of the total; fish, with 10.7 grams, or about 4 percent of the total; birds, with 6.4 grams, or about 2 percent of the total; invertebrates, with 2.3 grams, or about 1 percent of the total; and amphibians, with 0.5 gram, or about 0.2 percent of the total. By weight, mixed wetland and upland resources were the most important to the site's inhabitants, contributing 216.3 grams, or about 76 percent of the total, followed by unknown resources with 52.4 grams, or about 18 percent of the total. Wetland resources contributed 16.4 grams, or about 6 percent of the total (see Table 10.5). Together, wetland and mixed resources account for about 82 percent of the assemblage for Level 1. This is similar to the percentages for the Ryan-Harley site, where wetland and mixed resources dominated the assemblage and accounted for nearly 100 percent of the examined remains. Based on these numbers, it is clear that wetland resources were important to the economies of the Suwannee point makers. Again, as in the case of Ryan-Harley, the site's inhabitants utilized the catchment areas closest to the site. From the faunal perspective, the Ryan-Harley and Lewis-McQuinn sites are more similar to each other than to the Norden and Dunnigans Old Mill sites. One of the species present in the Lewis-McQuinn assemblage is the rabbit (Leporidae), an important fur-bearing animal.

Lithic Analysis

This analysis of stone artifacts primarily includes a comparison of debitage and tools from the Ryan-Harley and Norden sites. Both sites are Middle

TABLE 10.6. Lithic artifact size distribution at the Lewis-McQuinn site.

Size	0-1 cm	1-2 cms	2-3 cms	3-4 cms	4-5 cms	5-6 cms	Total
Count	12	50	8	5	0	1	76
Percent	16	65	11	7	0	1	100

Paleoindian, Suwannee point sites. The Lewis-McQuinn site produced few stone tools for analysis but provides a debitage assemblage for comparative purposes (Table 10.6). The age of the Lewis-McQuinn Paleoindian level is uncertain but appears to represent either a Middle or Early Paleoindian time frame. Lithic artifacts from the Dunnigans Old Mill site represent an insignificant sample of lithic specimens for comparative purposes and are not considered here.

Both the *in situ* as well as the displaced artifacts from the Norden site are considered because they appear to be distinctly Paleoindian. This assumption is supported by the recovery of a similar but smaller sample collected in context from two test units. Also, there is little evidence of contamination by younger artifacts in the deflated part of the Norden site that was surface collected. The only post-Paleoindian artifacts collected were one Early Archaic and two Middle Archaic stemmed points. Although there may be other, perhaps less diagnostic, post-Paleoindian artifacts from the surface collection at the Norden site, we believe there has been minimal contamination. Elsewhere, within the larger upland boundaries of the Norden site, Early and Middle Archaic biface and uniface artifacts are common, and the signature of Paleoindian diagnostics, although present, is diffuse.

Lithic artifacts were present but scarce at Dunnigans Old Mill. The only stone tools recovered from the excavation units were a fragment of hammerstone and a graver spur on a flake (the graver spur is now missing from the collection). All other specimens were debitage.

Biface Tools

A fluted Suwannee preform and an earlier-stage lanceolate paleo-preform were recovered from context at the Ryan-Harley site, along with a preform tip and a biface fragment (Table 10.7). All other Suwannee points and preforms were surface collected within the area of concentrated Suwannee tools. This area was directly adjacent to or on the eroding surface of the Suwannee point level. One of the surface collected points was found in two pieces and refitted together. The refitted point was collected in the vicinity of,

TABLE 10.7. In situ versus surface-collected bifaces (Norden [8Gi40] and Ryan-Harley sites [8Je1004] all accessions).

Bifaces	Gi40 GS Count	Gi40 GS %	Gi40 Count*	Gi40 %*	Je1004 Count*	Je1004 %*	Je1004 GS Count	Je1004 GS %
Waisted Suwannees	4	13%	0	0%	0	0%	3	30%
Suwannee preform (fluted)	0	0%	0	0%	1	20%	0	0%
Notched auriculate base point	1	3%	0	0%	0	0%	0	0%
Greenbriar side notched	1	3%	0	0%	0	0%	0	0%
Bolen beveled	0	0%	0	0%	0	0%	1	10%
Kirk serrated	1	3%	0	0%	0	0%	1	10%
Archaic stemmed	2	6%	0	0%	0	0%	0	0%
Misc. bifaces	7	23%	0	0%	1	20%	0	0%
Lanceolate Paleo-preforms	9	29%	0	0%	1	20%	2	20%
Preform distals	4	13%	0	0%	2	40%	3	30%
Rounded base preforms	1	3%	0	0%	0	0%	0	0%
Dalton adze	1	3%	0	0%	0	0%	0	0%
Total	**31**	**100%**	**0**	**100%**	**5**	**100%**	**10**	**100%**

* in situ

if not in, either Test Unit 6 or 7 prior to site testing. The other two Suwannee points, along with the ivory shaft fragment and most of the lanceolate-paleo preforms, were collected from the Test 6–7 area to an area about 10 meters upstream, where most of the Suwannee component had already been deflated by river current. Both of the Early Archaic Bolen Beveled and Kirk Serrated points were surface collected from the deeper water downstream from the test units in a paleo-channel. The Kirk point appeared to be dislodged from channel-fill deposits above the Bolen while a naturally cut bank was being trimmed for profile sketching. The Bolen point was recovered from the interface between the paleo-channel's older channel-cut and younger channel-fill deposits.

No bifaces were collected *in situ* from the Norden site testing. However, the Norden site produced four waisted Suwannee points and nine lanceolate paleo-preforms from displaced contexts, along with the other bifaces listed in Table 10.7.

The Ryan-Harley site seems to differ from the Norden site primarily in having a much greater percentage of bifaces. When analysis data was compiled for the Ryan-Harley assemblage of lithic artifacts, C. Andrew Hemmings astutely observed there was an unusually high number of bifaces and bifacial reduction debitage recovered from the site. If the percentages of three stone tool categories (bifaces, unifaces, and hammerstone–core-abrader)

TABLE 10.8. Occurrence of stone tool categories, general surface and in situ combined (Norden and Ryan-Harley all accessions).

Category of Tool*	Gi40 Count	Gi40 %	Je1004 Count	Je1004 %
Uniface	340	91%	37	71%
Paleo bifaces	13	3%	10	19%
Hammer-core-abrader	22	6%	5	10%
Total	375	100%	52	100%

* Does not include undiagnostic preforms and notched and stemmed points from displaced contexts.

are calculated for each site and used to evaluate the differences between the samples, it appears that Hemmings is correct (Table 10.8). The Norden site included about 3 percent bifaces versus 19 percent bifaces for the Ryan-Harley site. Conversely, looking at all debitage with striking platforms, the Norden site yielded 22 percent of the bifacial-thinning ground-platform flakes, while the Ryan-Harley site yielded only 7 percent of the total from the sites. The Lewis-McQuinn site produced 32 percent of the bifacial-thinning ground-platform flakes, which is more in line with the totals from the Norden site. A possible reason for these differences will be discussed in more detail in the section on debitage.

The assemblage of bifaces from the Ryan-Harley site suggests there was a considerable amount of biface manufacturing taking place at least within the area tested. The waisted Suwannee points from the site are complete specimens, even though one was recovered in two pieces that refit. Although possible, the broken specimen from Ryan-Harley does not appear to have failed due to postmanufacture use. Thus, there are no identifiable projectile fragments from Ryan-Harley suggesting failure due to use, and only one of the waisted Suwannee points appears to have been resharpened after manufacture.

On the other hand, the Norden site yielded preforms at various stages of manufacture, finished points, and at least two fragmentary waisted Suwannee points displaying heavy impact damage resulting from their use as projectile points. The severity of the impact damage on the Norden site specimens is remarkably similar to the type of heavy damage often found on waisted Clovis specimens from Florida (Dunbar and Hemmings 2004). Similar impact damage to a waisted Clovis point is also evident on the specimen recovered from the bison kill area of the Murray Springs site in

TABLE 10.9. In situ versus surface-collected uniface tools (Norden, Ryan-Harley, and Lewis-McQuinn all accessions).

Uniface Tools	Gi40 Count*	Gi40 %*	Gi40 GS Count	Gi40 GS %	Je1004 Count*	Je1004 %*	Je1004 GS Count	Je1004 GS %	Di112 Count*	Di112 %*	Di112 GS Count	Di112 GS %
End scraper	1	25%	35	10%	1	6%	0	0%	1	20%	0	0%
Turtleback scrapers, small	0	0%	34	10%	3	18%	2	10%	0	0%	0	0%
Small rectangular scrapers	0	0%	2	1%	0	0%	0	0%	0	0%	0	0%
Oval scrapers	0	0%	6	2%	3	18%	2	10%	0	0%	1	50%
Scrapers	0	0%	37	11%	1	6%	7	35%	1	20%	0	0%
Thumbnail scrapers	0	0%	10	3%	1	6%	0	0%	0	0%	0	0%
Beveled-edged scrapers	0	0%	3	1%	0	0%	0	0%	0	0%	0	0%
Hendrix scraper	0	0%	0	0%	0	0%	0	0%	0	0%	1	50%
Large scraper-choppers	0	0%	2	1%	0	0%	1	5%	0	0%	0	0%
Small gravers (w/ 23 spurs)	2	50%	19	6%	0	0%	0	0%	1	20%	0	0%
Large Gravers	0	0%	3	1%	0	0%	0	0%	0	0%	0	0%
Spokeshaves on random flakes	0	0%	5	1%	0	0%	0	0%	1	20%	0	0%
Beaked tools	0	0%	2	1%	0	0%	0	0%	0	0%	0	0%
Wedge-shaped tools	0	0%	2	1%	0	0%	2	10%	0	0%	0	0%
Worked-utilized blades	0	0%	6	2%	1	6%	1	5%	0	0%	0	0%
Utilized flakes	1	25%	170	51%	7	41%	5	25%	1	20%	0	0%
Total	4	100.0%	336	100.0%	17	100%	20	100%	5	100%	2	100%

* in situ

Arizona (Haynes 1982:387, figure 3). If similarities such as the occurrence of heavy impact fractures represent permissible evidence, then the Norden site waisted Suwannee points add to the notion that they are genetically related to waisted Clovis.

Uniface Tools

A total of 384 uniface tools were collected from the Norden, Ryan-Harley, and Lewis-McQuinn sites (Table 10.9). Most of the uniface tools were surface-collected specimens (93 percent). The Norden site not only produced most of the specimens (88 percent), it also produced the majority of surface-collected finds (87 percent) compared to the other two sites. Four uniface tools have been recovered from context at the Norden site, which accounts for only 1 percent of the uniface tools recovered from the site. The small number of uniface tools recovered from context at the Norden site is directly related to the lack of substantial subsurface testing at the site. The combined area of both test units at the Norden site was less than three-quarters of a square meter, but yielded a total of 83 bone and lithic specimens. Conversely, about half the specimens from the Ryan-Harley site were recovered from context within a seven-square-meter test area.

Uniface tools that commonly occur include end scrapers on blade-shaped flakes and flakes, both medium-size and small ovate scrapers (turtlebacks), scrapers of various configurations, and utilized flakes and blade-shaped flakes. Gravers have not been accounted for at the Ryan-Harley site but have been recovered in context from the other three sites. Spokeshaves on random flakes are similarly present at the Norden and Lewis-McQuinn sites, but none have been recovered from Ryan-Harley. The Norden site has produced an assemblage of uniface tools that for now are unique to that site. The most notable of these are beveled-edge scrapers that are beveled on one side or, in one instance, opposite-beveled. The beveled scrapers are made on flakes or flake fragments that have a relatively uniform thickness of about 1 centimeter (Figure 10.8). Other interesting tools include the small rectangular scrapers, which may be some type of variation of the turtleback scraper, and the beaked tools (see Figure 10.8).

Debitage

The Norden site produced the highest counts of debitage (n = 596), followed by Ryan-Harley (n = 174) and Lewis-McQuinn (n = 76). Four methods of platform preparation were identified on the inventory of complete and proximal

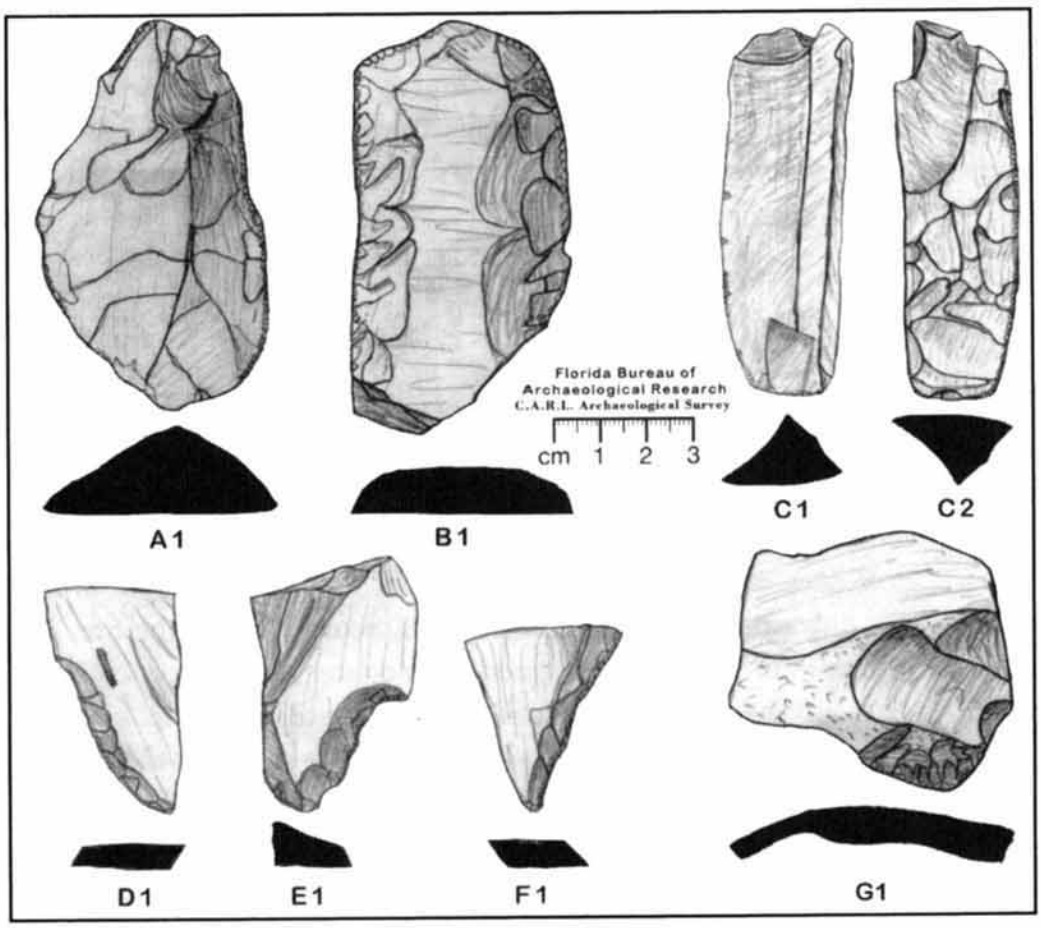

FIGURE 10.8. Selected uniface tools from the Norden site.

end debitage recovered from each site. The debitage from the Ryan-Harley and Lewis-McQuinn sites was recovered *in situ*, while most of the platform debitage from the Norden site was from displaced context but within the area of concentrated Paleoindian tools. Admittedly, the number of platform flakes from Lewis-McQuinn is small. Recognized platform types include:

- No platform preparation—where no attempt was made to alter the striking surface of the material being knapped;
- Back-flaked platform—where the platform was prepared by small back-flake removals that were done either toward or away from the direction of the subsequent flake detachment;
- Back-flaked and ground platform—where the platform was prepared first by back flaking and then ground by an abrader, and;
- Ground platform—where the method of platform preparation was by grinding with an abrader, and there was no evidence of prior back-flaking.

The percentages of the different platform types are fairly uniform for the Norden and Lewis-McQuinn sites (Table 10.10). The Ryan-Harley site differs considerably, especially in having the lowest occurrence of ground-platform flakes versus highest percentage of back-flaked platforms. It is likely that there is a mechanical reason for these differences related to the quality of lithic resources available in the Santa Fe–Suwannee area versus the Aucilla-Wacissa area. The Norden site is located in the heart of the old land-pebble phosphate district of Florida. Here, geologists were quick to realize that the phosphate beds were also a source of residual Eocene and Oligocene chert. Today, these chert-bearing sediments are included under the Hawthorne Group (Scott et al. 2001), but were formerly referred to as the Alachua Formation (Puri et al. 1967; Vernon 1951). Vernon (1951:191–192) offers a good description of the chert:

> Silicified limestone and flint boulders occur in many of the abandoned phosphate pits in Citrus and Levy counties and occur in all degrees of consolidation from a very porous and friable silicified coquina of foraminifers to dense, crystalline, completely silicified, flint boulders. The silicified limestone is yellow to brown and the flint may be yellow, white and light blue. These boulders are a nuisance in mining phosphate as they are intimately mixed in the ore and must be eliminated, often a selective job of hand picking.

The chert-bearing sediment of the Hawthorne Group is mapped in the Norden site area (Puri et al. 1967), and phosphate and silicified phosphate nodules, along with a variety of chert grades, have been recovered from the site. The sometimes good to excellent quality microcrystalline chert, associated with the so-called Alachua Formation and now subsumed in the Hawthorne Group, was a significant and sought-after prehistoric resource. This chert resource can be found in the Santa Fe River basin and the surrounding karst lowlands. Of particular interest are ovoid and round nodules of Suwannee Limestone formation chert (hereafter referred to as Suwannee chert) that are of good knapping quality. The chert tends to be both homogenous and fine grained. The Lewis-McQuinn site in the lower Suwannee River basin is also located in the area of Hawthorne Group chert outcrops. Ryan-Harley and other sites in the Wacissa and Aucilla river basins are considerably west of any chert-bearing Hawthorne Group outcrops. Nevertheless, the Aucilla-Wacissa area is located in one of the state's major prehistoric quarry areas, where plentiful Suwannee chert is avail-

TABLE 10.10. Comparison of striking platform preparation.

Site	No Platform Preparation		Back-Flaked Platform		Back-Flaked and Ground Platform		Ground Platform	
Norden	55	19%	120	41%	53	18%	66	22%
Ryan-Harley	17	23%	37	50%	15	20%	5	7%
Lewis-McQuinn	5	18%	9	32%	5	18%	9	32%

able (Upchurch et al. 1982). The primary difference between the Santa Fe–Suwannee and Aucilla-Wacissa chert appears to be one of knapping quality. Bifaces of vitreous, fine-grained chert are more likely to have been ground in preparation for bifacial thinning, in contrast to those of medium- or varied-grained chert, which were more likely to be back flaked for bifacial thinning. It is also possible that complete or partial platform failures obscure evidence of grinding more frequently on medium- or varied-grained chert than on homogenous, fine-grained chert.

The Suwannee chert in the Aucilla-Wacissa area tends to have concretionary bands that vary in grain size but are otherwise homogenous, or that are riddled with voids and unincorporated fossil inclusions. This is not to say that fine-grained chert does not exist in the Aucilla-Wacissa basins, but that it is less common. In the Santa Fe–Suwannee area, nodules of dense, vitreous to semivitreous, black, gray-blue, and light gray chert are not uncommon, and one outcrop location near High Springs is known to modern flint knappers as a place to go for black "flint" (Patton, personal communication 1999).

Claude VanOrder, one of Florida's finest present-day knappers, was given five large flakes or blanks of Wacissa Cannonball chert. His challenge was to manufacture replica waisted Clovis points in order to conduct utilization experiments. Because Paleoindians did not pretreat the blanks by thermal alteration, he was asked to knap the pieces from unaltered chert. Three of the five production blanks failed due to breakage, but the two that were successfully finished eventually proved to be tough and resistant to breakage.

It is possible that the structure of the stone in the Aucilla-Wacissa area represented a greater challenge to the Paleoindian peoples attempting to bifacially reduce blanks to points. Certainly the scarcity of ground platform flakes versus the abundance of back-flaked platform flakes from the Ryan-Harley site is almost the inverse of similar debitage counts from the Norden and Lewis-McQuinn sites. The proposed difference in workability of the chert from the Aucilla and Wacissa river area versus the fine-grained

TABLE 10.11. Stone artifacts by lithographic grade of the chert.

Type of Lithic Artifact	Grade I	Grade II	Grade III
Hammerstones	0	3	3
Abraders	0	0	2
Cores	2	3	2
Lanceolate preforms	2	6	0
Rounded base preforms	1	1	0
Distal ends	4	0	0
Misc. bifaces	2	3	0
Suwannee	4	0	0
Dalton-like adze	0	1	0
Turtleback scrapers	17	15	0
Ovate scrapers	3	3	0
Thumbnail scrapers	5	4	0
Scrapers/random flakes	5	21	2
End scrapers	11	15	0
Beveled-edged scrapers	2	1	0
Spokeshaves	1	4	0
Small gravers	8	10	0
Large gravers	0	2	0
Wedge-shaped tools	0	2	0
Utilized flakes	56	58	3
Worked-utilized blades	2	4	0
Beaked tools	0	2	0
Debitage	198	212	16
Total	**323**	**370**	**28**

chert from the Santa Fe and lower Suwannee river area is a likely scenario. This scenario bears further testing but is also supported by data from the Norden site, where most of the lanceolate paleo-preform failures occur on inferior-grade chert (Table 10.11).

Bone Artifacts

The most interesting bone tool from the Ryan-Harley site is a fragment of ivory shaft or foreshaft recovered from eroded context, adjacent to the in-

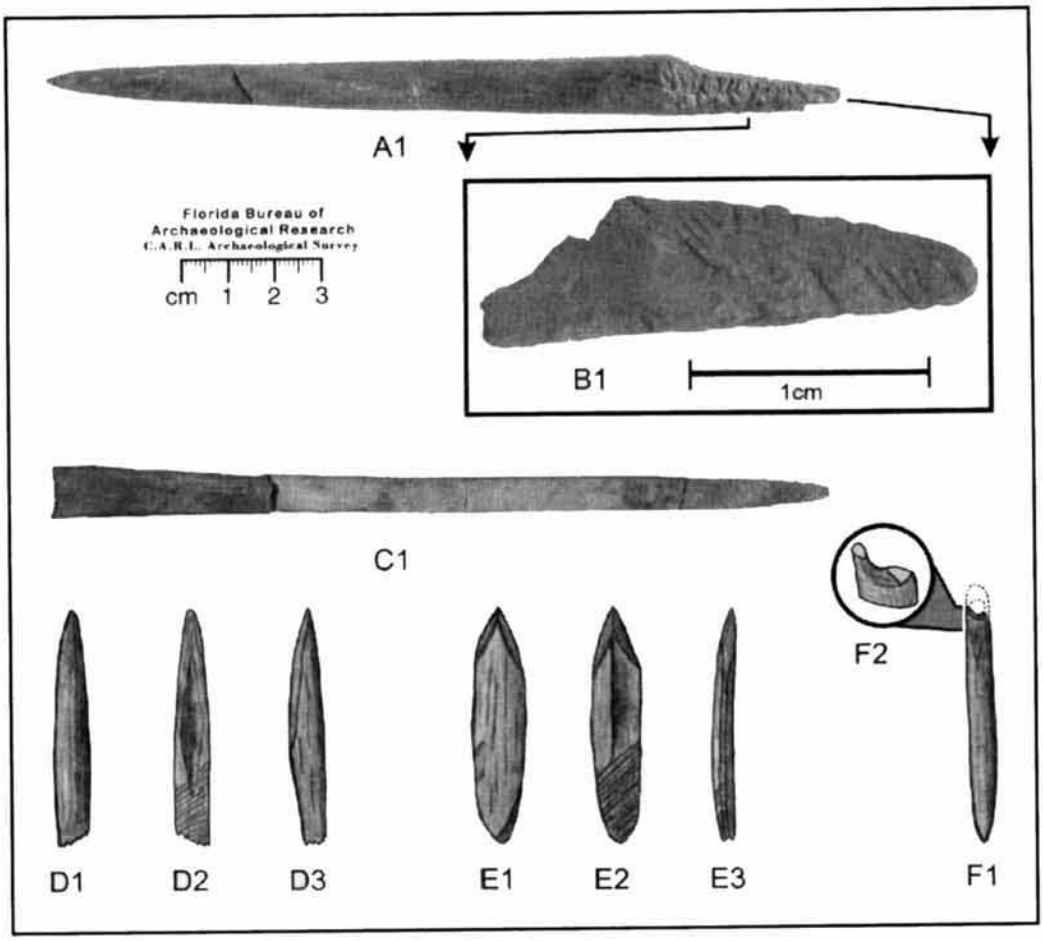

FIGURE 10.9. Bone and ivory tools.

place component (Figure 10.9). It is quite possible that it originated from the Suwannee point component. Although the ivory shaft fragment was recovered from displaced context and might represent Clovis, there is no identifiable Clovis component at the site, and the stratigraphy suggests that the site area had been inundated prior to the Suwannee occupation (Hemmings 2004; Balsillie et al. 2006). In addition, the ivory shaft fragment was collected inside the concentrated area of surface-collected Suwannee tools directly adjacent to the *in situ* remains.

In Florida, the typical Paleoindian shafts, foreshafts, or rods, as they have been referred to interchangeably, are made of ivory (Dunbar and Webb 1996:340), although elsewhere in North America they are just as likely to be made of thick-walled bone (Lahren and Bonnichsen 1974:147–150). The typical ivory shaft is almost perfectly round in cross section, tapers to a point on the distal end, and has been obliquely truncated and basally roughened on the proximal end to facilitate hafting. The terms "proximal" and "distal" may be somewhat misused in this case because there are at

least two hypotheses about the use of shafts as part of Paleoindian weaponry. Some researchers believe the shafts were used as osseous projectile points, with the pointed end used as the impacting projectile tip (Guthrie 1983:273–294). Other researchers believe they were used as spear foreshafts, with the pointed end fit into a socket on the end of the spear shaft, while the obliquely truncated, hafting end held a Clovis point as the impacting projectile tip (Tankersley 1994a, 1994b; Lahren and Bonnichsen 1974).

At the Norden site, small bone pins or points were recovered that are similar to the Ryan-Harley site ivory shaft, in that the hafting end was obliquely truncated to form the hafting platform or bevel (see Figure 10.9). The hafting platforms on the smaller bone specimens from the Norden site as well as the larger ivory specimen from the Ryan-Harley site are basally roughened to facilitate hafting. However, the Norden site bone pins were manufactured from deer-size long-bone elements, which is a characteristic of bone tool assemblages after the late Pleistocene megafauna died out. After the megafauna extinction, the thick-walled bone necessary for large-size bone tool production was no longer available. Besides bone pins, the Norden site also yielded an eyed bone needle indicative of some type of sewing technology. Obliquely truncated, basally roughened bone pins as well as eyed bone needles have also been recovered in Early Archaic context in Florida at the Page-Ladson site in the Aucilla River (Dunbar et al. 1989) and at the Warm Mineral Springs site near Venice, Florida (Cockrell and Murphy 1978). In addition, bone needles are known to occur in Paleoindian context elsewhere in North America (Gramley 1992:39). Although not necessarily diagnostic, the dual occurrence of artifacts such as eyed bone needles and common artifact attributes such as the same type of hafting platform in both the Paleoindian and Early Archaic bone tool assemblages represents yet another indication of in-place cultural development and continuity.

A bone projectile point recovered in four pieces came from the Dunnigans Old Mill test units (see Figure 10.9). Three of the pieces were touching one another, and the breaks between them appear to have resulted from post-depositional, old bone breakage. The fourth proximal end piece was recovered from another test unit. This fragment fits onto the proximal-most end of the other three, and, pieced together, all four form a complete artifact. The break on the proximal end appears to have resulted from a longitudinal, green bone fracture and indicates failure due to a thrusting or head-on impact. The green bone fracture at the proximal end suggests the point functioned as a projectile or stabbing weapon. The bone point is unlike the "typical" osseous shaft or foreshaft in that it was manufactured from deer-

size long bone and not from megafauna-size bone or ivory. The Dunnigans Old Mill bone point is also unlike the bone pins and eyed bone needle recovered from the Norden site (see Figure 10.9).

In many respects, the Dunnigans Old Mill bone point resembles a single-pointed type on one end and a blunt-ended type on the other end, similar to those found on younger sites. There are only so many ways one can fashion a bone point or pin when using the splinter-groove technique, and, as a result, there are seldom any distinguishing morphological features. Perhaps the one unusual feature of the Dunnigans Old Mill specimen is how the point was finished. Once the bone splinter had been burin cut and removed from the long bone, a point was fashioned on one end while the other end was left flat. The point was honed down on its dorsal and ventral surfaces but not along its laterals, thereby leaving part of the original burin cuts intact. In contrast, a sample of 923 Archaic or later bipointed and single-pointed bone pins recovered from the Little River Rapids site (8Je603) had been honed smooth around their circumferences (Willis 1988:467). This latter type of finishing seldom leaves any traces of the original burin cuts. This difference in manufacture finishing prior to utilization may or may not prove to be indicative of a Paleoindian origin, but is worthy of note.

Discussion

The general faunal evidence from the Ryan-Harley and Lewis McQuinn sites indicates that wetland resources, including fish, turtles, alligators, and birds, were perhaps as heavily relied upon as mammals as sources of food. However, the evidence from the Dunnigans Old Mill site and possibly the Norden site may reflect Paleoindian camps dominated by mixed large-mammal remains. This latter conclusion remains uncertain, however, due to the extreme biases inherent in the samples thus far collected from the two sites.

The Late Paleoindian Dust Cave site in Alabama (Walker 1998) produced surprisingly large numbers of migratory birds, along with mammals, reptiles, fish, and amphibians. At Modoc Rock Shelter in Missouri (Styles et al. 1983), small mammals dominated the faunal assemblage during the Early Archaic, with the subsequent increase in the utilization of fish. The use of fine screening in both cases helped to clarify the diversity in the assemblages. At Ryan-Harley, mammals and reptiles dominate the assemblage, although fish and birds are present in significant quantities. The testing accomplished at Ryan-Harley was aimed at salvaging that part of the Suwannee-age site component threatened by river current down cut-

ting. This effort utilized a surface screen with a 1/8-inch mesh. Such a large screen mesh may have skewed the counts of the small fauna present, particularly fish. An additional soil sample collected after the initial salvage effort confirms this; however, additional testing is needed to clarify the results.

Pleistocene muskrat, tapir, and horse remains were recovered from context at the Ryan-Harley site. In addition, the ivory shaft fragment recovered from displaced context is from a mastodon. The remains of other species that were recovered from displaced context at Ryan-Harley include giant tortoise, *Paramylodon* (sloth), and giant armadillo. The mastodon and giant armadillo remains were particularly convincing as candidates probably originating from the Suwannee component because they were recovered within the concentration of displaced Suwannee artifacts (Dunbar et al. 2005). At the Norden site, minimal testing has yielded ungulate and other large-mammal bone most likely representing horse and/or bison. At the Dunnigans Old Mill site, both bison and horse are represented, along with many other unidentifiable specimens of large-mammal bone. At Lewis-McQuinn, a long-bone fragment of proboscidean or comparable very large mammal was recovered in context from Level 1.

Perhaps the most important implication of the fauna assemblages is that both the Ryan-Harley site and the Norden site have yielded Pleistocene species that appear to have survived beyond the Younger Dryas boundary ca. 11,000 BP. This means there was no devastation of Pleistocene species prior to the onset of the Younger Dryas in the southeastern United States (Dunbar et al. 2005) as there was in the desert Southwest (Fiedel 1999b; Haynes et al. 1999; Haynes 2006). Consequently, there may be reason for the waisted Suwannee to reflect a greater continuity between it and waisted Clovis than a comparison of the Clovis to Folsom sequence out west.

Another important aspect of the fauna assemblage is the diversity of small and medium-size wetland animal species. The data presented here is preliminary in the sense that none of the sites has been extensively tested; however, many of the species represented reflect a range of different-size fauna from a variety of habitats. All of the sites have yielded the remains of reptiles, especially turtles as well as birds and mammals, notably deer. Three of the sites have yielded the remains of fish and two of the sites the remains of American alligator. Although large mammals appear to dominate the Dunnigans Old Mill assemblage, preservation and the lack of screening may have biased that sample. Certainly fish, reptiles, and birds are present, and the impact-fractured bone point suggests a possible capture

method. The small bone pins from the Norden site may represent barbs or points. Small fauna from the Norden site included the remains of a turtle, medium-size bird, and river otter, none of which were likely to have been taken by the hunting tackle associated with waisted Suwannee points. The turtle may have been captured by hand, but the other small animals were likely captured by another technique involving some type of lighter hunting tackle that included bone points made from deer-size long bone.

In *The Foraging Spectrum* (1995), Robert Kelly cautions archaeologists not to expect or to make one-to-one correlations between living hunter-gatherer societies and those of the distant past. We do not attempt to do so here; rather, we provide an example of the diversity in hunting tackle used by modern Hadza males of Tanzania, East Africa. The Hadza are among the last big-game hunting, hunter-gather cultures of the world. Hadza males use bows and arrows for hunting. Big-game hunting is accomplished with the use of poison on metal-tipped arrowheads. For medium-size game, smaller, nonpoison metal arrowheads are used. Finally, for birds, hyrax, and other small game, the Hadza use a variety of nonpoison wooden arrowheads with barbs and occasional harpoon heads, which detach to slow the animal (Woodburn 1970:17–31). The argument here is that there is no reason to believe that the American Paleoindians were myopic about animal capture methods. Certainly, both the fauna and the artifact assemblages of at least the Middle Paleoindian waisted Suwannee point makers indicate multiple capture methods and technology.

Smaller, fur-bearing animals were recovered from the Ryan-Harley, Norden, and Lewis-McQuinn sites. The Norden site yielded the remains of the diurnal river otter. However, the other two sites yielded the remains of nocturnal furbearers. Although there is no evidence in the artifact record for trap-setting technology as a means of small-animal capture, the evidence presented here suggests the possibility is likely. In addition, if trap setting took place, it is likely to have become archaeologically invisible. However, because at least five fur-bearing, nocturnal animals were recovered from the small areas tested at the Ryan-Harley site, these animals seem to have somehow been important. By present American standards, mink does not seem like it would be a prized protein source. Not only is there a small amount of meat, but mink also emit "a fetid discharge from the anal glands, which is at least as malodorous as a skunk's, although it does not carry as far" (Whitaker 1992:579). Muskrats, although edible, should be prepared carefully. In the wild game preparation section, the *Woman's Day Encyclopedia of Cookery* #5 includes some of the following steps for the preparation of "Maryland Muskrat" (Tighe 1966:769):

1. Carefully remove the musk sacks without breaking them and the two kernels along the back.
2. Cure by hanging cleaned carcass in air for several days.
3. Parboil for two hours in brine-water with cut onions and bay leaf.
4. Then bake in oven with other ingredients until tender.

Thus, at least two of the small fur-bearing animals likely took extra care in processing, assuming their meat was used as a source of protein. If not too ethnocentric, the difficulty with food preparation might provide evidence of a different primary use, which brings us back to the idea of fur pelts. Finally, the eyed bone needle from the Norden site further suggests that Paleoindians had the means to stitch hides with cordage for clothing and blankets or, possibly, the production of entanglement netting for traps.

The Ryan-Harley and Norden sites produced superb samples of Suwannee-age bone and stone tools. Because of the similarities of tool kits, both sites are assumed to be Middle Paleoindian, with the Ryan-Harley site more likely to be on the early end and the Norden site more likely to be on the later end of that time frame. The artifact assemblages from Ryan-Harley and Norden are similar, even though most of the sample from the Norden site came from displaced contexts in the river adjacent to the *in situ* component. Both collections include waisted Suwannee points. Those from the Ryan-Harley site include overshot flaking and fluting, while those from the Norden site may be associated with an early notched point having Suwannee-like traits and a solitary Dalton-like adze.

The lithic assemblage from the Ryan-Harley site and most of the lithics from the Norden site include a proliferation of unifacial tools that are distinctly different from the subsequent Late Paleoindian Dalton-Hardaway-Greenbriar as well as Early Archaic Bolen–Big Sandy projectile point makers. Whereas uniface triangular and notched forms designed for basal hafting as well as Dalton-like adzes occur with frequency in the Late Paleoindian and Early Archaic period (Goodyear 1974; Purdy 1981), they appear only to show up rarely at the Norden site. There are also some traits of the waisted Suwannee point, including occasional fluting, overshot flaking, impact fracture patterns from use, and hafting area attributes, that are waisted Clovis-like. Waisted Suwannee and Clovis points often display heavy impact fractures. An impact-fractured waisted Clovis point was recovered from the bison kill area at Murray Springs, Arizona; its tip was recovered over 100 meters away at the hunter's camp (Haynes 1982). The skull cap

with horn cores and other elements of a *Bison antiquus* dating to ca. 11,000 BP was recovered from the Wacissa River a little less than nine kilometers north of the Ryan-Harley site. The most interesting feature of this find was an impact-fractured projectile point tip lodged in the frontal bone between the horn cores (Webb et al. 1984:384–392). The Ryan-Harley, Norden, and Dunnigans Old Mill sites have produced in-place ungulate remains. The Ryan-Harley site yielded a fluted Suwannee preform from the Suwannee component as well as three waisted Suwannee points in the area of concentrated Suwannee artifacts deflated by recent river action. Likewise, the Norden site has produced a concentration of waisted Suwannee points and lanceolate preforms, and previous recoveries at Dunnigans Old Mill also included Suwannee points from displaced context. The evidence is rather compelling that large game was being taken, but it was not the only game to be exploited.

In some ways, the Suwannee uniface tools are most similar to the waisted Clovis assemblage. The Suwannee assemblage includes a variety of well-made oval, round, and oblong scrapers; thick-nosed end scrapers; gravers of various sizes; conical blade-flake cores; thumbnail scrapers; burins; wedges; beveled flake tools; and a variety of carefully retouched flake tools.

The contrast between the exploitation of mammals for subsistence versus the exploitation of diversified terrestrial and wetland faunas is significant and may indicate technological adaptability and flexibility dependent on the species and resources available in the area settled as well as the season and the need for certain animal by-products, such as furs, skins, bone for tools, and so forth; or that some sites are chronologically separated and therefore reflect an evolutionary continuum of adaptations to late glacial climate and habitat change; or that cultural diversification had already taken place by the Early or Middle Paleoindian time frame and that differentiation of cultural groups had taken place in such a way that they coexisted in time and perhaps space but exploited different food sources.

Whichever scenario best explains the assemblage of faunal remains at these sites, all of the sites have mixed assemblages, albeit to different degrees. At Dunnigans Old Mill and perhaps Norden, the fauna appears to be dominated by large mammals. These mammal-dominated sites appear to represent activities that are focused more toward specialized foraging. At Ryan-Harley, the activities appear to be more generalized, as fish, reptiles, and birds figure prominently along with large and small mammals, including extinct late Pleistocene species. The analysis of the Level 1 fauna

from the Lewis-McQuinn site also shows more of a generalized pattern. Perhaps a conservative view of this data would place all of the sites into a Middle Paleoindian context because none of them fit a big-game-hunting-only paradigm. That is to say, sites like Dunnigans Old Mill and Norden have too many smaller mammals, and still more diverse sites like Ryan-Harley and Lewis-McQuinn include animals that walked, swam, crawled, or flew. The faunal assemblages suggest a greater technological diversity than is readily apparent from the surviving artifact assemblages or that has been generally attributed to known Paleoindian occupations of Suwannee, Clovis, or beyond.

Another important aspect of the faunal assemblages from all of the sites is that all include extinct Pleistocene species. Continuing with the concept of a conservative view, the standard suggesting when and where Pleistocene megamammals became extinct, like the big-game hunting paradigm, originated from research focused on the desert Southwest. Most recently, the extinction date for mammoths and other Pleistocene species has been set during the later Allerød between ca. 11,500 to ca. 11,000 BP. In the desert Southwest, this is the time of the Clovis drought (Haynes et al. 1999). Thus, by the onset of the Younger Dryas at ca. 11,000 BP, Pleistocene megafauna is believed to have already become extinct in the Southwest (Fiedel 1999b; Haynes 2006).

The evidence from Florida is that no such drought affected the Southeast until the end of the Younger Dryas at ca. 10,000 BP, but that drying conditions began at ca. 10,400 BP during the warm (glacial recession) phase of the Younger Dryas (Dunbar 2002; Dunbar 2006a,b,c). Thus, our view is that all of the Florida sites date no later than the cold phase of the Younger Dryas between ca. 11,000 and ca. 10,400 BP and that the Dunnigans Old Mill and Lewis-McQuinn sites may or may not date before the onset of the Younger Dryas. The apparent significance is that Pleistocene megafauna survived beyond the Allerød boundary into the Younger Dryas in the southeastern United States, and that Suwannee point makers, who we believe to be post-Clovis offspring, not only relied on megamammals but various other species as well. The need for furs and other necessities appear to have made this essential.

Based on the faunal assemblages from the Ryan-Harley, Norden, Lewis-McQuinn, and Dunnigans Old Mill sites, the notion that Paleoindian peoples in Florida were solely devoted to big-game hunting of megamammals is not correct. Nor is it correct that Paleoindian peoples were solely focused on medium-size and small, mostly modern (extant) game; rather, they had

varied hunting strategies that included large, medium-size, and small animals. The faunal assemblage also includes nocturnal fur-bearing animals, which suggests that Paleoindians utilized alternative means of capture, such as traps or snares, even though the artifactual evidence for either technique has not been found or preserved. Finally, the Paleoindian stone tool technology appears to reflect a degree of flexibility between areas of lithic materials of differing quality.

We leave unresolved the question as to whether the Dunnigans Old Mill and Lewis-McQuinn sites represent the Middle or Early Paleoindian time frame but suggest that the Ryan-Harley and Norden sites do. Therefore, for the first time in the extreme southeastern United States, there are several Paleoindian sites that share a potential to provide additional and more persuasive research data.

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