10

Ancestor-Descendant Relationships in the Early Holocene

Evidence for Clovis Paleoindian–Bolen Early Archaic Cultural Continuity in Florida

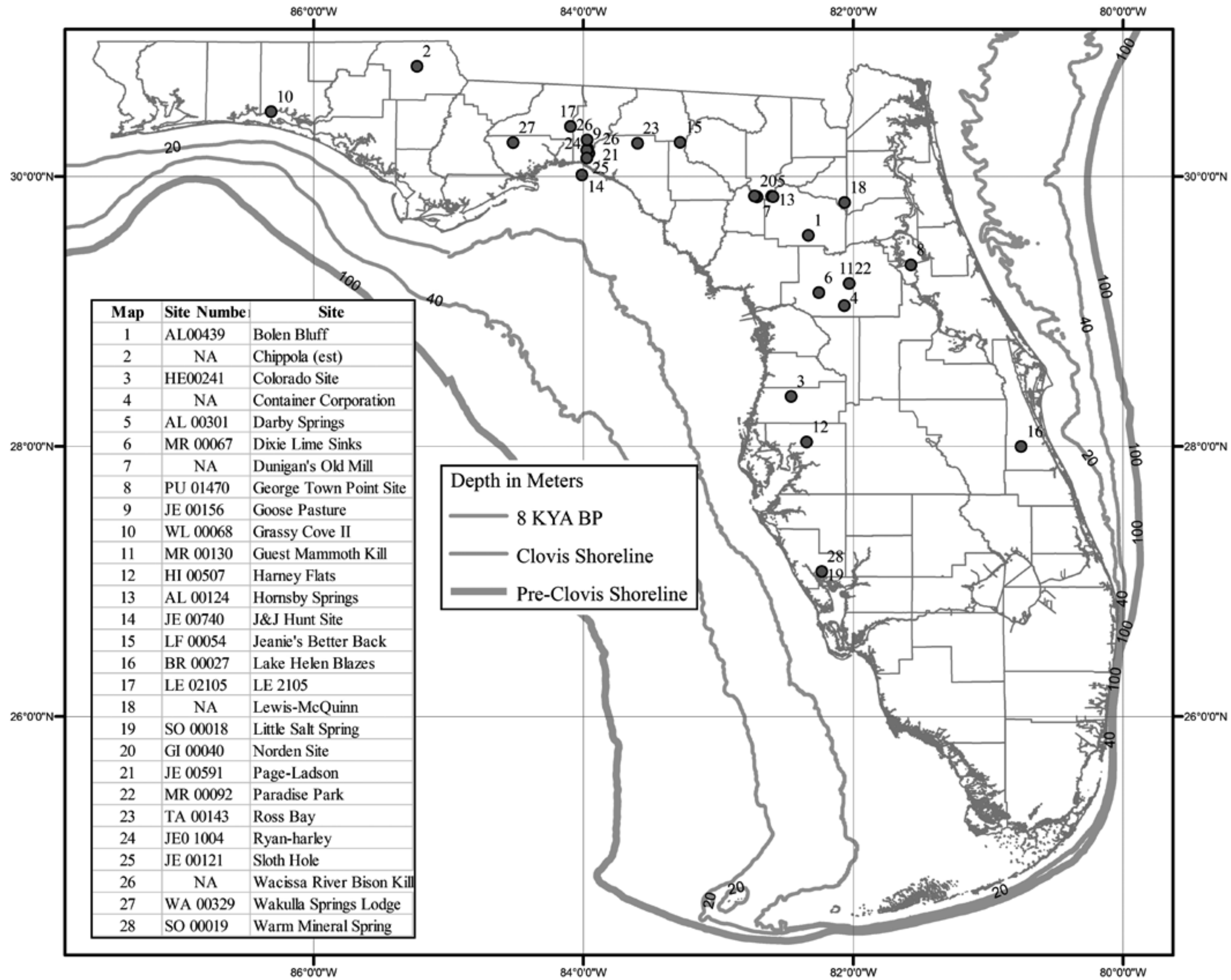
Charlotte Donald Pevny, David K. Thulman, and Michael K. Faught

Southeastern North America exhibits a robust fluted and lanceolate point Paleoindian record that along with other data provides evidence for a localized trajectory of Paleoindian settlement and cultural continuity into the early Holocene (Anderson and Faught 2000; Driskell 1996; Mason 1962; Morse 1973; O'Brien et al. 2014; Smith 1986; Stanford 1991; Williams and Stoltman 1965). We propose that Florida's late Pleistocene and early Holocene archaeological record follows the greater southeastern pattern of a contemporaneous regionally bounded Early Archaic population that was directly descended from Clovis ancestors (Sweeney 2013; Thulman 2013). However, this record is both a blessing and a curse.

Florida is rich in Paleoindian (PI) and Early Archaic (EA) data. Early fluted (Clovis) points, later fluted and unfluted lanceolate points (Suwannee, Simpson, Greenbrier, Union Side-notched, and a variety of unnamed points), and EA side- and corner-notched Bolen points, along with other tools, are numerous and known from surface and excavated contexts. Local collectors have amassed and shared large collections of lithic artifacts that document PI and EA tool diversity (Bissett 2003; Dunbar 1991; Sweeney 2013; Thulman 2006a, 2006b; Tyler 2008). Unparalleled preservation at submerged sites provides a glimpse of the organic assemblage (e.g., ivory, bone, wood) (Carter 2003; Carter and Dunbar 2006; Clausen et al. 1979; Dunbar and Webb 1996; Dunbar et al. 1989; Hemmings 1999). Several important sites have been professionally excavated, and the assemblages have been published (Figure 10.1, Table 10.1; Austin 2001, 2006; Austin and Mitchell 1999, 2010; Bullen 1958; Clausen et al. 1975; Clausen et al. 1979; Daniel and Wisenbaker 1987; Goodwin et al. 2013; Heller et al. 2011; Neill 1958; Tesar and Jones 2004; Webb 2006). Reports in the last 15 years, much of it the "gray literature" of cultural resources management, have explored EA settlement, subsistence, and technology in ways that were not possible in the past.

On the other hand, the state is cursed by an apparent paucity of datable materials from settings where environmental conditions (e.g., acidic soil, leaching) bias recovery (Thulman 2012a). Only relative or absolute dating will allow us to confidently catalog Florida's PI tools and to better characterize the post-Clovis PI chronology, as will be seen. Equally frustrating has been the failure to find more stratified sites with intact PI components. Data from such sites would facilitate understanding of the changes between PI and EA settlement, subsistence, and technology.

Our goal in this chapter is to describe, summarize, and reevaluate Florida's PI and EA records and to examine the idea of cultural



Map	Site Numbe	Site
1	AL00439	Bolen Bluff
2	NA	Chippola (est)
3	HE00241	Colorado Site
4	NA	Container Corporation
5	AL 00301	Darby Springs
6	MR 00067	Dixie Lime Sinks
7	NA	Dunigan's Old Mill
8	PU 01470	George Town Point Site
9	JE 00156	Goose Pasture
10	WL 00068	Grassy Cove II
11	MR 00130	Guest Mammoth Kill
12	HI 00507	Harney Flats
13	AL 00124	Hornsby Springs
14	JE 00740	J&J Hunt Site
15	LF 00054	Jeanie's Better Back
16	BR 00027	Lake Helen Blazes
17	LE 02105	LE 2105
18	NA	Lewis-McQuinn
19	SO 00018	Little Salt Spring
20	GI 00040	Norden Site
21	JE 00591	Page-Ladson
22	MR 00092	Paradise Park
23	TA 00143	Ross Bay
24	JE0 1004	Ryan-harley
25	JE 00121	Sloth Hole
26	NA	Wacissa River Bison Kill
27	WA 00329	Wakulla Springs Lodge
28	SO 00019	Warm Mineral Spring

FIGURE 10.1. Map of Florida with Paleoindian and Early Archaic sites discussed in the text. The present bathymetry is indicated; the Clovis (ca. 13,000 cal BP) and 8000 ^{14}C BP (ca. 8800 cal BP) shorelines are indicated.

TABLE 10.1. Sites Discussed in the Text, Including Site Numbers, Ages, and References to the Data.

Lab No.	Date (rcybp)	SD	Site Name	Site No.	Material	Quality of Radiocarbon Treatment	Association to Human Behavior	Context	Reference(s)
Beta-25430	17,340	310	Little Salt Springs	8SO18	Bone	Poor	Poor	Tortoise, associated with possible stake, collagen date; no modern pretreatment (see Tx-2636 for stake)	Dasovich and Doran 2011; Gifford and Koski 2011
TX-2335	13,450	190	Little Salt Springs	8SO18	Bone, tortoise	Poor	Poor	Carbonate fraction of tortoise, 20.9 m bmsl, Pit B75, Test 1; no modern pretreatment (see Tx-2636 for stake)	Clausen et al. 1979; Dasovich and Doran 2011
I-13591	13,130	200	Page-Ladson	8JE591	Wood	Acceptable	Questionable	Unit 3 83-A; rejected by Webb and Dunbar (2006:Table 4.3)	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
I-13590	12,570	200	Page-Ladson	8JE591	Peat	Acceptable	Acceptable	Unit 3 83-A straw mat; rejected by Webb and Dunbar (2006:Table 4.3)	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
AA-8759	12,570	100	Page-Ladson	8JE591	Plant seed	Acceptable	Acceptable	Unit 3 91-F, Level 26b, *curcurbita* on *Mammut* skull fragment	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
AA-7452	12,545	80	Page-Ladson	8JE591	Plant seed	Acceptable	Acceptable	Unit 3 88-CS diver head in Latvis collection; rejected by Webb and Dunbar	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-116493	12,480	100	Page-Ladson	8JE591	Acorn	Acceptable	Acceptable	Unit 3 97-F-1-ES, from lower part of Unit 3b near a *Paleolama* jugal	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-116499	12,460	100	Page-Ladson	8JE591	Wood	Acceptable	Acceptable	Unit 3 97-F-1-ES, from lower digesta level	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-116500	12,420	130	Page-Ladson	8JE591	Wood	Acceptable	Acceptable	Unit 3 97-F-1-ES, from north wall of end 97-1-sc	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-116497	12,400	110	Page-Ladson	8JE591	Acorn	Acceptable	Acceptable	Unit 3 97-F-1-UPPER acorn collected from Mammut pelvis	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-112236	12,390	50	Page-Ladson	8JE591	Bone, *Paleolama*	Acceptable	Acceptable	Unit 3 9 "lower digesta" bone collagen, *Paleolama* jugal	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
AA-7453	12,375	75	Page-Ladson	8JE591	Plant material	Acceptable	Acceptable	Unit 3 88-C S diver head; rejected by Webb and Dunbar (2006:Table 4.3)	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
AA-11048	12,370	90	Page-Ladson	8JE591	Plant seed	Acceptable	Acceptable	Unit 3 97 F, Level 20b	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-15088	12,330	110	Page-Ladson	8JE591	Organics	Acceptable	Poor	Unit 5-6 84-B peat; recalculated to 12,297 ± 115 BP = plant material (Webb and Dunbar 2006)	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-22268	12,240	90	Page-Ladson	8JE591	Plant material	Acceptable	Acceptable	Unit 3 87-6 core; rejected by Webb and Dunbar	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2

TABLE 10.1. (cont'd.) Sites discussed in the text, including site numbers, ages, and references to the data.

Lab No.	Date (rcybp)	SD	Site Name	Site No.	Material	Quality of Radiocarbon Treatment	Association to Human Behavior	Context	Reference(s)
Beta-15090	12,120	120	Page-Ladson	8JE591	Wood	Acceptable	Acceptable	Unit 3 84-B 4L 4 U; recalculated to 12,200 ± 124 BP (Webb and Dunbar 2006)	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
TX-2636	12,030	200	Little Salt Springs	8SO18	Wood	Acceptable	Poor	Reentrant at 20.9 m bmsl, Pit B75, Test 1; stick purported spear in tortoise shell	Clausen et al. 1979; Dasovich and Doran 2011
Beta-8365	11,770	90	Page-Ladson	8JE591	Organics	Acceptable	Acceptable	Unit 3 83 A digesta sample; rejected by Webb and Dunbar (2006:Table 4.3)	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-5942	11,170	130	Bison Kill	N/A	Bone, bison	Poor	Poor	Distal end of Bison humerus, near but not the same as bison with chert in frontal; no modern pretreatment	Webb et al. 1984
SL 2850	11,050	50	Sloth Hole	8JE121	Ivory foreshaft	Acceptable	Acceptable	Age on artifact	Hemmings 2004
I-6459	10,980	210	Little Salt Springs	8SO18	Peat	Acceptable	Unknown	Spring basin below burial, from pedestal of skull #14322, 2.3 m bmsl; called C-72-2, Tag #14336 by Jim Wallace; burial could be intrusive in older peat	Clausen et al. 1979; Dasovich and Doran 2011
Beta-22268	10,800	130	Page-Ladson	8JE591	Wood	Acceptable	Unknown	Unit 3 88-C-S; rejected by Webb and Dunbar (2006:Table 4.3)	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Gak-3997	10,630	210	Warm Mineral Springs	8SO19	Wood	Unknown	Unknown	Zone 3, Level 3; burial could be intrusive in older peat	Clausen et al. 1975; Dasovich and Doran 2011
Beta-8360	10,520	130	Page-Ladson	8JE591	Bone, proboscidean	Poor	Unknown	Unit 3? Test A in digesta; rejected by Webb and Dunbar (2006:Table 4.3); no modern pretreatment	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-103889	10,300	120	Page-Ladson	8JE591	Organic sediment	Acceptable	Acceptable	Unit 5-6 surface, 95-C below Bolen point	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
I-7207	10,285	145	Warm Mineral Springs	8SO19	Leaf mold	Acceptable	Unknown	Beside Burial 1 and to the west; burial could be intrusive in older peat	Dasovich and Doran 2011
Beta-21752	10,280	110	Page-Ladson	8JE591	Wood	Acceptable	Acceptable	Unit 5-687-C, 2b desiccated wood; recalculated to 10,360 ± 115 B.P. (Webb and Dunbar 2006)	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Gak-3998	10,260	190	Warm Mineral Springs	8SO19	Wood	Unknown	Unknown	Zone 3, Level 4, level of human vertebra	Clausen et al. 1975; Dasovich and Doran 2011
I-7206	10,255	145	Warm Mineral Springs	8SO19	Leaf mold	Unknown	Unknown	Found with skull but beneath at 45 ft level; burial could be intrusive in older peat	Dasovich and Doran 2011
I-7208	10,225	145	Warm Mineral Springs	8SO19	Leaf mold	Unknown	Unknown	Beside Burial 1 to the south; burial could be intrusive in older peat	Dasovich and Doran 2011

TX-2595	10,190	1,450	Little Salt Springs	8SO18	Charcoal	Acceptable	Unknown	Basin on gray sand, from informal hearths 6.1 m bmsl	Clausen et al. 1979; Dasovich and Doran 2011
Beta-81469	10,090	70	8LE2105	8LE2105	Charcoal	Acceptable	Acceptable	Component II Bolen	Faught et al. 2003; Goodwin et al. 2013; Hornum et al. 1996
I-7218	10,085	145	Warm Mineral Springs	8SO19	Wood	Acceptable	Unknown	Burial 1; burial could be intrusive in older peat	Dasovich and Doran 2011
I-7209	10,080	470	Warm Mineral Springs	8SO19	Humic debris	Acceptable	Unknown	Under ledge, over skull and stalactite, near Burial 1; burial could be intrusive in older peat	Dasovich and Doran 2011
I-7217	10,025	145	Warm Mineral Springs	8SO19	Wood	Acceptable	Unknown	Burial 1; burial could be intrusive in older peat	Dasovich and Doran 2011
Gak-3996	10,020	180	Warm Mineral Springs	8SO19	Wood	Acceptable	Unknown	Zone 3, Level 2	Clausen et al. 1975
LJ-120	10,000	200	Warm Mineral Springs	8SO19	Wood	Acceptable	Unknown	11.6 m underwater, 2 m of cave deposit, 1.83 m back from the outermost stalactites; Scripps Lab date; human bone in close contact	Dasovich and Doran 2011
Beta-21750	10,000	120	Page-Ladson	8JE591	Wood	Acceptable	Acceptable	Unit 5 Test 87-C 1a-2b charcoal; burned; recalculated to 10,016 ± 124 BP (Webb and Dunbar 2006)	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-58857	10,000	80	Page-Ladson	8JE591	Wood	Acceptable	Acceptable	Unit 5-6 92-C surface stake with cut marks	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-5941	9990	200	Bison Kill	N/A	Bone, bison	Poor	Acceptable	3 pieces of skull purportedly from skull with chert in frontal; no modern pretreatment	Webb et al. 1984
UM-112	9950	100	Warm Mineral Springs	8SO19	Wood	Unknown	Unknown	C-73-22, 19302B, wood from under Rock 4 (stalactite); associated with Human Burial 1	Dasovich and Doran 2011
Beta-103888	9950	70	Page-Ladson	8JE591	Plant seed	Acceptable	Acceptable	Unit 5-6 surface, 95C hickory nut on contact of Units 5 and 6	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
I-7216	9945	145	Warm Mineral Springs	8SO19	Wood	Unknown	Unknown	Burial 1; burial could be intrusive in older peat	Dasovich and Doran 2011
Beta-58858	9930	60	Page-Ladson	8JE591	Wood	Acceptable	Acceptable	Unit 5-6 surface, 92-C cypress log with cut marks	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-81468	9900	60	8LE2105	8LE2105	Charcoal	Acceptable	Acceptable	Component II Bolen	Faught et al. 2003; Goodwin et al. 2013; Hornum et al. 1996
Unknown	9880	270	Hornsby Springs	8AL124	"Marl"	Poor	Unknown	"Found in a sandy muck pocket…completely enclosed within a…fresh-water marl"; no way to evaluate radiocarbon treatment	Dolan and Allen 1961:35
Gak-3999	9880	230	Warm Mineral Springs	8SO19	Wood	Acceptable	Unknown	Zone 3, Level 5	Clausen et al. 1975; Dasovich and Doran 2011
W-1153	9870	370	Warm Mineral Springs	8SO19	Charcoal	Acceptable	Unknown	Zone 3	Clausen et al. 1975; Dasovich and Doran 2011

TABLE 10.1. (cont'd.) Sites discussed in the text, including site numbers, ages, and references to the data.

Lab No.	Date (rcybp)	SD	Site Name	Site No.	Material	Quality of Radiocarbon Treatment	Association to Human Behavior	Context	Reference(s)
I-7205	9860	140	Warm Mineral Springs	8SO19	Leaf mold	Acceptable	Unknown	East of skull in Burial 1; burial could be intrusive in older peat	Dasovich and Doran 2011
Beta-81467	9850	50	8LE2105	8LE2105	Charcoal	Acceptable	Acceptable	Component II Bolen	Faught et al. 2003; Goodwin et al. 2013; Hornum et al. 1996
Gak-4512	9840	190	Guest Mammoth Kill	8MR130	Bone, mammoth	Poor	Acceptable	Bone collagen of mammoth; no modern pretreatment	Hoffman 1983
Beta-16750	9760	120	Cutler Fossil	8DA2001	Charcoal	Acceptable	Unknown	Purported hearth	Carr 1986
Beta-11905	9730	120	Page-Ladson	8JE591	Peat	Acceptable	Acceptable	Unit 6L Test 84 B peat around Bolen point; recalculated to 9697 ± 130 BP (Webb and Dunbar 2006:Table 4.2)	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Beta-290142	9710	50	Grassy Cove	8WL68	Charcoal	Acceptable	Acceptable	Charcoal from Feature 123, associated with hypertrophic corner-notched Kirk or Bolen point included a probable cremation	Thomas et al. 2013
I-6460	9645	160	Little Salt Springs	8SO18	Wood, stake	Acceptable	Acceptable	Basin drop-off, 12 m bmsl, pointed peeled sapling; called C-72-3 #14183	Clausen et al. 1979; Dasovich and Doran 2011
I-7214	9565	160	Warm Mineral Springs	8SO19	Wood	Acceptable	Acceptable	Same strata as Burial 1 at 45 ft level under Rock #3	Dasovich and Doran 2011
TX-2460	9500	120	Little Salt Springs	8SO18	Wood, stake	Acceptable	Acceptable	Basin drop-off, 12.4 m bmsl, pointed split pine; slide #768-18-12	Clausen et al. 1979; Dasovich and Doran 2011
W-1212	9500	400	Warm Mineral Springs	8SO19	Charcoal	Acceptable	Unknown	Zone 3	Clausen et al. 1975; Dasovich and Doran 2011
Beta-15089	9450	100	Page-Ladson	8JE591	Charcoal	Acceptable	Acceptable	Unit 6U Test 85-B burned wood; recalculated to 9466 ± 105 BP (Webb and Dunbar 2006:Table 4.2)	Dunbar 2006:Table 14.1; Webb and Dunbar 2006:Table 4.2
Gak-3995	9420	150	Warm Mineral Springs	8SO19	Wood, charred	Acceptable	Unknown	Zone 3, Level 1	Clausen et al. 1975; Dasovich and Doran 2011
W-1245	9370	400	Warm Mineral Springs	8SO19	Charcoal	Acceptable	Unknown	Zone 3	Clausen et al. 1975; Dasovich and Doran 2011
Gak-3993	9350	190	Warm Mineral Springs	8SO19	Wood	Acceptable	Unknown	Zone 3, 0.37 m below top of deposit; date not in direct association with human material	Clausen et al. 1975; Dasovich and Doran 2011
UGA 10439	9330	40	Wakulla Springs	WA329	Charcoal	Acceptable	Acceptable	Test 71/Level 10 material TBD	Tesar and Jones 2004
UGA 10442	9270	40	Wakulla Springs	WA329	Charcoal	Acceptable	Acceptable	Test 70/Level 11 sand with flecks of charcoal	Tesar and Jones 2004
Beta-195380	9240	60	Little Salt Springs	8SO18	Oak	Acceptable	Acceptable	Oak wood found near cut antler	Gifford and Koski 2011
UGA 10441	8710	40	Wakulla Springs	WA329	Charcoal	Acceptable	Acceptable	Red ochre with charcoal	Tesar and Jones 2004

Note: bmsl = below mean sea level.

continuity through these periods. We start with an overview of the late Pleistocene and early Holocene environments in the state and propose a chronology based on radiocarbon ages and diagnostic artifacts, such as they exist. Much of the chronology is inferred from probable contemporaneous relationships of similar point types in the surrounding Southeast and thus at this time is heuristic. We then review and critique important middle and late PI (13,500–11,425 cal BP) and EA (11,425–8900 cal BP) sites and present some recent research. Finally, we discuss the evidence for cultural continuity—an ancestor-descendant relationship (sensu O'Brien et al. 2014)—from the Clovis Paleoindian to the Bolen Early Archaic. At this time not enough evidence exists to confidently assess the nature of relationships, if any, between Clovis and early PI pre-Clovis (>13,500 cal BP) cultures (Dunbar 2006).

For the purpose of these discussions, lanceolate points are associated with the middle and late PI (i.e., Clovis and post-Clovis), and notched points are associated with the EA, a simple way of defining these two periods, and we follow the general southeastern convention of designating the start of the EA with the start of the Holocene, ca. 11,500 cal BP (10,000 ^{14}C BP). We recognize that megafauna were likely extinct by the late PI period and that the start of the EA is not entirely coincident with changes in fauna and environment. It has been argued that environmental changes at the end of the late PI period are insufficient to explain the change from the use of lanceolate to notched points (Eren, ed. 2012), and this appears especially so in Florida, where the effects of the Younger Dryas were ameliorated (Russell et al. 2009). Finally, scarce though they are, we present data on proposed pre-Clovis artifacts to provide contrast to middle and late PI lithic assemblages and reduction strategies.

Environmental and Climatic Factors Affecting Paleoindian and Early Archaic Settlement and Subsistence

Florida is part of the Coastal Plain that stretches along the Gulf Coast and the Atlantic seaboard to North Carolina and generally coincides with the extent of the Floridan aquifer (Bush and Johnson 1988; Dunbar 1991), Coastal Plain chert, and the distribution of Suwannee and Simpson PI projectile points (Figure 10.2).[1] Accurate models of past spatial social organization in Florida must consider the state's unique, generally flat topography, karstic landscape, terminal Pleistocene shoreline, and groundwater-dependent hydrogeology. Thus, settlement organization models inferred for the PI and EA periods in other southeastern regions, with shore-perpendicular alluvial rivers and interfluves (e.g., Anderson and Hanson 1988; Daniel 1985; Moore and Irwin 2013), are inappropriate for Florida.

Geology

Florida's environment is largely defined by its mantled karstic-limestone platform geology. This mantle is composed of deposits of sand, clay, and organic materials (Donoghue 2006; Lee 2002) that affect surface and subsurface waters as well as the availability of quality toolstone. Throughout the peninsula and most of the panhandle, deeper groundwater is contained in the Floridan aquifer in differentially transmissive carbonate formations (Miller 1986). Overlying the Floridan is a ubiquitous surficial aquifer that is wholly dependent on rainfall. An intermediate aquifer is present in the southern half of the peninsula (Miller 1986; Sepúlveda 2002), outside of the area with the highest concentrations of PI and EA sites and isolated finds (Figure 10.2; Thulman 2009). The Floridan groundwater reaches the surface by artesian pressure or in areas where deeper river bottoms, solution pipes, caves, and sinkholes intersect the top of the aquifer (Puri et al. 1967). Artesian pressure is sufficient to force water to the surface in areas where the aquifer is within about 30 m of the surface, a condition readily found along the Gulf of Mexico Coastal Plain but not frequently on the Atlantic side of the state.

Surface Water

Rivers, such as the Aucilla, Chipola, and Santa Fe, follow incised bedrock channels that tend to have minimal floodplains. Florida's low topography (its highest point is 105 m above sea level) means that many rivers flow sluggishly and channel thalwegs are created through dissolution of the limestone by acidic rain and swamp discharge rather than mechanical (alluvial) erosion. Historically, when water tables are low, many Florida springs and rivers stop flowing (Pride and Crooks

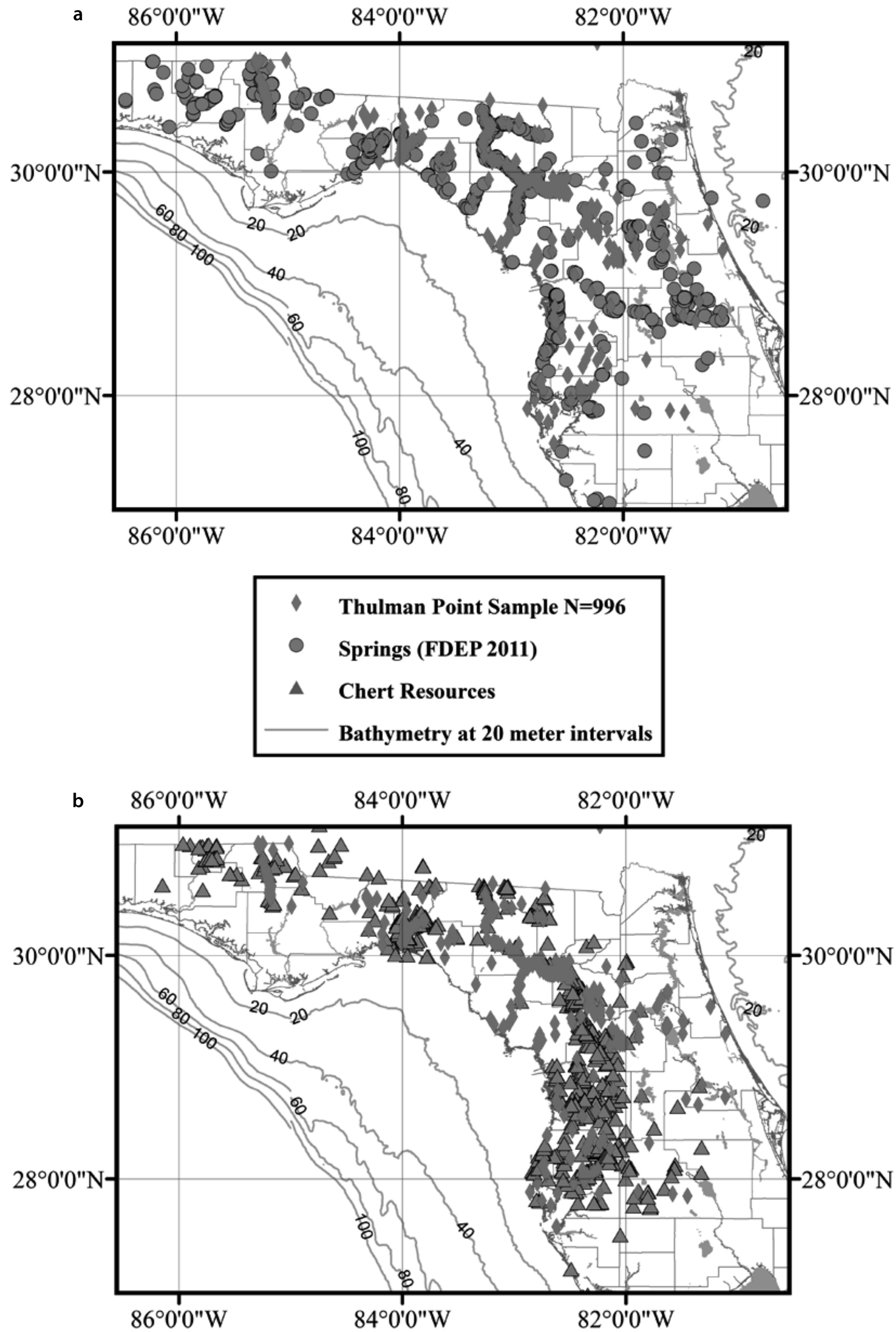


FIGURE 10.2. Distribution of individual Paleoindian points and spring locations (*a*) and individual Paleoindian points and chert sources (*b*).

1962). Thus, when sea levels were much lower at the end of the Pleistocene epoch, it is likely that the potentiometric surface of the Floridan aquifer was lower and surface water in much of the interior of the state was scarce (Clausen et al. 1975; Dunbar 1991; Thulman 2009; Watts et al. 1992). Under these conditions, available surface water locations such as the sinkhole at the Page-Ladson site, the springhead at Wakulla Springs, and much of the Santa Fe and Upper Suwannee rivers were foci of both animal and human activity (Figure 10.2; Dunbar and Vojnovski 2007; Scott et al. 2004; Thulman 2009). The surface expression of the Floridan aquifer is generally coextensive with the highest concentrations of PI and EA sites and isolated finds (Figure 10.2; Thulman 2009).

Offshore Landscape

During the late Pleistocene and early Holocene epochs, Florida's dry land was twice its present extent (Donoghue 2006; Faught 2004a, 2004b; Faught and Donoghue 1997), and the extant coastline would have been far inland. The low relief of the Gulf of Mexico shelf means that today's topography would have been recapitulated offshore, as the contour lines in Figures 10.1 and 10.2 show. It seems likely that the modern pattern of incised river channels, sinkholes, coastal barrier islands, springs, inlets, and protected bays was present on earlier shorelines. Whether early Floridians were coastally adapted remains to be determined, but no marine shell or other evidence of maritime resources that would confirm such behavior has been reported from PI or EA Florida sites. Investigations of submerged nearshore archaeological deposits (within 9 nautical miles of the modern shoreline) produced PI, EA, and Middle Archaic diagnostic artifacts near paleoriver channels (Dunbar et al. 1988, 1992; Faught 1988, 2004a, 2004b; Faught and Donoghue 1997; Faught and Gusick 2011; Marks and Faught 2003), and we have little reason to doubt that this pattern of land use extended to the late Pleistocene shoreline (Hemmings and Adovasio 2014). Duggins (2012) has used geographic information system modeling and bathymetric data to predict the locations of offshore river drainage systems, which should be useful in discovering submerged prehistoric sites.

Toolstone

Cryptocrystalline toolstone in the state (Figure 10.2) is dominated by the catchall term *Coastal Plain chert*, which encompasses a number of chert sources derived from different limestone formations (Austin and Estabrook 2000; Endonino 2007; Upchurch et al. 2008). Each formation contains distinctive fossilized foraminifera, which facilitate general chert sourcing, but cherts are heterogeneous within formations, impeding precise locational identification and hampering reconstruction of indigenous territories and land-use organization based on raw material analysis.

Coastal Plain Climate During the Younger Dryas

Russell et al. infer that the Gulf Stream ameliorated temperatures in this region, creating a "relatively warm thermal enclave, bounded to the west by cooler winter temperatures and to the north by an initially stable, and then retreating, ice sheet" (2009:176; Webb 1974). The ecological transition at the northern boundary of the thermal enclave was abrupt, and the ameliorating effects of the Gulf Stream may have kept the lower Appalachians from glaciating (Russell et al. 2009). Regardless, Florida and the Coastal Plain to the north do not fit typical environmental reconstructions of eastern North America during the Younger Dryas (YD) as an area that returned to near-glacial conditions (Dunbar and Vojnovski 2007; Halligan 2013).

The effect of the beginning of the YD (12,900 cal BP; Fiedel 2011) on Florida's environment is only roughly understood, but it is fair to infer that it was warmer and drier than contemporaneous areas to the north and certainly drier than modern conditions (Watts 1971; Watts et al. 1992). Watts, Hansen, and Grimm (1992:1064) characterize Florida as a mesic forest with spruce, beech, and hickory between 14,000 and 12,000 cal BP. Watts and Hansen (1994:174) also infer a mesic environment at Sheelar Lake in the north-central part of the state before 12,000 cal BP. Drier conditions are inferred for the late Pleistocene through early Holocene (late PI through EA) periods from a depositional hiatus at Camel Lake (Watts et al. 1992) and pollen analyses at Page-Ladson (Dunbar 2002; Hansen 2006). Apparently, the end of the YD brought a rapid shift to warmer conditions and, according to Dunbar (2002), the onset of a relatively short but significant drought followed by higher water tables by ca. 11,150 cal BP. Lowering water tables by 1 or 2 m can have dramatic effects on plant distributions, transforming wetlands into the kinds of xeric habitats found in the southern latitudes of present-day Florida (Kinser and Minno 1995). Drier conditions and lower water tables created scattered oases of water mostly available in spring vents or sinkholes, theoretically attracting animals and humans, a concept that is known as the "Oasis Hypothesis" (Dunbar 1991; Thulman 2009).

Oasis Hypothesis

This mosaic of a drier environment with dispersed refugia is consistent with the Oasis Hypothesis of Paleoindian land use in Florida, developed in the 1960s to explain the concentration of Pleistocene faunal remains and artifacts in several of Florida's rivers (Dunbar 1991; Dunbar and Waller 1983; Neill 1964; Thulman 2009; Waller 1970). Figure 10.2 illustrates the correlation of PI points and areas with a higher likelihood of having available surface water, such as springs and areas of fractured limestone. This karst/sinkhole/spring-based settlement model contrasts with the models developed for other areas of the Southeast mentioned above, which posit seasonal rounds along or between alluvial rivers traversing different environments (Anderson and Hanson 1988; Daniel 1985). The idea that Florida was a late Pleistocene refugium is speculative at this point and mentioned here to clarify that we should not just look northward for cultural connections to Florida. However, other than potential associations with Central and South America along the Gulf Coast, we see no obvious relationship to other proposed refugia in North America such as that proposed recently for the San Pedro Valley in southern Arizona (Ballenger 2010a, 2010b; Ballenger et al. 2011).

Fauna and Extinctions

Florida's rich and varied late Pleistocene fauna were hit harder by megafaunal extinctions than areas to the north, which is counterintuitive given Florida's ameliorated environment (Russell et al. 2009). No properly processed radiocarbon evidence from extinct faunal bone supports the proposition that Florida's megafauna survived longer into the YD than elsewhere in North America (Fiedel 2004; Haynes and Huckell 2009), but Dunbar and Vojnovski (2007) propose that Florida may have been a refugium for a time, based on faunal assemblages from four PI Suwannee sites—Ryan/Harley, Norden, Lewis-McQuinn, and Dunnigan's Old Mill (Figure 10.1). Dunbar and Vojnovski (2007:197) also contend that the diverse faunal assemblages from these sites are subsistence related, showing a highly variable PI diet that included large and small mammals, reptiles, fish, avian species, and late Pleistocene megafauna such as mastodon and giant tortoise, among others. Furthermore, they argue that the faunal evidence demonstrates no YD extinction event in Florida as seen out west.

It is likely that the modern flora found around surface waters—cypress and other wetland hardwoods at the water's edge surrounded by a thick overstory of upland trees—was also present in the late Pleistocene and early Holocene, but those species may not have extended much beyond the water's edge, unlike modern conditions in which forested uplands and wetlands dominate the entire state north of the Everglades. Russell et al. have proposed that much of peninsular Florida was a "Warm Mixed Forest Biome" (2009:186). Thus, we can imagine a drier parkland biome interspersed with relatively lush flora pockets focused around surface water rivers and sinkholes that allowed grazers such as *Equus* spp. and Columbian mammoth (*Mammuthus columbi*) and browsers such as American mastodon (*Mammuthus americanus*), tapir (*Tapirus veroensis*), and long-nosed peccary (*Mylohyus fossilis*) to flourish (Russell et al. 2009). In further contrast with the rest of the Southeast, the neotropical Pleistocene fauna in Florida are related to Central and South American fauna via a posited broad "Gulf Coast savanna corridor" of uniform grassland ecology on the exposed gulf shelf, stretching from Florida's peninsula around to the Yucatán (Webb 1974:21–22). If so, early Florida Paleoindians may have had circum-gulf cultural connections as they exploited familiar animals that inhabited this corridor (Faught 2006).

Early Archaic Climate and Site Distribution

A period of drought, or lowered water tables, at the start of the EA is inferred from evidence at Page-Ladson, where the Bolen surface was exposed approximately 5 m below the present water surface (Hansen 2006). Regardless, it is our impression that EA Bolen sites are more numerous on the landscape than late PI Suwannee sites, and Bolen sites are found in areas where Suwannee people did not leave evidence of occupation. Suwannee sites and individual points are most likely to be found in or adjacent to rivers and other water bodies, whereas Bolen sites are not so constrained. Whether this difference in land use was caused by environmental (changes in water availability) or social (population increase) factors or a combination of the two remains to be determined.

The EA evidence shows the expected Holocene faunal assemblage found throughout the Southeast at sites such as Dust Cave (Walker 2007; Walker et al. 2001). Tools made from white-tailed deer were recovered at the EA level at Page-Ladson, and some unidentified faunal bone was recovered at the Wakulla Springs Lodge site (Peres 1997; Tesar and Jones 2004). Based on blood residue analyses (Goodwin et al. 2013; Hornum et al. 1996), we can infer that EA Floridians relied on the typical Holocene faunal assemblage, including small mammals such as rabbits and birds, as well as larger game such as deer. However, bear and bison blood residues were identified at 8LE2105 (Goodwin et al. 2013:405–407).

Temporally Diagnostic Artifacts, Sites, and Chronology

In this section we review Florida's early diagnostic artifacts, important sites, and chronometric data (Figure 10.1, Tables 10.1 and 10.2) for the pre-Clovis, PI, and EA periods in Florida.

Early Paleoindian Pre-Clovis Period

No consensus has been reached on whether there is a point that is truly diagnostic of pre-Clovis in Florida, and no points have been recovered from pre-Clovis contexts. Still, at least two candidates for pre-Clovis diagnostic points have been proposed. First, Stanford (1991:9) suggested that the unfluted lanceolate Suwannee/Simpson point is a pre-Clovis candidate based on morphological and reduction strategy arguments, but we counter below that the stratigraphic evidence and similarity of Suwannee and Bolen tool kits make this proposition untenable (Daniel and Wisenbaker 1987; Goodwin et al. 2013; Thulman 2006b). Second, Dunbar (2012) and Dunbar and Hemmings (2004) have proposed that the "Page-Ladson" point, a lanceolate-shaped point with a ground base, is likely associated with the pre-Clovis levels at the Page-Ladson and Wakulla Springs Lodge sites (Figure 10.3). The lanceolate form was made on a flake and unfluted, though at least one face usually retained a "flutelike" flat area on the base that acts technologically as a flute (Dunbar and Hemmings 2004). At least one Page-Ladson point was found in a displaced context on the bottom of the Aucilla River at the Page-Ladson site, and Dunbar and Hemmings (2004; Dunbar 2013; Dunbar and Vojnovski 2007) have identified other possible examples from around the state. However, the same area of the Aucilla has produced points and other artifacts representative of virtually every cultural period, including modern debris. Dunbar (2012) has also proposed that the Simpson point is a pre-Clovis knife that was a complement to the Page-Ladson point. However, many and varied unnamed lanceolate points with ground bases have been found in displaced contexts throughout Florida (Thulman 2006a), pointing to the need for data from excavated stratified sites to test these hypotheses, as mentioned above.

Four possible pre-Clovis sites have been identified in Florida: Container Corporation of America, Little Salt Springs, Wakulla Springs Lodge, and Page-Ladson (Figure 10.1). The Container Corporation of America site in Marion County (Purdy 1981a, 1981b, 1991, 2008) is a large quarry and the earliest proposed pre-Clovis site, purportedly dated to 28,000–26,000 BP using thermoluminescence (Purdy and Clark 1987). The site produced an unfluted lanceolate base and an EA Bolen point, but younger artifacts were also recovered. The pre-Clovis component lies deeper in ancient clay below the younger deposits. The proposed pre-Clovis artifacts consist of technologically nondiagnostic fractured cherts. It is possible that the pre-Clovis artifacts

TABLE 10.2. Paleoindian and Early Archaic Chronology for the Southeast.

Period	Approximate Calendar Age (calendar years BP)	Radiocarbon Age (rcybp)	Culture Complex	Climatic Event	Environmental/ Climatic Conditions
Early Archaic	8871	8000	Bifurcate		
	10,123	9000		Boreal	
	10,864	9500	Corner-notched points widespread, e.g., Kirk Corner-notched, Palmer		
		9600			
	11,321	9900			
Late Paleoindian	11,506	10,000	Side-notched points widespread, e.g., Bolen, Big Sandy, Hardaway Side-notched		
	11,691	10,100	Hardaway Dalton?	Younger Dryas ends; Preboreal begins	
	11,895	10,200			Warmer and drier
	12,436	10,500	Dalton e.g., Greenbrier, Nuckolls, San Patrice		Warming
	12,779	10,800	Redstone, Folsom, Cumberland, Suwannee, Simpson		
Middle Paleoindian				Younger Dryas begins	Cold and highly variable
	12,851	10,900			Pre-Younger Dryas warming
	12,914	11,000			
	12,992	11,100		Inter-Allerød ends	Cold
			Clovis widespread		
	13,103	11,200			
	13,297	11,400		Inter-Allerød begins	
	13,404	11,500	Onset of Clovis		
Clovis beginnings???					
	13,634	11,750		Allerød	Warm and moist
	13,869	11,950		Older Dryas ends	Cold and dry
	13,976	12,000			
Early Paleoindian					
	14,114	12,100		Older Dryas begins	
	14,817	12,500	Page-Ladson, Monte Verde		Warm interstadial; retreat of glaciers
	14,956	12,600		Bølling begins	
	19,145	16,000	Cactus Hill (?)		
	21,714	18,000	Initial colonization (?)	Glacial maximum	

Note: Calibrated dates obtained using the CalPal online program with a 50-year standard deviation.
Source: Adapted from Anderson 2005; Anderson and Sassaman 2012; Stuiver et al. 1998.

FIGURE 10.3. Page-Ladson point recovered from displaced contexts at the Page-Ladson site in Florida.

are geofacts, perhaps created by shrink-swell, freeze-thaw, or other natural processes. The evidence for pre-Clovis at Container Corporation of America remains equivocal and in need of additional research.

Little Salt Springs is a large, deep sinkhole in Sarasota County (Figure 10.1). The site gained national attention when a "sharpened wooden stake" was found associated with the blackened remains of a giant land tortoise (*Geochelone crassiscutata*) (Clausen et al. 1979:609–611; cf. Purdy 1991, 2008). The excavators inferred that the stake was used to skewer and cook the tortoise. However, the stake was radiocarbon dated at 14,000 cal BP, and the tortoise shell returned a date 2,000 years older, making their association questionable. Further work on the shell showed that the "burned" fragments were more likely differentially stained after the shell fell apart and not carbonized from cooking (Dunbar and Webb 1996:352).

The Wakulla Springs Lodge site is located on a sand dune just west of Wakulla Springs, a large coastal spring that has produced abundant Pleistocene faunal remains and PI and EA artifacts (Figure 10.1). EA Bolen and possible PI components were identified at the site. The PI component was represented by a hypertrophic biface and two unfluted nondiagnostic lanceolates in proper stratigraphic order (Jones and Tesar 2000; Rink et al. 2012; Tesar and Jones 2004). Excavations in 2008 produced a large endscraper and unifacial knife that were associated with pre-Clovis-age optically stimulated luminescence dates (Rink et al. 2012). However, the site is likely bioturbated, which could have affected the optically stimulated luminescence results, as well as the locations of artifacts (Rink et al. 2012; Thulman 2012a).

Unit 3 at Page-Ladson is the most likely pre-Clovis candidate in Florida (Dunbar 2006; Kendrick 2006; Webb and Dunbar 2006). Unquestionable artifacts were found in an undisturbed sediment bed with consistent, uncontaminated radiocarbon ages (Dunbar 2006; Halligan 2014). The pre-Clovis component is located approximately 10 m below the water surface in the Aucilla River in northwest Florida (Figure 10.1). The Aucilla River Prehistory Project excavated at the site for more than 15 years until the mid-1990s (Dunbar et al. 1988; Webb 2006), and in 2012 excavations were reopened by a team sponsored by Texas A&M (Halligan 2014).

Unit 3 is composed of mastodon digesta, likely a mixture of proboscidean excrement and sand; this unit also produced a mastodon tusk with possible cut marks around its circumference and a green break on a mastodon vertebral process, possibly by human action (Webb 2006:334). Several flakes were recovered by the Aucilla River Prehistory Project; two of seven are unequivocal artifacts. The level from which those artifacts were recovered is securely dated by a suite of radiocarbon ages from within, above, and below it. Bone collagen from *Paleolama* and a sample of peat recovered from the hollow end of the possibly worked tusk yielded calibrated accelerator mass spectrometry ages of 14,846–14,211 cal BP (12,425 ± 35 ^{14}C BP; Beta-112236) and 15,732–15,229 cal BP (12,940 ± 70 ^{14}C BP; Beta-118586), respectively (Webb and Dunbar 2006:93, Table 4.2). The results of recent fieldwork by Halligan et al. (2016) confirm previous findings. The Texas A&M team recovered Pleistocene faunal bone, several flakes, and a stained and broken biface in situ in the same digesta level. It seems unlikely that the biface is from later contexts, and we consider Page-Ladson a strong pre-Clovis candidate.

Clovis and Post-Clovis Paleoindian Period

Florida's middle and late PI points have been seriated into a relative chronology based in large measure on assumptions about the pace and trajectory of morphological change. As Faught

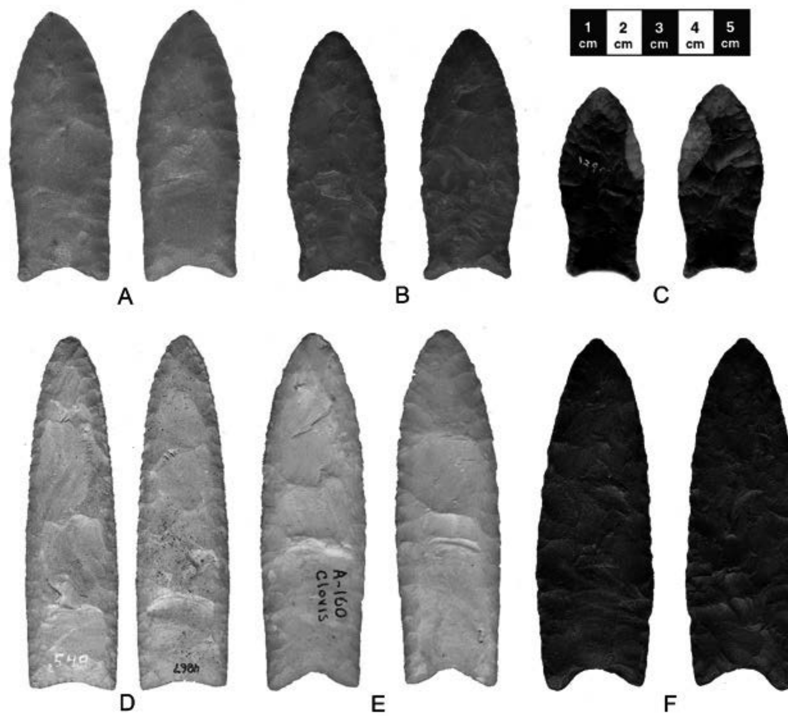


FIGURE 10.4. Obverse and reverse views of waisted Clovis (*top row*) and classic Clovis (*bottom row*) points: (*A–B*) Suwannee River; (*C*) Santa Fe River; (*D*) Marion County; (*E*) St. Johns County; (*F*) Chipola River.

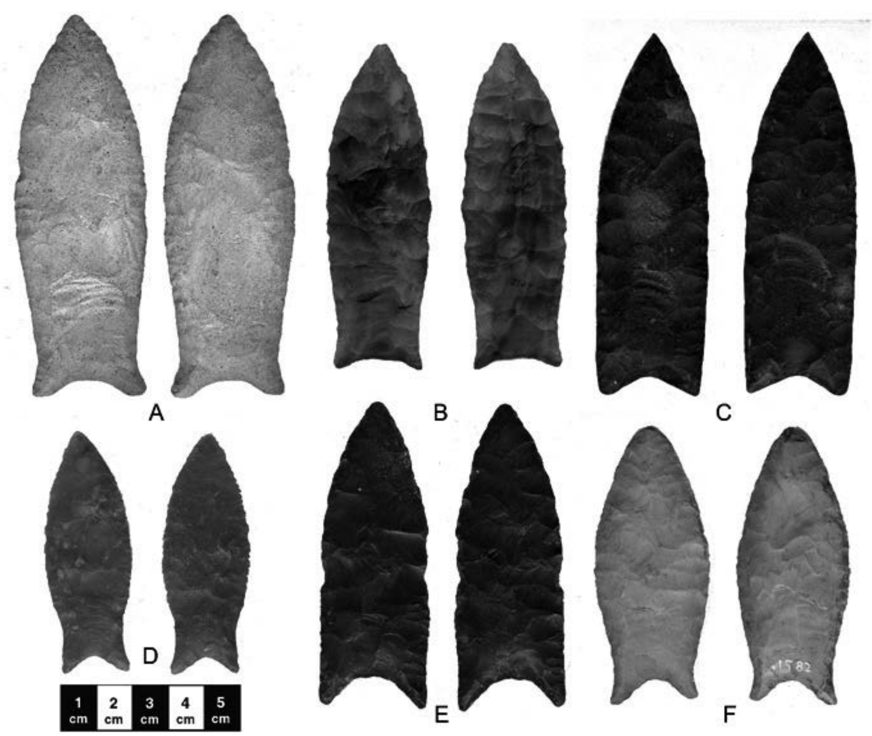


FIGURE 10.5. Other fluted points: (*A*) Leon County; (*B–C*) Santa Fe River; (*D*) St. Johns River; (*E*) Chipola River; (*F*) Wacassassa River.

and Waggoner (2012) point out, a lacuna in the radiocarbon record exists between the Clovis-age ivory tool from Sloth Hole and multiple ages associated with fully notched EA points at the beginning of the Holocene epoch at sites such as 8LE2105 (Table 10.1; Goodwin et al. 2013) and Page-Ladson (Carter and Dunbar 2006). Our chronology is based on Florida's archaeological record, reference to other sequences in the greater Southeast, and the received view that fluted lanceolate points predate unfluted lanceolate points (Anderson and Sassaman 1996; Coe 1964; Driskell 1996; Walthall 1980). We define all lanceolate points with ground basal margins as PI-type points, which are described above. Our discussion of diagnostic points is based on previous publications and our review and interpretation of the collections documented by Dunbar (1991; Dunbar and Waller 1983; Waller and Dunbar 1977) and Thulman (2006a). More than 1,000 of these points were collected by private individuals, but only 30 or so were recovered from professionally excavated sites (http://pidba.utk.edu/florida.htm). Nevertheless, the recovery locations of virtually all of these points were identified to within 1 km of the find spot (Figure 10.2).

Depending on the researcher, Florida's early diagnostic projectile point sequence has been sorted into three (Clovis-Suwannee-Bolen), sometimes four (Clovis-Simpson-Suwannee-Bolen), and as many as six (Clovis–Simpson–Suwannee–Union Side-notched–Greenbriar–Bolen) typological divisions. However, these typologies are fraught with a common problem, the seeming inability to agree on a common definition of any one point type. For example, even though most Florida PI archaeologists agree that the (usually) unfluted lanceolate Suwannee point was made after Clovis and before Bolen, they have more trouble agreeing on precise criteria for what constitutes a Suwannee point (Bullen 1975; Daniel and Wisenbaker 1987; Dunbar 2013; Dunbar and Hemmings 2004; Farr 2006; Thulman 2012b). Regardless, we describe and illustrate diagnostic types we recognize and their most probable chronological order, and any sites that have produced them in stratigraphic position, with the understanding that new sites, new data, or additional analyses can clarify these ambiguities.

We define Florida Clovis points as fluted lanceolate-shaped bifaces with straight sides, a shallow basal concavity, and a rounded tip (Figure 10.4D–F); a Waisted Clovis has these characteristics with a slightly incurvate base (Figure 10.4A–C). From Thulman's (2006a; http://pidba.utk.edu/florida.htm) projectile point data, we identified one-third of 104 lanceolate points with likely flutes as Clovis, one-third as Waisted Clovis, and about one-third as "other" (Figure 10.5), many of which would likely be classified as fluted Simpson or Suwannee points (Figure 10.6). Two in the "other" category could confidently be identified as Redstone points, and one, as a Cumberland point. Overall, fluted points represent about 10 percent of the total number of lanceolate points in the database. This indicates to us that Paleoindian Floridians likely discontinued fluting finished points soon after Clovis and had little interaction with other Paleoindians to the north. However, whether there was a population decline after Clovis and a possible lacuna between point types, as inferred elsewhere in the Southeast (Anderson et al. 2011; Meeks and Anderson 2012), remains to be demonstrated and depends on where the unfluted point forms fall in time.

Fluted points have been found in many places in Florida, generally north of Tampa Bay, particularly in the Santa Fe and Aucilla rivers (Dunbar 1991; Thulman 2006a, 2006b), but the only fluted points found in unambiguous stratigraphic sequence in Florida are from the Paradise Park site at Silver Springs in Marion County (Figure 10.1; Hemmings 1975; Neill 1958). The original points are missing, and all that remains are images from the published report, but these images clearly show three fluted points and three broken, unfluted lanceolate bases from the same strata. Hemmings (1975:148) revisited Paradise Park and found the midsection fragment of a fluted point, confirming that the artifacts found by Neill likely came from deep in the stratigraphic section. Thulman and Faught revisited the site but were unable to recover reliable charcoal that was clearly culturally associated to use for radiocarbon dating (Faught 2009). Several fluted points have been recovered from the spring itself (Neill 1958), and the site is near the Guest Mammoth site in the Silver River (Hoffman 1983; Rayl 1974).

Sloth Hole, a sinkhole in the Aucilla River, which likely would have been dry or nearly dry

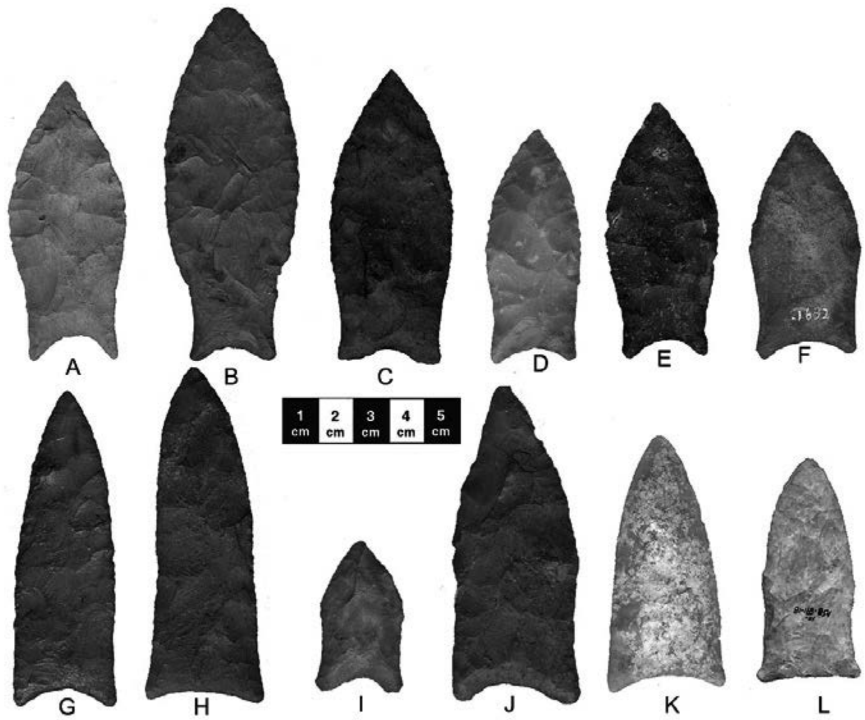


FIGURE 10.6. Simpson (*top row*) and Suwannee (bottom row) points: (*A, D*) Suwannee River; (*B*) Chipola River; (*C, H*) North Withlachoochee River; (*E–G, J*) Santa Fe River; (*I*) St. Johns River; (*K*) Taylor County; (*L*) Harney Flats site, Hillsborough County.

in the late Pleistocene, produced Pleistocene fauna and early artifacts including ivory tools and possibly ivory fabrication debris (Hemmings 1999, 2004). A fragment of an ivory rod from the site was radiocarbon dated to the Clovis period (Table 10.1; Hemmings 1999; Waters and Stafford 2007). Unfortunately, this rod comes from an ambiguous stratum (Halligan 2012). This ivory specimen is unequivocally a tool, and while it could have been made from "old" ivory, it seems more likely that it is an actual Clovis artifact (Bradley, Collins, and Hemmings 2010:115–116, 124; Hemmings et al. 2004; Waters and Stafford 2007).

Sloth Hole and other locations in the Aucilla River have produced virtually all of the ivory shafts known from North America (Dunbar et al. 1989; Hemmings 2004). A number of other ivory and osseous tools made from megafaunal remains have been recovered from underwater locations in Florida, including a mastodon patella anvil, a handle made from a horse tibia, and a digging implement fashioned from a proboscidean rib (Dunbar and Webb 1996).

In addition to Clovis, Bullen (1975:53–56) defined four late PI unfluted point types for Florida (listed in likely chronological order): Simpson, Suwannee, Union Side-notched, and Greenbriar. Florida is different from other areas to the north that produce post-Clovis fluted lanceolate points such as Redstone and Cumberland (Goodyear 2006). Thus, it appears that Floridians did not jump on the post-Clovis, instrument-assisted fluting bandwagon like their neighbors to the north and west did. Likewise, Dalton points are concentrated in the panhandle portion of the state compared with adjacent regions to the north (Alabama) and west (Arkansas and Missouri). This has implications for the degree of interaction or information exchange between Florida and the rest of the Southeast, which is discussed below.

The Simpson type, which seems to be unique to Florida, is typically defined as having a ground, concave, relatively narrow base with pointed ears or tangs (Figure 10.6A–F; Bullen 1975:56; Dunbar and Hemmings 2004), but there is dispute about the attributes that define a Simpson

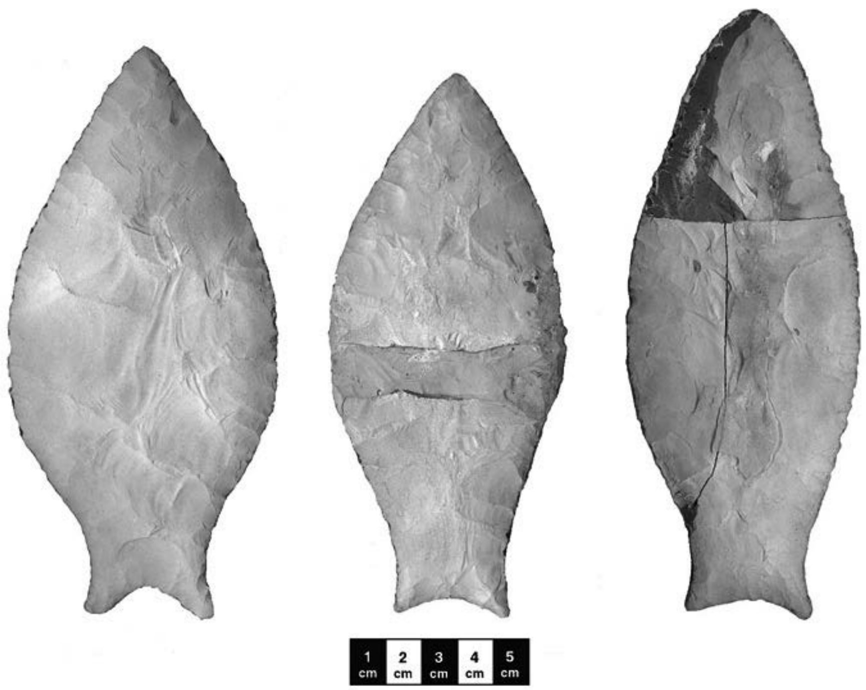


FIGURE 10.7. Three Bull-Tongue Simpson points found in a field near the Chipola River. The two points on the right were damaged during plowing and subsequently repaired. No other artifacts were identified in the immediate vicinity of the cache. Smaller examples have been found as rare isolated finds in Florida.

(Thulman 2012b). The blade is unusually long and wide in relation to the base, leading Dunbar and Hemmings (2004:68) to infer that the Simpson was a knife, not a point, and that the knife was a complementary tool to the pre-Clovis Page-Ladson point (Rink et al. 2012). Daniel and Wisenbaker (1987) identified a Simpson point at the Suwannee-Bolen site of Harney Flats, suggesting to us that if Simpsons are in fact knives, then perhaps they were used in conjunction with Suwannee points. Dunbar and Hemmings (2004:68–69) suggest that the Harney Flats Simpson specimen is more similar to Suwannee and Clovis forms. They also note that the specimen from Harney Flats is beveled on opposite faces, a trait usually associated with EA Bolen projectile points. The variable width of Simpson blades may reflect a resharpening trajectory (Faught 2006:177). A cache of three hypertrophic Simpsons with extremely wide blades, sometimes described as "Bull-Tongue Simpsons" (Figure 10.7), was discovered in a plowed field near the Chipola River (Chason 1987).

A Suwannee point is defined here as an unfluted (or rarely fluted) lanceolate that has a ground, waisted, concave base with pointed to rounded "ears" (Figure 10.6G–L; Bullen 1975; Dunbar and Hemmings 2004; Farr 2006). Goodyear et al. (1983:40) noted that Suwannee bases from Harney Flats were finished using shallow basal or oblique lateral thinning. The Suwannee base is not as constricted, that is, it has a lower blade width–to–stem width ratio than the Simpson form, and the blade is not as wide; but there is a subtle continuum between forms that confuses clear distinction (Thulman 2012b). Suwannee blade tips are typically pointed, in contrast to the blunter tip of a Clovis point. Occasionally the blade is alternatively beveled through resharpening.

We interpret the Greenbriar, Chipola, Union Side-notched, and Gilchrist types (Figures 10.8 and 10.9; Bullen 1975; Farr 2006; Tyler 2008) as local Dalton variations found in Florida. Dalton and its probable contemporaries, such as Greenbrier, Hardaway, Nuckolls, and San Patrice,

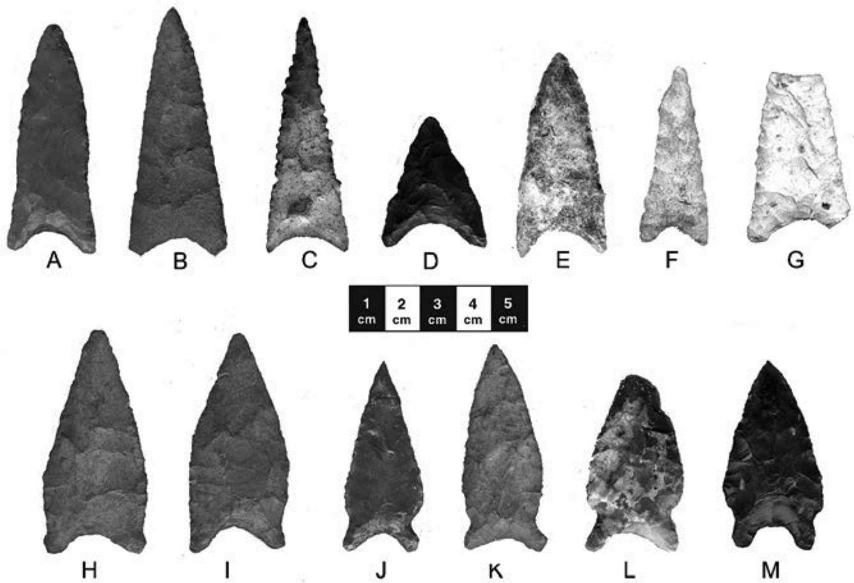


FIGURE 10.8. Dalton (*top row*) and Chipola (bottom row) points: (*A–E, H–L*) Chipola River; (*F–G*) Eglin Air Force Base; (*M*) St. Johns River.

appeared after 12,400 cal BP in many areas of the Southeast (Driskell 1996; Goodyear 1982; Sherwood et al. 2004). Northeastern Arkansas and southeastern Missouri are considered to be the Dalton heartland (Morse 1971b, 1973, 1975a, 1975b, 1976, 1977; Redfield 1971; Redfield and Moselage 1970), with the greatest concentration of San Patrice sites farther south along the Gulf Coast (Anderson and Smith 2003; Jennings 2008a, 2008b; Lopinot and Ray 2010; Lopinot et al. 1998, 2000; Morehead and Lafitte 2014; Rees 2010). Points that look like the Hardaway Dalton type have been found in northern Florida but in low numbers and not in situ (Figure 10.8A–G). There are also several other unnamed forms with ground bases that are few in number and have no clear analogues outside the state. These shallow- or incipiently notched types probably span the transition to fully notched points, and we infer them to be the predicate form immediately preceding early side-notched points such as Hardaway Side-notched (Coe 1964), San Patrice variety St. Johns (Webb et al. 1971), Big Sandy (Kneberg 1956), and Bolen (Bullen 1975) types, which are frequent in collections but rarer from dated contexts. Sites at Eglin Air Force Base have produced small Dalton-like points made out of Tallahatta quartzite (Catherine Nolan, personal communication 2011), a toolstone found in gravel from southern Alabama (Figure 10.8E).

The Greenbriar point type (Figure 10.8) was initially defined by Bullen (1975:53) and likened to the Greenbrier point identified by Lewis and Kneberg (1958, 1960) in Tennessee and by Cambron and Hulse (1975) at several sites in northern Alabama. Bullen's alternative spelling (Greenbri*a*r vs. Greenbri*e*r) was apparently used to indicate similarity and difference between the Florida and Alabama types. Union Side-notched are not really side-notched but represent what Bullen (1975:54) saw as a progressive development of greater indentations on the haft that finally ended up as fully notched Bolens. These types are difficult to distinguish in practice from each other and from Suwannee points. Farr has proposed the name "transitional side-notched" (2006:73; Figure 10.9) to capture what he proposes were the interim forms between Suwannee and Bolen, including Greenbriar and Union Side-notched, and we adopt that term here. Chipola points, which are similar to Greenbriar but have distinctly deeper bases, are found throughout north Florida but are most common in and around the Chipola River (Figure 10.8H–M; Tyler 2008). The Florida variants are well made, with shallow side notches similar to other Dalton variants in

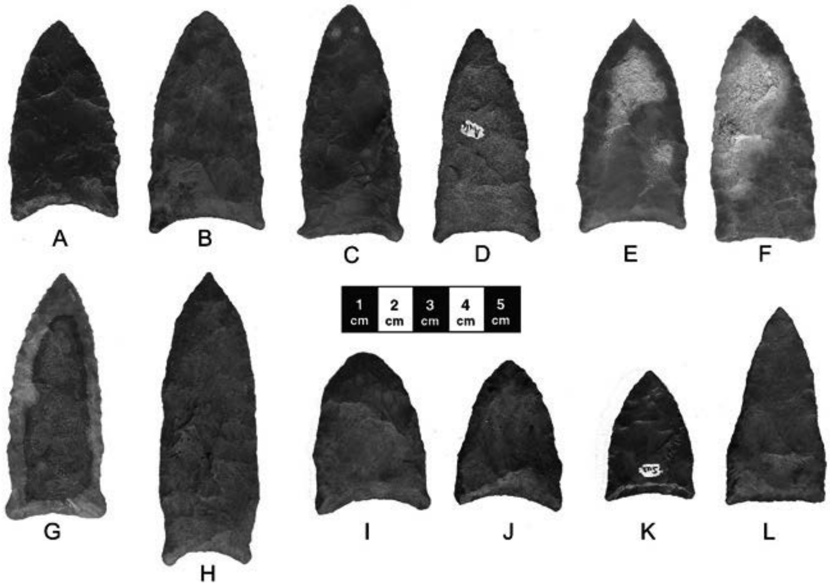


FIGURE 10.9. Transitional side-notched points: (*A*) Alapaha River; (*B, J–L*) Suwannee River; (*C*) Pasco County; (*D*) Wacissa River; (*F–G*) Levy County; (*E, H–I*) Santa Fe River.

the Southeast such as San Patrice variety Hope (Ensor 1986; Farr 2006). The basal tangs (i.e., feet, peduncle, or ears) generally expand or flare outward, and the incurvate lower lateral and basal edges are ground; the concavity of the basal edge can be pronounced on some specimens (Figure 10.9A–E).

Two post-Clovis Paleoindian sites—Harney Flats and Ryan/Harley—are worth detailed discussion because they are informative of the challenges facing archaeologists trying to elucidate and organize the cultural history of Florida. Harney Flats (Daniel and Wisenbaker 1987; Daniel et al. 1986) is likely the largest PI site in the state and one of three large sites found so far in Florida, including the Lake George Point site (Thulman 2012c) and Goose Pasture (Figure 10.1). The Goose Pasture and Lake George Point sites were collected thoroughly but not professionally excavated. Salvage excavations at Ryan/Harley, likely a Suwannee campsite, were undertaken when the site became increasingly threatened by erosion (Balsillie et al. 2006; Dunbar et al. 2005).

Harney Flats (8HI507) was identified more than 30 years ago as part of the I-75 Highway Salvage Program, and it was one of the first PI sites to be excavated professionally in Florida (Figure 10.1; Daniel and Wisenbaker 1981, 1983, 1987, 1989). The site produced Suwannee, Simpson, and Bolen points, but there was only a weak vertical separation between diagnostic artifacts, indicating either that the site was a palimpsest of occupations or that Suwannee and Bolen points were made there concurrently (Daniel and Wisenbaker 1987). Horizontally, artifacts at the site were identified in three discrete functional areas: two quarry-related activity areas evidenced by higher frequencies of hammerstones, cores, and debitage and a living area located on the highest and flattest portion of the site. From 829 tools and 79,000 pieces of debitage, Daniel and Wisenbaker (1987) identified 21 distinct tool categories, including three projectile point types (Suwannee, Simpson, and Bolen). Only three tools made of exotic metamorphic rock from outside of Florida were found; nearly all the tools and debitage were made from a locally available variety of Coastal Plain chert.

The Ryan/Harley site, located in the Wacissa River in the panhandle region of Florida, is a purported late PI Suwannee campsite with midden refuse (Balsillie et al. 2006; Dunbar et al. 2005). Excavations at the site produced three Suwannee lanceolate points (Figure 10.10) and late Pleistocene faunal remains, although the two were not found in association. Though Dunbar and

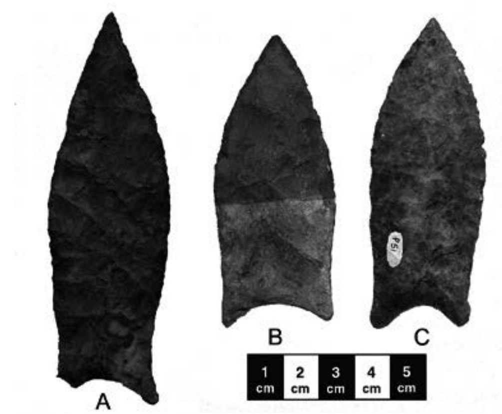


FIGURE 10.10. (*A–C*) Lanceolate points from the Ryan/Harley site.

Vojnovski (2007:174, Figure 10.6c) classify this specimen as a Suwannee point, we think that it could just as easily be classified as a Simpson point (Figure 10.10A), adding to the uncertainty of the site's chronological position and the association of the Pleistocene faunal remains with the artifacts. Unlike at Harney Flats, no EA diagnostic artifacts were located at Ryan/Harley, providing a rare glimpse of a potentially unadulterated late PI lithic assemblage (Dunbar et al. 2005). Other lithic artifacts recovered from the site included a basally thinned preform—the debitage from the site is characteristic of late-stage biface reduction—and unifacial tools such as snub-nosed endscrapers, ovoid scrapers, and other flake and blade tools similar to those recovered from Harney Flats.

Early Archaic Period

In Florida, the Bolen projectile point is the earliest dated diagnostic EA tool (Figure 10.11, Table 10.1). Although some researchers have included Bolen in the PI period (Bullen 1975; Milanich 1994; Milanich and Fairbanks 1980; Purdy 1981a), we follow the general convention in the Southeast of designating the start of the EA with the start of the Holocene coincident with 11,500 cal BP (10,000 ^{14}C BP). Referred to as "Dalton" (Bullen 1975:6), "Late Paleoindian," or "transitional" (Milanich and Fairbanks 1980; Purdy 1981a), Bolen points were included with PI because they were first identified in association with lanceolate points at several sites such as Bolen Bluff (Bullen 1958), Harney Flats (Daniel and Wisenbaker 1987), and Darby Springs (Dolan 1959; Dolan and Allen 1961), and the researchers recognized some of the behavioral continuities we argue for in this chapter. They referred to Bolen points as "Late Paleoindian," implying an ancestral or technological connection, not the chronological or adaptive changes that we imply here by including Bolen points with the EA.

In the last two decades, a number of EA sites—Jeanie's Better Back (Austin and Mitchell 1999, 2010), Page-Ladson (Webb 2006), Wakulla Springs Lodge (Jones and Tesar 2000; Tesar and Jones 2004), 8WL68 (Thomas et al. 2013), 8LE2105, 8LE2102, 8JE880, 8JE872, and 8JE878 (Goodwin et al. 2013)—have provided the sort of data needed to compare EA assemblages with their antecedents (Figure 10.1). These sites (1) have stratigraphically separate EA components, (2) were professionally excavated, and (3) were well reported. None of these sites have any PI artifacts below the EA component, although Page-Ladson has a sealed but sparse pre-Clovis level 3 m below the EA level, as described above. Further, Page-Ladson and 8LE2105 have multiple, reliable radiocarbon dates that are essentially identical (Table 10.1; Faught and Waggoner 2012; Faught et al. 2003). Finally, the sites are located in diverse geologic and environmental settings across northern Florida, and yet their tool kits are remarkably similar. At all these sites, the most robust EA expression can be classified as Bolen. As a result of large-scale excavations at these sites, we now have multiple lines of evidence that provide a clearer template of what constitutes Bolen technology and how Bolen hunter-gatherers used the landscape and a more robust understanding of what life was like during the EA period (Pevny et al. 2014).

The Bolen type (Figure 10.11) was defined by Bullen (1958:14) based on three points recovered at the Bolen Bluff site in central Florida (Figure 10.1). That definition was revised (Bullen 1975:51–52) to include two basic kinds (Plain and Beveled), with five subtypes differentiated from each other by the style of notching (side- or corner-notched) and basal shape (Bullen 1975:51–52). More recent research has confirmed or refined several of Bullen's original morphological observations. Bolen points are generally small to me-

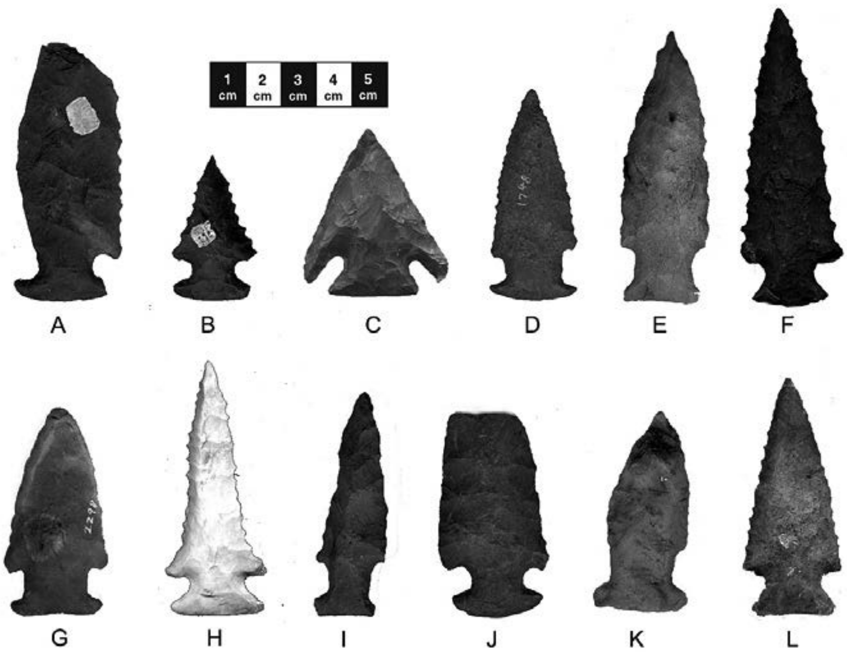


FIGURE 10.11. Bolen side- and corner-notched points: (*A–C*) Page-Ladson site, Jefferson County; (*F, L*) Aucilla River; (*H*) Taylor County; (*D–E, G, I–K*) Santa Fe River.

dium in size with a wide ground base (as wide as the blade) and side or corner notches (Austin and Mitchell 2010; Bullen 1968, 1975; Goodwin et al. 2013:214). Bolen points were thinned or reworked laterally. More often than not, blades were alternately beveled and serrated. Basal shape is variable, but the basal edge and notches usually are ground heavily, and the base often is thinned by the removal of small flakes from the basal edge. What has altered is our understanding of the manufacturing and use trajectories of Bolen points. For instance, Bullen's distinction between beveled and unbeveled blades was based on variable stages of Bolen point use and maintenance, rather than the manufacture of distinctive types or "subtypes" (Austin and Mitchell 2010; Carter and Dunbar 2006).

Also, our understanding of the chronological placement of Bolen points has improved. In contrast to the paucity of radiocarbon ages for lanceolate points, Florida has produced ^{14}C dates for side- and corner-notched Bolen points from three sites in north Florida: Page-Ladson Units B and C (Carter and Dunbar 2006), 8LE2105 (Faught et al. 2003; Goodwin et al. 2013), and 8WL68 (Thomas et al. 2013; Figure 10.1, Table 10.1). Two radiocarbon dates were obtained at Wakulla Springs Lodge (Tesar and Jones 2004), but the Bolen points recovered from the site were not found in association with the dated materials. It is clear that side- and corner-notched Bolen points are contemporaneous at Florida's earliest EA sites (Faught and Waggoner 2012; Faught et al. 2003; Goodwin et al. 2013). Bolen points are confidently dated between ca. 11,400 (Page-Ladson, pooled average of four ages) and 11,100 cal BP (8WL68, single age) and possibly as late as 10,500 cal BP (Wakulla Springs Lodge, average of two ages), if one accepts the association of the cremation with Bolen at that site, which we do. Two side-notched and one corner-notched point were recovered from the Bolen surface at Page-Ladson (Carter and Dunbar 2006). Thirty-eight Bolen points, two of which were side-notched, were recovered from 8LE2105, which has been dated to 11,273 cal BP (Goodwin et al. 2013; Hornum et al. 1996; Thulman 2013).

EA tool assemblages from these sites have established conclusively in our minds that side- and corner-notched point distributions in Florida reflect very early Holocene, contemporaneous social group territories, rather than

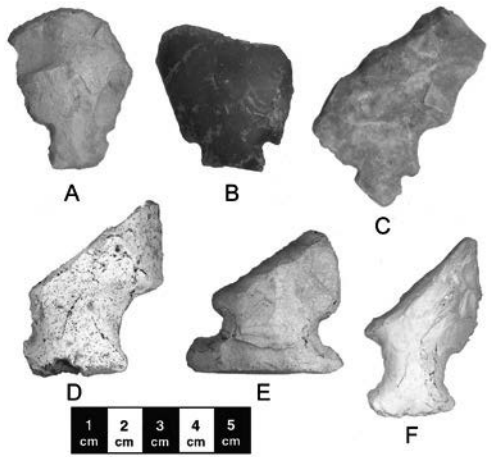


FIGURE 10.12. (*A–C*) Waller knives, Jeanie's Better Back site, Lafayette County, and (*D–F*) Edgefield scrapers.

the sequential point form evolution that appears to be present in the rest of the Southeast, where corner-notched points appear about 10,800 cal BP (9500 ^{14}C BP). Spatial analysis of the distribution of Bolen side- and corner-notched types in Florida indicates that approximately two-thirds of corner-notched points are found northwest of the Suwannee River and two-thirds of side-notched points are found southeast of the river (Thulman 2013). These distributions cannot be easily explained as resulting from functional differences; the more parsimonious explanation is that two different, but interacting, social groups occupied these regions at the same time.

Other lithic tools typically associated with Bolen points stratigraphically include formal bifacial and unifacial implements of variable size and shape, some of which were hafted. In addition to notched Bolen points, two other notched and hafted tools—Edgefield scrapers and Waller knives—appeared at this time, and they have been recovered from Bolen contexts at a number of sites in Florida (Figure 10.12; Carter and Dunbar 2006:494; Sweeney 2013) and from dated contexts at site 8LE2105 (Goodwin et al. 2013).

Like Bolen points, Edgefield scrapers were originally attributed to PI contexts (Michie 1968) but were later reassigned to the EA based on Mitchie's (1971, 1972, 1996) stratigraphic work at the Taylor site in South Carolina. Edgefield scrapers are large, triangular-shaped implements with wide, deep side notches (Figure 10.12D–F; Michie 1972). The unifacial asymmetrical blade generally has one excurvate edge opposite a straighter, steeply beveled edge that typically shows heavy use. The base is bifacially flaked, and the edges and notches are ground. Edgefield scrapers were likely associated with woodworking (Carter and Dunbar 2006; Goodwin et al. 2013; Goodyear 1973). Edgefield scrapers have been noted in association with EA assemblages in other regions of the Southeast such as Georgia (Elliot and Sassaman 1995; Sweeney 2013), and a similar form, the Albany scraper, has been noted as far west as Louisiana in association with San Patrice points (Webb 1946; Webb et al. 1971), which are morphologically similar to (and theoretically age-equivalent to) Greenbriar points. Edgefield scrapers have also been identified in later Kirk Corner-notched occupations at the EA G. S. Lewis-East site in South Carolina (Sassaman et al. 2002).

Another notched tool that appears in the Bolen tool kit is the unifacially retouched Waller knife, which was first described by Ben Waller (1970) as a thin, side-notched, hafted knife (Figure 10.12A–C). Waller knives typically occur on elongated or bladelike flakes with ground bases and notches and thin edges that likely functioned as cutting implements (Goodwin et al. 2013; Purdy 1981a).

Unifacial Aucilla adzes (Gerrell et al. 1991) and bifacial adzes have been recovered in association with Bolen points at sites such as Jeanie's Better Back (Austin and Mitchell 1999, 2010), Page-Ladson (Carter and Dunbar 2006), 8LE2105 (Goodwin et al. 2013; Hornum et al. 1996), and Dixie Lime Caves (Bullen and Benson 1964). Aucilla adzes and other bifacial and unifacial adzes have also been recovered from the Ross Bay Bolen site (Figure 10.13; Gramly 1994). Unlike bifacial triangular-shaped Dalton adzes (Morse 1997), Aucilla adzes asymmetrically constrict (or become waisted) toward the proximal end (Gerrell et al. 1991:14). Aucilla adzes and wedge-like tools were found in association with Bolen points, wooden stakes, and a chopped cypress log at Page-Ladson (Carter and Dunbar 2006:499); wedges were identified in the PI/EA assemblage from J&J Hunt (Faught 1996, 2004b).

Though neither have been noted with any frequency, ground-stone and organic tools have

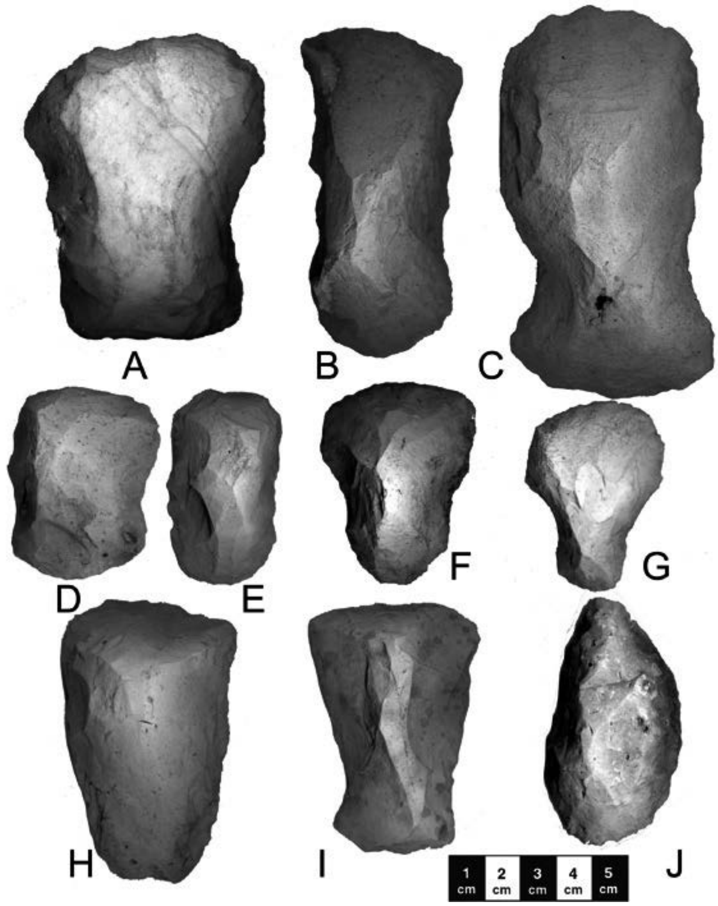


FIGURE 10.13. Adzes: (*A–B, D–E*) unifacial adzes; (*C, H–I*) bifacial adzes; (*F–G*) unifacial Aucilla adzes; (*J*) Hendrix scraper. All artifacts were recovered from Ross Bay, Florida, and are housed at the Florida Bureau of Archaeological Research.

been identified from several EA sites. Pitted or anvil-like nutting stones and other types of ground stone have been noted infrequently at a few EA sites in Florida, such as 8LE2105 (Goodwin et al. 2013), Page-Ladson (Carter and Dunbar 2006), and Jeanie's Better Back (Austin and Mitchell 1999). These include dimple stones, also known as bola stones or club heads, which are egg-shaped ground stone of unknown function found in dated EA contexts at Page-Ladson (Carter and Dunbar 2006:505–507; Purdy 1981a; Tesar 1994). These unusual artifacts, which can be made of a variety of stone (e.g., limestone, red ochre), have been interpreted as bola stones, atlatl weights, or club heads, among others.

Underwater discoveries from the EA Bolen Unit 5 component at Page-Ladson included bone pins, antler tool handles, and a possible drinking cup made from a deer skull (Carter and Dunbar 2006; Kendrick 2006; Peres 1997, 1998). Wooden stakes were driven into the Bolen surface at Page-Ladson, one of which was dated at 10,000 ± 80 BP (ca. 11,815–11,240 cal BP; Table 10.1). At Little Salt Springs two wooden stakes that were not associated with diagnostic artifacts were recovered and radiocarbon dated to 9645 ± 160 and 9500 ± 120 BP (ca. 11,400–10,500 cal BP; Clausen et al. 1979; Table 10.1), which fall within the Bolen period. A carved oak mortar that dated 9080 ± 250 BP (ca. 10,800–9500 cal BP) may represent the tail end of the Bolen era and has one of the latest ages referred to by Faught and Waggoner (2012) before their proposed occupational gap or hiatus in Florida. The very end of the Bolen era may be an 8710 ± 40 BP (ca. 9800–9550 cal BP; Table 10.1) age from Wakulla Springs Lodge.

Tools and Continuity

Florida has its share of chronological challenges in terms of temporally sensitive projectile point typologies and a lack of radiometric dating. Despite these limitations, we propose a working hypothesis of the chronology of diagnostic artifacts based on changes in hafting techniques (Jennings 2010). We observe that the general southeastern, post-Clovis trend in lanceolate design is toward (1) shorter hafts, evidenced by shorter grinding lengths along the lower lateral edges of points; (2) an increasingly tapered waist; (3) progressively diminished reliance on fluting to thin bases; and (4) increased use of blade beveling just prior to the region-wide adoption of notched points, which occurred at least 11,400 years ago (Morse et al. 1996). Based on these criteria, we tentatively propose a chronological progression from Clovis to post-Clovis fluted forms to Suwannee to Union Side-notched to Greenbriar to Bolen. We have not included the Simpson type in this chronology, because, as Dunbar and Hemmings (2004) suggest, it seems likely that the Simpson—a tool usually considered to be a projectile point—would have made a poor projectile tip. If so, this implement may not be part of the point trajectory in terms of tool use. Others have proposed that Simpson points may fall chronologically between Clovis and Suwannee because they are occasionally fluted.

Knowing that (1) Clovis points have been found in Florida and assuming that (2) Clovis point manufacture likely ceased by 12,600 cal BP (10,600 ^{14}C BP; Waters and Stafford 2007) and (3) Suwannee dates nearer to 11,900 cal BP (10,200 ^{14}C BP), one would expect an intermediate form between Clovis and Suwannee, but no distinctively different form has been recognized. Dunbar (2006) and Dunbar and Hemmings (2004) suggest that similarities between Clovis Waisted and Suwannee Waisted (aka Simpson) indicate that Clovis is the likely ancestor of Suwannee. Thulman (2007) has identified a spatulate-bladed, waisted, fluted point that could be a transitional candidate; the point has aspects of Simpson points that might imply their primacy over Suwannee. Simpson forms have few counterparts in the greater Southeast; they are more similar to points found at Madden Lake in Panama and to Fishtail points from South and Central America than to lanceolate points from the Plains or farther west because of their broad blade shapes and narrow haft (Bird and Cooke 1978; Faught 2006). Thulman also identifies a narrow-waisted fluted point with a form that suggests it may be transitional from Clovis to Suwannee. The paucity of these possible post-Clovis fluted points in Florida is consistent with the YD population decline proposed by Anderson et al. (2011).

It is fairly easy to see the technological and morphological differences between points at either end of the Clovis-to-Bolen continuum. However, if no temporally diagnostic projectile points were present at a site, would we be able to tell whether it was a PI or an EA site (e.g., Horvath 2000)? Besides diagnostic projectile points, numerous other PI and EA bifacial and unifacial tool types are reported in the literature. Through time, how alike are these tools? How alike are tool assemblages from Clovis to Bolen? It is our opinion that much of the evidence for cultural behavioral continuity is to be found in the production of tools that accompany the well-studied and dated projectile points. Clovis material culture generally is described as a distinctive set of stone tools that includes finely crafted lanceolate projectile points/knives, bifacial and unifacial tools including endscrapers made on blades or bladelike flakes, small accessory tools such as gravers and perforators, and ivory shafts or rods (Dunbar 1991; Dunbar et al. 1989; Goggin 1950; Hemmings 2004; Jenks and Simpson 1941; Simpson 1948; Thulman 2006a, 2006b). The post-Clovis PI lithic assemblage includes oblong Hendrix scrapers (Figure 10.13J), hafted endscrapers, and gravers (Daniel and Wisenbaker 1987; Dunbar 2006; Milanich and Fairbanks 1980:39; Mitchell and Pharmer 2012; Purdy 1981a). In the EA, Bolen side- and corner-notched points are accompanied by Edgefield scrapers, Waller knives, bifacial and unifacial adzes, and drills. Forms such as end-, side-, and other types of scrapers, spokeshaves, blades or flake knives, retouched flakes, prismatic blades, and bladelike flakes were made into various tools.

Whereas at least some of the tool types changed from Clovis to Bolen, and certainly the variety and number increased, the type of lithic material that tools were manufactured from did not vary, and the reduction of the material reflects common approaches to biface thinning. Some methods of biface reduction also appear to have stayed the same, reflecting their ancestry. For example, Bradley suggests that Dalton technology developed in situ directly from Clovis based on commonalities in biface reduction or "systematic technological fluting" (1997:57), such as the removal of long flakes from the basal edge at the end of the preform fabrication process to laterally thin a point preform, regardless of whether it was fluted in its final form. These end-thinning flake removals, that is, "flutelike end-thinning flakes," have been noted on bifaces from Clovis sites in South Carolina (Smallwood 2010, 2012), Tennessee (Sanders 1990), and Texas (Waters, Pevny, and Carlson 2011); Dalton sites in Arkansas and Missouri (Bradley 1997; Goodyear 1982; Gramly 2002); San Patrice sites in Missouri and Louisiana (Lopinot and Ray 2010; Lopinot et al. 1998, 2000; Pevny 2014); Golondrina sites in Texas (Jennings 2013); and Bolen sites in Florida (Austin and Mitchell 1999, 2010; Goodwin et al. 2013; Hornum et al. 1996). Like Clovis preforms, Simpson preforms may have end-thinning or early fluting flake removals and occasionally flutelike basal-thinning flakes on the finished form (Dunbar et al. 2005; Goodwin et al. 2013). Fluted preforms have been recovered from possible Suwannee contexts in Florida at Harney Flats (Daniel and Wisenbaker 1987) and several sites along the Cody Scarp (Goodwin et al. 2013), as well as in dated contexts at 8LE2105 and stratigraphically at Jeanie's Better Back (Figure 10.14).

Like Bradley, we interpret the presence of end-thinning flake removals on Suwannee and Bolen preforms (i.e., fluted preforms) as the most apparent and readily interpretable technological continuity in biface reduction techniques; it is likely a long-term continuation of learned motor skills and a reduction methodology that indicates descent with modification (O'Brien et al. 2014; Thulman 2014). There certainly is much apparent concern with basal shape and preparation through time (cf. Goodwin et al. 2013; Thulman 2012b). Abrading the basal and lower lateral edges of point preforms continued from Clovis to Bolen regardless of basal shape but stopped when notched forms were replaced by stemmed forms in the later Middle Archaic (Faught and Waggoner 2012).

Discussion and Conclusion

The technological transitions in the Southeast from Paleoindian lanceolate to Early Archaic notched points was most probably a process, rather than an event, with people using tool forms derived and evolved from those produced by their ancestors, who made fluted and then unfluted lanceolate points. The diversity of point forms are related to "Clovis," using *Clovis* in the conceptual sense of the earliest points that were fluted, as opposed to referring to the type site specimens from Blackwater Draw, which may or may not represent the earliest forms. We infer from this continuum in point forms, manufacturing techniques, raw material preferences, and tool kits that Bolen people could trace their ancestry to the first Clovis people in Florida.

Several lines of evidence lead us to propose this PI-to-EA sequence as population continuity, which, as prehistorians, we divide into a temporal sequence of successive "cultures" defined by the points made at the time, that is, Suwannee, Greenbriar, Bolen, and the like. Population continuity is inferred from the conservation of motor skill behaviors and tool manufacturing choices through approximately 3,000 years, particularly the continual use of formal unifacial tools, blade technology, and end-thinning point preforms. These behaviors and choices can be discerned regardless of the final tool form. For example, the variety of unifacial scraper forms exploded in the Suwannee and Bolen tool kits when compared with the limited unifacial tool types used by Clovis people, but the general manufacturing techniques were essentially the same. Likewise with blades, which became smaller and less frequent in the EA, but we see the reduction strategy as unchanged. Whereas it is difficult to differentiate some portions of the Bolen and Suwannee tool assemblages, it is safe to say that in contrast to Clovis, these later assemblages have larger and more varied tools, and it does appear that several of them were made specifically for working wood (Austin and Mitchell 1999; Carter and Dunbar

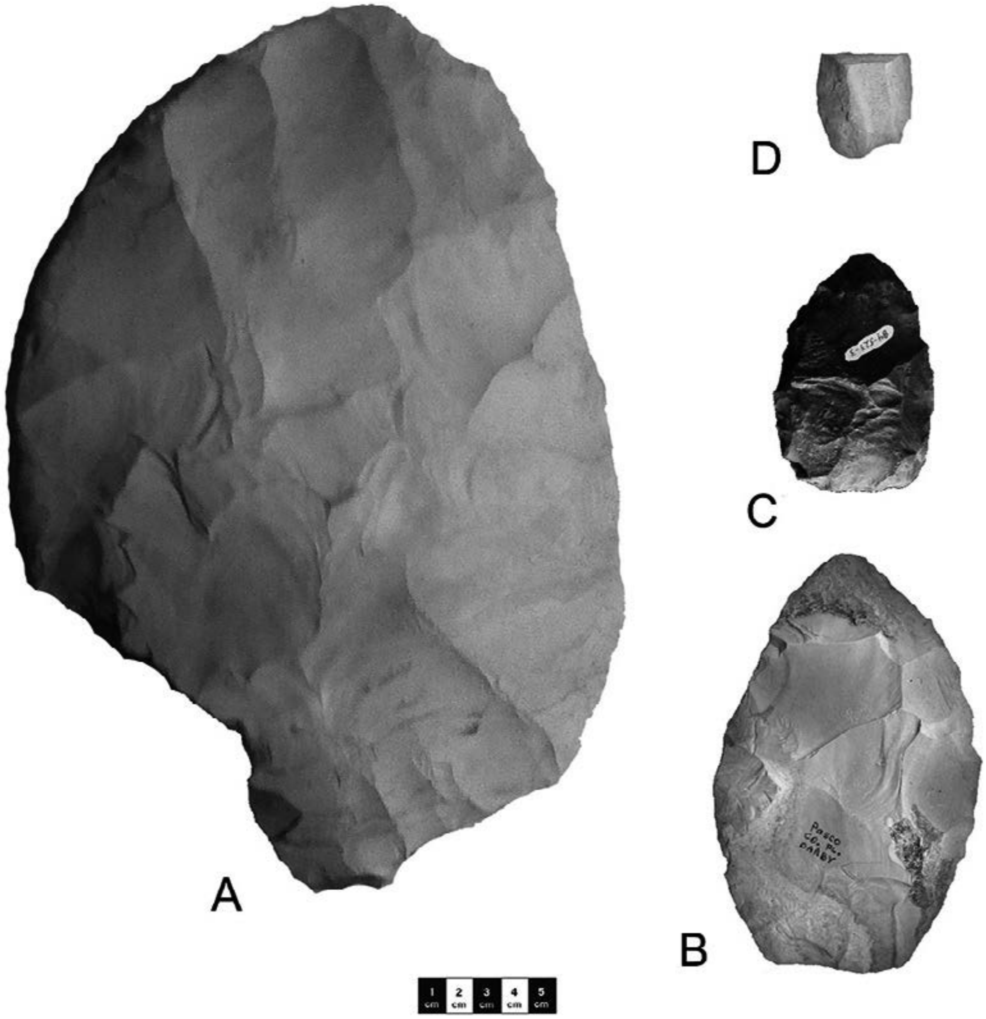


FIGURE 10.14. End-thinning flake removals on Paleoindian bifaces from (*A*) the Bahamon Cache in Wakulla County and (*B*) Pasco County and EA bifaces from (*C*) the Page-Ladson site in Jefferson County and (*D*) Ross Bay in Taylor County. As shown by these images, the technique of longitudinally thinning a biface was used through time regardless of biface size.

2006; Goodwin et al. 2013). Such conservation in motor skills over millennia has been used to infer population continuity in other areas of North America (Thulman 2014), and we see the same process at work in Florida.

We also see a continuum of tool forms that supports our population continuity hypothesis. Cultural transmission processes can explain the evolution of post-Clovis point forms without resort to environmental explanations (Boyd and Richerson 2005; Eerkens and Lipo 2007; Henrich 2010; Morrow and Morrow 1999). Florida's unique environment and apparent ameliorated climate—in contrast to areas to the north during the Younger Dryas—indicate to us that Florida may have been isolated during this time, focused on either the now-drowned coastal environs or other areas along the Gulf Coast. Isolation from the greater Southeast is indicated during the late PI period in Florida's lack of instrument-assisted fluting and apparently unique late PI Suwannee and Simpson point and tool forms. It was not until the latest PI period that Dalton-related tool forms made inroads into the state, mainly in the western panhandle, where north/south-flowing rivers such as the Apalachicola and Choctawhatchee likely provided communication conduits into the state, through which new ideas were transmitted. The post-Suwannee/pre-Bolen forms such as Greenbriar, Union Side-notched, and Chipola are not well studied or constrained stratigraphically or radiometrically, but they indicate the transition to side- and corner-notched point forms that is seen elsewhere in the Southeast.

This opening of the state to the rest of the Southeast reached its maximum expression with the apparent instant and region-wide adoption of notched points, with both side- and corner-notched specimens unequivocally associated at early Holocene, EA, dated sites such as Page-Ladson and 8LE2105. Whether the idea for notching spread north from Florida or in some other direction remains to be determined. Nevertheless, once the idea hit the state, it was adopted, and lanceolate tools were replaced by notched tools. Whereas it appears that Bolen people occupied the margins (and maybe the exposed bottoms) of rivers, springs, and other water bodies like their Suwannee ancestors, we believe that Bolen sites are more widely dispersed on the landscape (and therefore were more populous) based on the frequency and distribution of sites and individual points in various collections. Whether early Floridian social groups were logistically or residentially focused, or both (Daniel 1985), is also a matter for consideration and additional study, but our understanding of site distribution is limited to the currently exposed portions of the peninsula after sea levels rose. Submerged early Holocene sites, with side- and corner-notched points, attest to the change in Florida's receding coastline (Faught 1996; Faught and Donoghue 1997; Hemmings and Adovasio 2014).

In our opinion, the change from lanceolate to notched points was not a response to changing environment or specific hunting requirements. There is no indication in Florida that the start of the Holocene marked a dramatic environmental change, other than possible drier conditions like those indicated at Page-Ladson, that would have necessitated such a fundamental modification in hafting design. Rather, the change was a pan-southeastern social phenomenon where notching was adopted in Florida, southern Indiana (Stafford and Cantin 2009), and northern Alabama (Sherwood et al. 2004) at roughly the same time within the present level of precision in radiocarbon dating (10,000 ± 100 ^{14}C BP). Similar lanceolate-to-notched evolutions are seen farther afield at sites such as Big Eddy in Missouri (Lopinot et al. 1998, 2000), where San Patrice variety Hope (more lanceolate) and variety St. Johns (more notched) were found together in the Upper 3Ab dating to 11,848 cal BP (10,185 ± 75 ^{14}C BP, AA-26653), which is slightly earlier than side- and corner-notched Bolen sites in Florida given the current level of radiocarbon precision.

In sum, we see Florida as representing a unique patch of Clovis-related PI and EA people in the Southeast. Several efforts are under way to reopen and reevaluate older sites with modern techniques (Halligan 2012), and there is renewed interest in finding PI sites offshore (Hemmings and Adovasio 2014). The organic preservation in the Aucilla River seems particularly promising (Halligan 2012, 2014), and such conditions may be found in other rivers (Hoffman 1983; Jenks and Simpson 1941), springs (Rink et al. 2012), lakes (Bullen and Beilman 1973; Thulman 2012c), and sinkholes (Gifford and Koski 2011) with rich PI and EA assemblages.

Note

1. Scanned images are archived in the Paleoindian Database of the Americas (Anderson et al. 2010; http://pidba.utk.edu/florida.htm).