J. Ethnobiol. 14(2):141–160 Winter 1994

THE WELLS OF SPANISH FLORIDA: USING TAPHONOMY TO IDENTIFY SITE HISTORY

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ABSTRACT.—Wells from Spanish Florida provide a wealth of information about subsistence in the colony. Archaeologists working with materials from the Spanish colony argue that these wells were filled quickly. It is possible, however, that they were filled slowly. Wells left open after being abandoned, like natural pitfall traps, should accumulate the remains of animals such as rodents, snakes, and frogs, which become entrapped in such features. Wells filled quickly once abandoned should contain few of these animals. While two Spanish wells have been found that did function as natural traps, most of the wells of St. Augustine and Santa Elena do not appear to have been open and unused long enough to serve as natural traps.

RESUMEN.—Los pozos de La Florida española son una rica fuente de información acerca de la subsistencia en la colonia. Los arqueólogos que han trabajado con los materiales de la colonia española aseveran que estos pozos fueron llenados rapidamente. Es posible, sin embargo, que se hayan llenado lentamente. Los pozos que permanecieron abiertos después de ser abandonados, como las trampas naturales, debieron acumular los restos de animales tales como roedores, víboras y ranas que son atrapados en esos sitios. Los pozos que se llenaron rapidamente despues de ser abandonados debieran contener pocos de estos animales. Si bien se han encontrado dos pozos españoles que sí funcionaron como trampas naturales, la mayoría de los pozos de San Augustín y Santa Elena no parecen haber permanecido abiertos y sin uso por suficiente tiempo para servir como trampas naturales.

RÉSUMÉ.—Les puits de la Florida offrent une abondance de renseignements concernant la subsistance au temps de la colonie. Les archaéologues traitant du matériel archaéologique de la colonie espagnole maintiennent que ces puits se sont remplis rapidement. Toutes fois, il est possible qu'ils se soient remplis lentement. Les puits, ayant été abandonnés ouverts et formant des trappes naturelles, devraient accumuler des restes d'animaux, tels que rongeurs, serpents, et grenouilles qui se trouvent piégés dans ces trappes. Les puits qui se remplissent rapidement une fois abandonnés devraient contenir peu de ces animaux. Deux puits provenant de La Florida espagnole ont, en effect, joué le rôle de trappes naturelles. Mais la plus part des puits de St Augustine et Santa Elena ne semblent pas être demeurés ouverts et inutilisés assez longtemps pour avoir servi de trappes naturelles.

INTRODUCTION

Wells from Spanish Florida provide a wealth of information about subsistence and other aspects of human/animal interactions in the colony (Reitz 1991, 1992;

Reitz and Cumbaa 1983; Reitz and Scarry 1985). Archaeologists working in St. Augustine argue that wells associated with the First Spanish Period, A.D. 1565–1763, were filled relatively quickly with trash once they no longer were used for water (Deagan 1983:57). If that was the case, the contents of wells represent short-lived behavior and provide tightly focused, closed-context, glimpses into the life of a household at a specific point in time. Such closed-context deposits are useful in discussions of the colonies' economic and social networks. It is possible, however, that abandoned wells filled slowly. In that case their contents would be representative of no particular household or moment in time, and less valuable as sources of information about social and economic interactions. It is important, therefore, to determine which wells represent closed-contexts and which ones do not. This same dilemma confronts archaeologists working in other locations and time periods.

Observations of natural and artifical pitfall traps suggest this problem can be resolved using faunal remains since, from the perspective of a mouse, wells are hazards similar to bell-shaped pits or other features dug by humans. Wells filled quickly would be expected to have few characteristics in common with pitfall traps while wells left open would have many of the same faunal remains as natural pits. Testing this hypothesis is best accomplished where the historical events associated with each pit (well) are known; however, once it is established that faunal assemblages from traps do have a characteristic signature, such patterns may distinguish rapidly filled pits from pits filled slowly at sites whose histories are not known.

Open wells, like natural traps, may contain large numbers of animals such as insectivores, small rodents, snakes, frogs, and toads. Such animals accumulate in what are essentially deep holes, as long as these were too deep or steep-sided for escape (Whyte 1988). Wells filled quickly might have few of these animals since there would be a shorter period of time for them to become trapped and easier access through the accumulating debris to the surface and escape. Presumably a large number of entrapped animals would preclude use of a well for drinking water, providing a motive to either clean the well or dig a new one.

Using the identity of vertebrates found in well-fill, two patterns are seen. Some wells in Spanish Florida apparently were natural traps and probably filled slowly. Most of the wells of St. Augustine and Santa Elena do not contain quantities of animals considered likely members of a natural trap death-assemblage and were probably filled quickly when they no longer were used for water. Two wells identified as natural traps were both associated with unique moments in the history of the colony.

SPANISH FLORIDA HISTORY

Spanish Florida was founded in 1565 by Pedro Menéndez de Avilés, marking the beginning of the First Spanish Period. Originally Spain claimed all of North America south of Newfoundland and west of the Atlantic Ocean indefinitely (Gannon 1967:1); however, the actual occupation was a strip along the Atlantic coast between Santa Elena and St. Augustine and westward to Apalachee Province (Fig. 1). Menéndez founded two towns, St. Augustine and Santa Elena.

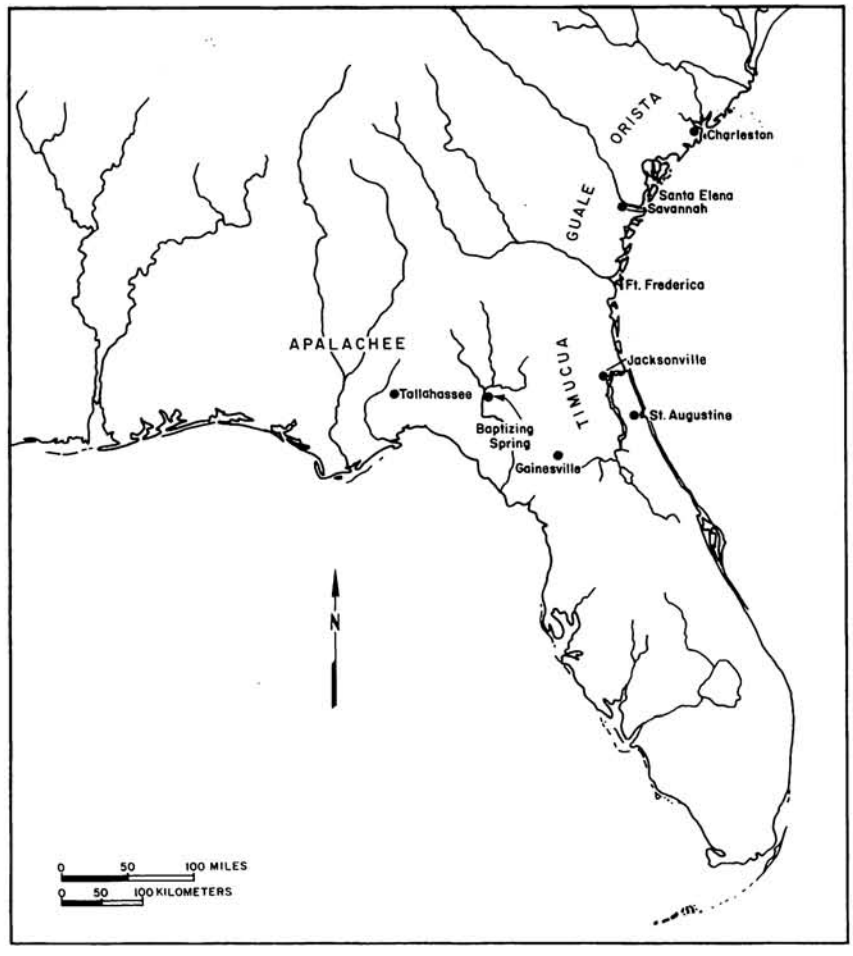

FIG. 1.—Map showing location of St. Augustine, Santa Elena, and Charleston.

Santa Elena was established a few months after St. Augustine and was the capital of Spanish Florida until 1587, when it was abandoned and St. Augustine became the capital of the province. Throughout the sixteenth century natural disasters and attacks by a variety of human foes contributed to the unreliabiity of imported staples, munitions, and other supplies. In 1570 an official subsidy was established to remedy the problem, but it did not do so (Lyon 1977; Sluiter 1985). Disease also hampered efforts to develop an export economy. If the official correspondence is to be believed, sixteenth-century St. Augustinians had very little to eat and subsisted on scum and vermin (Bushnell 1981:11; Conner 1925:99).

In the seventeenth century Floridians continued to experience disease, natural disasters, and war. Epidemics of yellow fever or typhus, smallpox, and measles devastated Europeans, Africans, and native Floridians (Bushnell 1978; 1981:13). Buccaneers attacked the mission chain along the Atlantic coast as well as outposts in the interior of peninsular Florida (Bushnell 1978, 1981:12; Hann 1986:175). Wars

throughout the century between Spain, France, and England made Caribbean waters generally unsafe for external trade (Bushnell 1981:12); the subsidy was often many years overdue. For this reason many indigenous local sources of food continued to be used by all Floridians.

The eighteenth century was also a time of turmoil for Spanish Florida (TePaske 1964). British raids destroyed outlying missions and cattle ranches by 1704, and St. Augustine was beseiged in 1728 and 1740. These raids reflected the gradual advance of English settlements down the Atlantic seaboard. Charleston, South Carolina, was founded in 1670 and Savannah, Georgia, in 1733. In spite of hostilities, trade with British colonies was routine (Harman 1969). As in the previous centuries, reports of hardship were frequent. For example, after the subsidy ship was captured in 1712, Governor Don Francisco de Córcoles y Martínez reported townspeople ate dogs, cats, and horses (Córcoles y Martínez 1712; TePaske 1964:83).

The First Spanish Period ended in 1763 when Spain ceded what remained of Spanish Florida to England. Virtually the entire European, African, and missionized Indian populations evacuated the colony from 1763 to 1783, during what is known as the British Period (Dunkel 1958). The Second Spanish Period began when Spain regained peninsular Florida in 1783 and ended when Spain ceded the territory to the United States of America in 1821.

MATERIALS AND METHODS

This analysis is facilitated by the large amount of faunal data available from Spanish Florida. As an indication of the sample size involved, 2,602 vertebrate individuals were estimated in a total sample of 106,570 bone fragments from First Spanish Period St. Augustine and Santa Elena contexts (Reitz 1992; Reitz and Cumbaa 1983; Reitz and Scarry 1985). In brief, the faunal evidence for Spanish Florida indicates extensive use of estuarine resources, some use of wild terrestrial resources including but not limited to white-tailed deer, and little use of domestic animals until the eighteenth century. Species lists for each of the sites discussed here are available elsewhere (Reitz 1990, 1991, 1992; Reitz and Cumbaa 1983; Reitz and Scarry 1985; Wood and Reitz 1986). The faunal remains from Spanish Florida have all been identified using either the comparative skeletal collections at the Florida Museum of Natural History or the University of Georgia Museum of Natural History. The reader is referred to Deagan (1983:54–61) for an extensive discussion of field logistics and nomenclature.

The sites and methods used in identification and analysis of the collections are described in detail elsewhere (Reitz 1990, 1991, 1992; Reitz and Cumbaa 1983; Reitz and Scarry 1985; Wood and Reitz 1986). For purposes of the following presentation, however, it is important to note that faunal remains recovered from both general zone deposits and features were studied from all Spanish Florida sites. Most of the 200 taxa identified in wells were also present in zone deposits. The only exceptions are single bones identified as great egret (*Casmerodius albus*), ruddy duck (*Oxyura jamaicensis*), broad-winged hawk (*Buteo platypterus*), and largemouth bass (*Micropterus salmoides*); as well as two fish bones identified as grunt (Haemulidae), all of which were found only in wells.

COMMENSAL TAXA IN SPANISH FLORIDA

To determine whether the wells of Spanish Florida filled quickly or slowly those animals that are considered characteristic of natural pitfall traps must be defined. The animals likely to be victims of natural traps were classified as commensal taxa during analysis of Spanish Florida faunal assemblages. Commensal taxa are those animals found frequently in association with human residences, perhaps through no active intention of humans (Reitz and Scarry 1985:42). Moles, mice, rats, voles, lizards, frogs, and toads are considered commensal animals. These small animals might in turn attract owls, snakes, and other predators. A special category of commensal fauna are pets and working animals. Pets, including dogs and cats, and working animals, such as mules, horses, and oxen, might be present at sites and incorporated into the archaeological record by accident or through burial not associated with consumption. Large working animals are unlikely to fall into wells by accident, but dogs and cats might do so.

While the classification of certain taxa as commensal has had functional utility over the course of the Spanish Florida project, classification of species as commensal rather than as food sources has never been taken for granted. Most of the "commensal" animals might also be consumed either routinely or at least occasionally (Stahl 1982; Szuter 1988). Individual animals of taxa that generally were consumed, such as opossums or raccoons, might also become entrapped, but these animals have not been classified as commensal. Determining which species are included in faunal assemblages through subsistence and other cultural behaviors is important because Spaniards at various times claimed that the poverty of the colony forced them to eat vermin. It is not clear what a Spaniard might consider vermin because a wide range of species that may have been unfamiliar to Europeans were consumed frequently in Spanish Florida. Any or all of these might have been considered disgusting, inedible vermin by homesick Spaniards either as a group or individually. Our normal (ethnocentric) categories of what might be commensal are irrelevant because Spaniards clearly claimed to consume undesirable foods, some of which might have been ordinarily commensal to the town and its surroundings.

Identifying which animals were "vermin" and testing the accuracy of the commensal classification are among the goals of zooarchaeological research for Spanish Florida. Is there a group of animals common in Spanish deposits that were not consumed, and if so, which of the 200 vertebrate taxa found in First Spanish Period collections might have been truly commensal rather than food items wrongly classified as commensal during analysis? Did Spaniards really face famines during which they ate vermin, and if they did, what did they think of as vermin? These are not minor questions since commensal taxa as defined here have comprised 5% of the St. Augustine sixteenth-century vertebrate individuals (MNI=1,126), 5% of the Santa Elena vertebrate individuals (MNI=558), 4% of the seventeenth-century vertebrate individuals (MNI=166), and 5% of the eighteenth-century vertebrate individuals (MNI=722), although their dietary contribution, if any, must have been small (Reitz 1992; Reitz and Cumbaa 1983:175; Reitz and Scarry 1985:66).

Traditionally zooarchaeologists examine characteristics such as articulated

joints, butchering and other modifications to bones resulting from exposure, digestion, or both, skeletal completeness, bone breakage, and context to separate the depositional origin of different species. Unfortunately, none of the standard techniques used to distinguish between food and nonfood animals have consistently delineated food from nonfood uses of either vertebrates or invertebrates in Spanish Florida. This suggests that the categories "commensal" and "noncommensal" do not clearly distinguish between "food" and "nonfood" animals in Spanish Florida. This issue is too complex to be addressed here other than to note that commensal taxa are ubiquitous in First Spanish Period collections and that their status in the colonial diet is unclear. Further research is needed to resolve the question of whether the animals classified as "commensal" here were consumed frequently, occasionally, or not at all.

However, as is often the case, data collected for one purpose may be useful for another. Site formation processes have been part of the research design at St. Augustine since the 1970s (Deagan 1983:14), but zooarchaeology has contributed little in this area largely because of the difficulty of distinguishing between food and nonfood refuse. However, there seems to be a characteristic accumulation of commensal taxa that indicates when a well was left open for enough time to serve as a natural trap. Wells filled quickly lack these characteristics. Accumulations of taxa classified as commensal for purposes of this study (Table 1) will be used as markers for natural traps without addressing the question of whether the species were eaten, although the assumption is made that they were not, at least in these contexts.

NATURAL TRAPS

The literature on natural traps is voluminous (e.g., Gibbons and Semlitsch 1981; Guilday et al. 1969; Hirschfeld 1968; Hudson and Solf 1959; Semken and Falk 1991; White et al. 1984) and will be briefly summarized here only to demonstrate that Spanish Florida wells meet many of the physical characteristics of natural traps and that the types of fauna found in traps with small openings can be anticipated with a good degree of accuracy. The point does not need to be belabored because most archaeologists are familiar with the success of 1×1 m squares in capturing small animals. Pitfall traps of various designs are also a common biological approach to capturing small animals in the field.

In experimental work designed to replicate site formation processes at archaeological sites, Whyte (1988) found that small vertebrates tend to be caught in deep, steep-sided pit features that remain uncovered while slowly filling with debris. Whyte's baited traps were designed to replicate common archaeological features and were 75 cm in diameter at the surface and 75 cm deep. These pits attracted newts, narrow-mouthed toads, treefrogs, pickerel frogs, leopard frogs, green frogs, bullfrogs, stinkpots, painted turtles, yellow-bellied turtles, snapping turtles, queen snakes, a black kingsnake, a wood duck, opossum, shrews, house mice, white-footed mice, pine voles, muskrats, and rabbits. The species captured and their relative proportions in each pit varied with season, weather, surrounding vegetation, bait, and pit characteristics. When all data from all seasons and all pit types are combined, amphibians comprised 29% of the 267 vertebrate individ-

TABLE 1.—Taxa found in wells and considered potentially commensal for purposes of this study.

Scientific Name	Common Name
Scalopus aquaticus	Eastern mole
UID Rodent	
Cricetidae/Muridae	New and Old World mice and rats
Sigmodon hispidus	Hispid cotton rat
Microtus pinetorum	Pine vole
Rattus spp.	Old World rat
Rattus norvegicus	Norway rat
Rattus rattus	Roof rat
Canis familiaris	Dog
Felis domesticus	Cat
UID Snake	
Colubridae	Non-poisonous snakes
Viperidae	Pit vipers
Crotalus/Sistrurus spp.	Rattlesnake
Rana/Bufo spp.	Anura; Frog/Toad
Rana spp.	Frog
Bufo spp.	Toad
Bufo terrestris	Southern toad

uals, turtles 36%, snakes and birds 1%, and mammals 34% (Whyte 1988:40). Mice were able to escape from some pits (Whyte 1988:57), a situation also reported by Hudson and Solf (1959) for insectivores. Whyte reports that entrapped animals are more likely to be found in the lower levels of natural traps (Whyte 1988:80, 82). A further observation made by Whyte (1988:139) is that entrapped animals are more abundant in experimental pits surrounded by vegetation or debris, a fact that might be used as an indication of site abandonment.

With the exception of the opossums, muskrat, turtles, duck, and rabbits, all of the animals captured in Whyte's pits would be classified as commensal taxa in Spanish Florida archaeofaunal collections. Turtles are a particular surprise since the possibility that turtles might be commensal had been considered and rejected for Spanish Florida collections. However, Whyte notes that 79 of the 95 entrapped turtles were young, newly hatched individuals rather than adults (Whyte 1988:45). Many of the other animals captured were also young, including both snakes and the wood duck. Gibbons and Semlitsch (1981) also found that adults of some species may not be captured in pitfall traps.

A similar interpretation was made by Armitage and West (1985) in a study of materials from a late medieval garden well of the Greyfriars in London. They found that 92% of the commensal small mammals and amphibians in this well were either juveniles or subadults (Armitage and West 1985:123). While not using this as evidence that the well was abandoned but open, they did interpret these animals as evidence of garden fauna associated with nearby orchards rather than subsistence items. They also observed that a high percentage of the garden fauna

were young individuals, probably exploring new territory but too inexperienced to be wary of hazards such as wells. Some may have been tossed into the abandoned well as a quick way of disposing of dead animals. Shrews, rodents, dogs, cats, and amphibians contributed 37% of the bone fragments reported from the Greyfriars well.

Carnivores and large herbivores are rarely part of a natural trap fauna when the opening is small, although a study by White and colleagues (White et al. 1984) of two caves formed in a lava field in Idaho provides a good example of a situation in which carnivores can become entrapped. Both caves contained a high incidence of rodents, rabbits, and carnivores, suggesting that the carnivores were attracted by the small rodents and rabbits that fell into the caves, and themselves became entrapped once they jumped through the cave entrances. This study also found that young animals, and very old adults, were the individuals most likely to become entrapped.

DESCRIPTION OF DATA FROM TWO WELLS/NATURAL TRAPS

Examining the Spanish Florida well data might be facilitated by looking first at materials from wells that probably were natural traps, from Lesesne Plantation and 70 Nassau Street, Charleston. While neither of these wells is from St. Augustine or Santa Elena, they do fall within the original sixteenth-century boundaries of Spanish Florida. Characteristics of these wells and their faunal assemblages are presented in Table 2. An important characteristic of wells is that when the well is filled with water, debris accumulates at the bottom of the well in an anaerobic zone, and preservation is therefore enhanced. Hence noting the relationship of commensal taxa to the well bottom and the current water table is important for reconstructing the taphonomic history of the deposit.

One of the "natural trap" wells is from the Lesesne Plantation, just north of Charleston, South Carolina (Wood and Reitz 1986; Zierden et al. 1986). The Lesesne Plantation well was brick-lined and about a meter in diameter at the surface (Zierden et al. 1986:4–44). The well was built in 1800 and abandoned in 1860, although materials probably accumulated during the midnineteenth century. Standing water was found at 2.6 m (Level 28), although the well was dug to culturally sterile soil at 3.3 m. The well was excavated in 20 cm increments from Levels 1–9 and in 10 cm levels from Levels 10–28. Level 29 was the bottom 30 cm of the well. Levels 1–18 contained materials associated with the slump of the plowzone; Levels 19–27 accumulated during the period of abandonment; and Levels 28–29 contained items probably lost while the well was still active. Level 29 was full of organic debris, including what was probably the water bucket. The studied materials were recovered using a 1/4-inch meshed screen.

While the location of the Lesesne well was rural, the second "natural trap" well is urban, from Charleston, South Carolina (Reitz 1990; Table 2). This brick-lined well was found at 70 Nassau Street, the home of a free African-American household. Although the well may have been dug in the 1840s, its contents appear to date to the early twentieth century. The well was enclosed by a house sometime after that, but it remained open, with water perhaps accessed via a pipe. It was excavated as a single unit, and hence there are no levels. The well was 10 ft deep,

TABLE 2.—Description of wells.

Site[1]	Feature	Century	Taxa[2]	NISP	Weight, gm	MNI	Screen	Comments
Natural Traps								
Lesesne	106	19th	13	1071	80.07	52	1/4"	to sterile
70 Nassau	1	19th/20th	8	2215	913.72	48	1/4"	to sterile
Sixteenth-century First Spanish Period, St. Augustine								
SA 26-1	21	16th	30	4295	1128.80	75	1/4"	to sterile
SA 26-1	62	16th	29	1232	1419.97	75	1/4"	to water level
SA 34-1	1977	16th	5	34	262.50	5	1/4"	to sterile; incomplete
SA 34-1	24	16th	19	470	500.10	38	1/4"	to sterile
SA 34-1	26	16th	19	1036	506.74	30	1/4",ss	to sterile
SA 34-2	44	16th	13	291	127.03	14	1/4"	not completely excavated
SA 36-4	5	16th	21	1387	1183.52	72	1/4"	to sterile
SA 36-4	16	16th	8	586	1296.10	9	1/8"	to sterile
FOY	9	16th	18	881	43.69	32	1/16"	to sterile
Sixteenth-century First Spanish Period, Santa Elena								
Sta. Elena	146	16th	24	2506	840.69	40	1/8"	to sterile
Sta. Elena	172	16th	25	1640	544.25	32	1/8"	to sterile
Sta. Elena	217	16th	2	21	17.45	2	1/8"	to sterile
Seventeenth-century First Spanish Period								
SA 34-2	47	17th	12	1559	1320.95	21	1/4"	not completely excavated
Eighteenth-century First Spanish Period								
SA 7-6	14	18th	12	1149	2771.20	22	1/4"	to sterile
SA 34-2	Area 13/17	18th	11	136	161.43	11	1/4"	not completely excavated
SA 36-4	11/12/13	18th	20	1480	1715.95	41	1/4"	to sterile
Later St. Augustine Wells								
SA 34-2	26	British	10	200	871.85	10	1/4"	not completely excavated
SA 34-2	41	2nd Span.	14	1210	2547.59	22	1/4"	to sterile

[1] St. Augustine sites are designed by the prefix "SA". FOY refers to the Fountain of Youth Park site.

[2] Number of taxa for which MNI was estimated.

with water encountered in the lower 3 ft.[1] The last 0.5 ft was dark fill above sterile sand. Only faunal materials from this dark fill at the bottom of the well were studied. The materials were recovered using 1/4-inch meshed screen.

Tables 3 and 4 show the Number of Identified Specimens (NISP) and Minimum Numbers of Individuals (MNI) for the Lesesne and 70 Nassau Street wells. The animals in both wells are overwhelmingly commensal taxa. An exception was made to the general classificatory rule for commensal taxa in the case of rabbits identified in the Lesesne well. Normally rabbits (*Sylvilagus* spp.) are not classified as commensal animals, however, the skeletons in these wells were very complete. High degrees of skeletal completeness indicate minimal postmortem disturbance, suggesting these individuals were commensal. In the Lesesne well 98% of the NISP and 94% of the MNI were commensal taxa. In the 70 Nassau Street well 95% of the NISP and 88% of the MNI were commensal taxa. The general lack of bones from animals that would normally have been consumed, such as cattle and chickens, indicates that food remains rarely were thrown, fell, dragged, or pushed into these wells. Since the 70 Nassau Street well was excavated as a single unit, we cannot examine the levels in which these commensal taxa were recovered. However, in the Lesesne well all but two of the commensal bones were recovered from Levels 20 through 23, the levels just above the water line (Table 5).

Both of these deposits clearly appear to be natural traps, with some additional refuse included in the case of the 70 Nassau Street well. It should be noted that the high incidence of adult rats in the 70 Nassau Street well lead Philip Armitage (personal communication, 1991) to suggest that this well was not a natural trap. He reasoned that because the well was under a house when these rodents became part of the well contents, they must have entered the well through their own initiative. Perhaps an aggressive rat poison campaign encouraged adult rats to seek water in the well regardless of the hazard of being trapped.

It is also important to note that a 1/4-inch mesh was used to recover materials from both deposits. In the presentation that follows, some of the well deposits were also seived through 1/4-inch mesh, which one might expect to bias against recovery of small animal remains. These two cases indicate that if a deposit did serve as a natural trap, use of 1/4-inch mesh will not necessarily disguise that function. Presumably if a smaller-meshed screen had been used, the numbers of commensal taxa would have increased to an even higher percentage of the total sample in both the Lesesne and 70 Nassau Street wells.

THE WELLS OF ST. AUGUSTINE

Wells are common in St. Augustine (Deagan 1981; 1983:57, 111). They were constructed by digging a large well construction pit into which a stack of wooden barrels was placed to form a well roughly a meter in diameter (Fig. 2). A typical well included a stack of one or two barrels extending about 4 m below ground level and 2 m below the water table. Wells are routinely found 12 to 15 m from the street edge toward the back of each lot (Deagan 1983:247). Frequently a number of well construction pits, wells, and false starts are located within a few meters of each other, sometimes overlapping one another. When archaeologists excavate a

TABLE 3.—Commensal taxa in wells, NISP.

Site[1]	Feature	NISP	NISP for Commensal Taxa						% Commensal Taxa
			Mole	Rabbits[2]	Rodents	Dogs	Cats	Snakes	Anura	
Natural Traps										
Lesesne	106	1071		75	206	3		255	509	97.9
70 Nassau	1	2215			1755	55	292			94.9
Sixteenth-century First Spanish Period, St. Augustine										
SA 26-1	21	4295		4	2	2			2	0.1
SA 26-1	62	1232			1		1			0.2
SA 34-1	24	470							2	0.4
SA 34-1	26	1036		3	1				21	2.1
SA 36-4	5	1387		13						
SA 36-4	16	586		1			1			0.2
FOY	9	881			2			2	80	9.5
Sixteenth-century First Spanish Period, Santa Elena										
Sta. Elena	146	2506		1	1				3	0.2
Sta. Elena	172	1640	1		63			109	32	12.5
Sta. Elena	217	21								
Eighteenth-century First Spanish Period										
SA 7-6	14	1149				20				1.7
SA 36-4	11/12/13	1480	1	1			1			0.1
Later St. Augustine Wells										
SA 34-2	41	1210						2		0.2

[1] St. Augustine sites are designed by the prefix "SA". FOY refers to the Fountain of Youth Park site.

[2] Rabbits are not included in the commensal calculations for Spanish deposits but are included in the table so that their numbers can be compared to those in the Lesesne well.

TABLE 4.—Commensal taxa in wells, MNI.

Site[1]	Feature	MNI	MNI for Commensal Taxa						% Commensal Taxa
			Mole	Rabbits[2]	Rodents	Dogs	Cats	Snakes	Anura	
Natural Traps										
Lesesne	106	52		5	11	1		4	28	94.2
70 Nassau	1	48			33	2	7			87.5
Sixteenth-century First Spanish Period, St. Augustine										
SA 26–1	21	75		1	2	1			1	5.3
SA 26–1	62	75			1		1			2.7
SA 34–1	24	38							1	2.6
SA 34–1	26	30		2	1				2	10.0
SA 36–4	5	72		3						
SA 36–4	16	9		1			1			11.1
FOY	9	32			1			1	12	43.8
Sixteenth-century First Spanish Period, Santa Elena										
Sta. Elena	146	40		1	1				1	5.0
Sta. Elena	172	32	1		2			2	1	18.8
Sta. Elena	217	2								
Eighteenth-century First Spanish Period										
SA 7–6	14	22				1				4.5
SA 36–4	11/12/13	41	1	1			1			4.9
Later St. Augustine Wells										
SA 34–2	41	22						1		4.5

[1] St. Augustine sites are designed by the prefix "SA". FOY refers to the Fountain of Youth Park site.

[2] Rabbits are not included in the commensal calculations for Spanish deposits but are included in the table so that their numbers can be compared to those in the Lesesne well.

TABLE 5.—Location of commensal taxa in Natural Trap (Lesesne) and Spanish wells, by Level.

	UID Small Mammal	Eastern mole	Rabbit	Rodents	Cat/Dog	Snakes	Anura
Lesesne, Feature 106							
Level 3				1			
Level 8							1
Level 20							4
Level 21			2				5
Level 22	11		60	3		72	29
Level 23	90		13	102	3	183	471
SA 7-6, Feature 14							
Level 1					9		
Level 3					6		
Level 6					4		
Level 9					1		
SA 26-1, Feature 21							
Level 2					2		
Level 3			1				
Level 4			1				1
Level 6			1				
Level 9				1			
Level 12			1				
Level 13							1
Level 16				1			
SA 26-1, Feature 62							
Level 1					1		
Level 2				1			
SA 34-1, Feature 24							
Level 3							2
SA 34-1, Feature 26							
Level 1							5
Level 3				1			3
Level 4							1
Level 6			1				1
Level 7			1				1
Level 10			1				10
SA 34-2, Feature 41							
Level 5						1	
Level 11						1	
SA 36-4, Feature 5							
Level 4			3				
Level 7			2				
Level 8			1				
Level 9			7				
SA 36-4, Feature 11/12/13							
Level 1			1				
Level 4					1		
Level 7		1					

TABLE 5.—Location of commensal taxa in Natural Trap (Lesesne) and Spanish wells, by Level. (continued)

	UID Small Mammal	Eastern mole	Rabbit	Rodents	Cat/Dog	Snakes	Anura
SA 36-4, Feature 16							
Level 4			1				
Level 6					1		
FOY, Feature 9							
Level 6				2		1	
Level 9							17
Level 11							1
Level 12							56
Level 13							6
Level 15						1	
Santa Elena, Feature 146							
Level A							1
Level B							1
Level C			1				
Level D							1
Level F				1			
Santa Elena, Feature 172							
Level A						1	
Level C							1
Level D				4			
Level E				7			7
Level F				52		108	5
Level G		1					19

well into sterile soil below the water table, large quantities of organic materials can be recovered. Organic debris includes such things as shoes, oranges, and other plant remains. Over 15,000 vertebrate bones have been recovered from the wells of St. Augustine (Table 2). It is likely that when wells were contaminated or found to be too shallow it was easier to dig another one than to clean the old one, or make it deeper, because ground water is so close to the surface in St. Augustine. The earliest well was constructed in the fall of 1565 when Pedro Menéndez de Avilés first established the colony at what is known as the Fountain of Youth Park site (FOY), but the tradition of constructing barrel wells continued into the Second Spanish Period (Table 2).

A total of 15 St. Augustine wells were considered in this study (Table 2). Thirteen of these wells were filled during the First Spanish Period. Nine of the First Spanish Period wells were filled during the sixteenth century, one in the seventeenth century, and three in the eighteenth century. Use of well points permitted excavation of many of these wells below water level into the culturally sterile zone below the well. In several cases conditions did not permit excavation of a well to sterile. One well (SA 26–1, Feature 62) was excavated just to water level, and only a few levels were excavated for four other wells. The actual

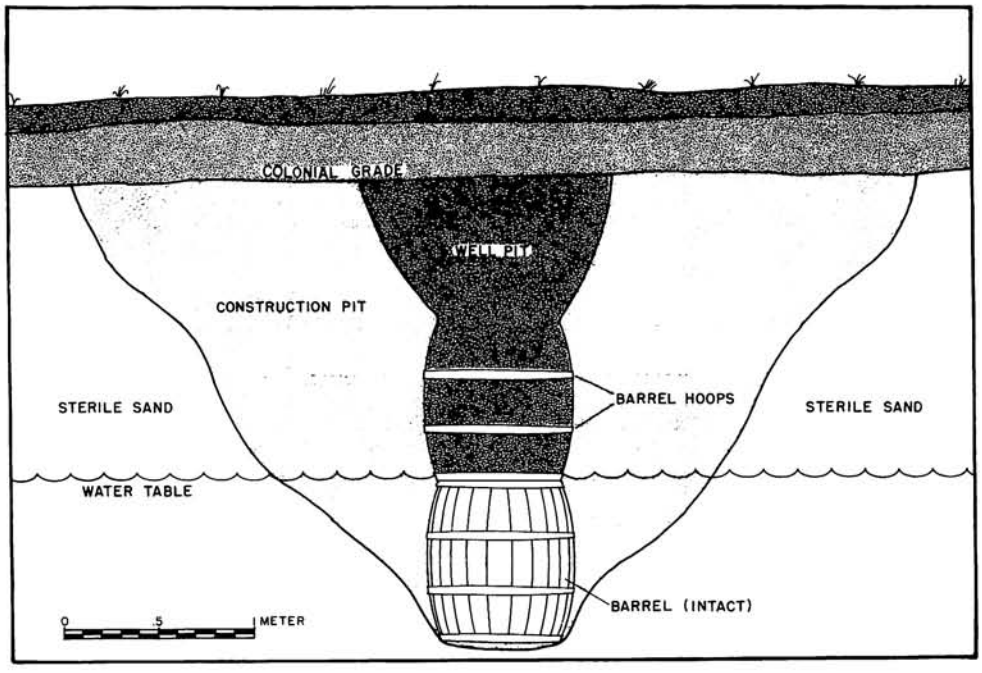

FIG. 2.—Schematic profile of a Spanish well (from Reitz and Scarry 1985:50).

number of levels in the wells varies, reflecting the fact that the initial point at which each well was observed was variable. Wells have been first encountered between 1.9 m and 2.7 m below datum and when excavated to sterile have ended between 3.6 m and 4.6 m below datum. Contents of wells have been variously excavated in 5 cm, 10 cm, or 15 cm increments over the 14 years it took to assemble this data base. Recovery techniques also varied. Although at least a 1/4-inch mesh was always used to recover the materials, finer meshes were used occasionally. In one case (SA 34–1, Feature 26), soil samples were examined in addition to the 1/4-inch fraction. Finer-meshed screens were used to recover samples from Feature 16 at SA 36–4 (1/8-inch) and the Fountain of Youth Park well (1/16-inch).

The St. Augustine wells contrast sharply with the two American wells described above. In all but one case (FOY), commensal taxa comprised less than 3% of the NISP in the St. Augustine wells (Table 3). The percentage of MNI is more variable, but commensal individuals contributed 11% or less of the estimated individuals in all but one case (FOY; Table 4). The exception in both cases, the Fountain of Youth Park well, is the oldest St. Augustine well at the oldest Spanish site (Reitz 1991). This well will be discussed in more detail below. While the use of a 1/4-inch meshed screen is a possible source of bias in this interpretation, it should be remembered that this screen size did not obscure the "natural trap" function of the Lesesne and 70 Nassau Street wells. Unlike these two American wells, and with the exception of the Fountain of Youth Park site well, the commensal taxa from the St. Augustine wells are evenly distributed throughout the strata (Table 5). This suggests that most of the St. Augustine wells were not left

open sufficiently long for commensal taxa to accumulate in them. Instead, these wells almost certainly were filled quickly, before commensal taxa had an opportunity to accumulate.

The Fountain of Youth Park well, however, is clearly a different case. Commensal taxa comprise 10% of the bones (Table 3) and 44% of the individuals (Table 4) in this well. Further evidence that this well was a natural trap for at least some period of time is found in the observation that commensal taxa are not evenly distributed in all levels (Table 5). Levels 9 through 15 contain 96% of the commensal taxa recovered from the well. This probably reflects the history of the site. The Fountain of Youth Park site was originally an Indian village. It was occupied by Pedro Menéndez's colonists when they first made landfall in September, 1565 (Reitz 1991). It was abandoned in April, 1566, when Indian hostilities forced Menéndez to find a more defensible position. The well was built during the brief Spanish occupation and the village was not reoccupied by Spaniards for some time thereafter. The well, therefore, was abandoned rather than filled as was the case at the other St. Augustine sites. The contents probably represent natural filling activities between the time the Spaniards left and the Native Americans returned to their village. Once the village was reoccupied, the well was filled relatively quickly with materials that appear to be food refuse.

SANTA ELENA WELLS

There is another case of a well which probably represents a natural trap. This is from St. Augustine's sister town, Santa Elena. Santa Elena yielded three wells associated with the San Felipe fortification (Table 2; South 1984, 1985). Fort San Felipe was constructed in 1570 and a *casa fuerte* built in 1572, but both were abandoned in 1576 when Santa Elena was sacked and burned by Indians hostile to the Spanish colony. The town itself was abandoned briefly after this attack. When Santa Elena was reoccupied by Spaniards, a new fort, San Marcos, was constructed.

All three barrel wells were built inside Fort San Felipe and used during a six-year period. Well contents were recovered using a 1/8-inch meshed screen (Table 2). Feature 146 barely extended into the water table. Apparently this well was not dug deeply enough to fill sufficiently with water and so the well was probably almost immediately abandoned, the barrels salvaged, and the hole filled with oyster shell and other debris characteristic of subsistence (South 1985:35). Feature 172 was the primary well in the fort and was probably in use when Fort San Felipe was abandoned in 1576. Levels F and G were associated with the 1576 burn of San Felipe; charcoal and burned daub from the fire were found in Level G. The water table was encountered at 36 cm above sea level. Feature 217 was excavated to the bottom of the well at 60 cm below sea level, and the water table was encountered at 45 cm above sea level. This well contained limited faunal material but no sign of intentional abandonment was seen.

Vertebrate remains suggest that Feature 146 was filled with trash relatively quickly and that Feature 172 served as a natural trap. Less than 1% of the NISP and 5% of the MNI for Feature 146 were commensal taxa, but commensal taxa comprised 13% of the NISP and 19% of the MNI in Feature 172 (Tables 3 and 4).

While the few commensal taxa in Feature 142 appear evenly distributed throughout the feature, those in Feature 172 appear to cluster in the lower levels of the well, in fact, just above the burned daub associated with the destruction of Fort San Felipe (Table 5). Feature 172 was probably still in use when the fort was abandoned in 1576. The well functioned as a natural trap while the village and fort were empty of Europeans. It was later filled with rubbish when colonists returned to the town. Feature 146 was filled shortly after it was constructed.

DISCUSSION

It appears that the wells of Spanish Florida seldom were left open once they no longer provided clean water. Only two of the 18 Spanish Florida wells examined contained high percentages of commensal taxa clustered in the lower levels of the feature. The only St. Augustine well that remained unfilled long enough to serve as a natural trap is a well (the Fountain of Youth Park site) used for a very short period of time and then abandoned. Even this well was eventually filled with cultural debris, but only after collecting at least 14 commensal individuals in the lowest levels. The Santa Elena well that probably served as a natural trap did so during a period when the European population was absent from the town.

Recovery techniques, as is so often the case in zooarchaeology, may be a source of error in these interpretations. However, in this study the function of wells as natural traps was not hidden by the use of larger-meshed screen. Only two of the four wells identified as probable traps were excavated using fine-mesh screen to recover materials. While the use of 1/4-inch screen undoubtedly resulted in a reduction of bones from small commensal animals, evidence of entrapment in the two American examples was not obscured by use of the larger meshed screen. Additionally, soil samples or material recovered using fine-meshed screens were examined for three wells and did not yield high quantities of commensal taxa. While screen meshes smaller than 1/4-inch should be used routinely when recovering faunal materials, larger screen does not necessarily eliminate the possibility of identifying wells or other features that functioned as natural traps.

One alternative explanation for the lack of commensal taxa in most wells is that unfilled wells were not accessible to commensal fauna even when no longer in use. For example, the area around most wells may have been kept so clear of vegetation that commensal taxa did not have access to the wells due to lack of protective cover. Interestingly, both Spanish wells identified here as natural traps (FOY, Santa Elena Feature 172) probably functioned as such during periods when Europeans, and possibly Native Americans, were absent from the sites and ground cover may have been more dense. Presumably the Fountain of Youth Park site and Fort San Felipe became over-grown with weedy vegetation during these periods. However, vegetation on the Atlantic coastal plain grows rapidly in all seasons, so it seems unlikely that even house lots with heavy human and domestic animal use would lack adequate protection for rodents, snakes, frogs, and toads, unless the household was extremely diligent at weeding.

A second alternative explanation for the lack of commensal taxa in Spanish wells is that abandoned wells may have been capped so that domestic animals and children could not fall in. Given that Spanish wells were relatively shallow, it

is difficult to imagine why an abandoned well would be capped rather than filled. More likely these attractive nuisances were rapidly filled by the household as soon as they no longer served as a source of water. In fact, some may have been abandoned because entrapped animals contaminated the water rather than the other way around.

CONCLUSION

This review suggests that site formation processes revealed by faunal data can be of use in outlining the history of a site, giving us another view of taphonomic processes. While a well at St. Augustine and one at Santa Elena may have functioned as natural traps during periods of abandonment, most Spanish wells studied lack the faunal characteristics of natural traps. It appears that if commensal taxa contribute over 9% of NISP and 40% of MNI in a feature, it may have been a natural trap during at least part of the site's history. Further evidence that a well was a natural trap for at least some period of time is found in the accumulation of commensal taxa in the lower levels of the feature. The most characteristic trap victims are rodents, snakes, amphibians, and young individuals of larger taxa such as turtles and cats. Based on the low percentages of commensal taxa, especially in the lower levels, most of the wells of Spanish Florida were probably intentionally filled with trash over a relatively short period of time. Identifying similar layers of commensal taxa may aid in distinguishing brief periods of abandonment at other types of archaeological sites.

NOTE

[1]English measurements are used at historic sites with English colonial histories, such as Charleston.

ACKNOWLEDGEMENTS

This work was made possible through the gracious support of archaeologists Kathleen A. Deagan, Stanley South, Martha A. Zierden, and Lesley M. Drucker. I am particularly grateful to Bonnie G. McEwan, who permitted me to make use of her unpublished data from SA 34–1 Feature 24. I also appreciate the assistance of Thomas Whyte, who provided the inspiration for this paper, James Cusick, who provided invaluable archaeological information at a critical moment, and Terrance J. Martin, who read an earlier version of this paper. Additional support was provided by H. Catherine Brown, Marc Frank, Tom Gresham, Lisa O'Steen, Yvonne Narganes, Bonnie McEwan, Kathleen Johnson, Lee A. Nabergall, Barbara Ruff, Erika Simons, Kay Wood, and Timothy Young through identification of many of these materials. The Fountain of Youth Park work was supported by grant #85030610 from the Florida Bureau of Historic Preservation to the Florida Museum of Natural History under the Historic Preservation Grant-in-Aid Program and the University of Florida, Division of Sponsored Research. Funds were also received from Florida Board of Regents STAR Grant Program (#77–081), the Florida State University COFRS Summer Faculty Research Program, the Florida Chapter of the Colonial Dames of America, the National Endowment for the Humanities Grant (RO 32537–78-1425 and RS-20293–82), the Dupont Foundation, the Florida Museum of Natural History, the Wentworth Foundation, the Historic St. Augustine Preservation Board, and the St. Augustine Restoration Foundation. Funds for work with the Santa Elena materials were provided by the National Geographic Society,

the National Endowment for the Humanities, the National Science Foundation, and the Explorers Club of New York. Work on the Lesesne Plantation was funded as part of the Mark Clark Expressway Archaeological Data Recovery project made possible through Federal Highway Administration [#FA I-526–4(63)] and the South Carolina Department of Highways and Public Transportation. An earlier version of this paper was presented at the 56th Annual Meeting of the Society for American Archaeology, New Orleans, Louisiana.

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