

Abstract

Charles L. Heath, Jr. A CULTURAL HISTORY OF RIVER HERRING AND SHAD FISHERIES IN EASTERN NORTH CAROLINA: THE PREHISTORIC PERIOD THROUGH THE TWENTIETH CENTURY. (Under the direction of Dr. David C. Griffith) Department of Anthropology, August 1997.

This thesis focuses on the cultural exploitation of four anadromous fish species of the Family Clupeidae, in the Genus *Alosa*: the blueback herring (*Alosa aestivalis*), the alewife (*A. pseudoharengus*), the American shad, (*A. sapidissima*), and the hickory shad, (*A. mediocris*), in eastern North Carolina. The study assesses anadromous *Alosa* fisheries in the prehistoric and historic periods from a combined anthropological, archaeological, ethnohistorical and historical perspective. The research combines oral interview data collected by the author with information gathered from previously published sources. The findings are interpreted in the context of *adaptive strategies*, as originally conceptualized and proposed by John Bennett.

Anadromous *Alosa* fisheries provided an important seasonal subsistence and trade resource to prehistoric (circa 3,000 B.C. to A.D. 1650) and historic (circa, A.D. 1584 to 1950) period cultures in eastern North Carolina. The significance as a subsistence resource was later paralleled by capital intensive commercial fisheries during the nineteenth and twentieth centuries. Four natural characteristics of *Alosa* account for the vitality as a major subsistence and trade resource: (1) predictability (in time and space), (2) availability (in massive spawning runs), (3) accessibility (ease of access and harvest with minimal effort), (4) storability (short-term and long-term preservation by smoke-drying or salt-curing).

The seasonal exploitation of shad and river herring through time reflects the aggregation of conscious choices by individuals in response to the range of natural resources available in the region. Such choices gradually developed into regional, culture-wide adaptive strategies that evolved from a

great fishing tradition of the past century into the last vestiges of shad and river herring fisheries that are seen today. The decline of the subsistence fishery tradition has been paralleled by a dramatic decline in *Alosa* stocks in North Carolina waters. The reasons for the biological decline relate back to the concept of adaptive strategies, whereby the human population in the region shifted from low-energy to high-energy production practices (e.g., fisheries, agricultural, industrial) over time. High-energy cultural processes increase pressure on *Alosa* stocks through the destruction of spawning habitat and overfishing. The evolution from low-energy to high-energy production has led to both resource degradation and the displacement of segments of the population who traditionally relied on the fishery resources (e.g., commercial and subsistence fishermen).

A CULTURAL HISTORY OF RIVER HERRING AND SHAD FISHERIES IN EASTERN
NORTH CAROLINA: THE PREHISTORIC PERIOD THROUGH THE TWENTIETH CENTURY

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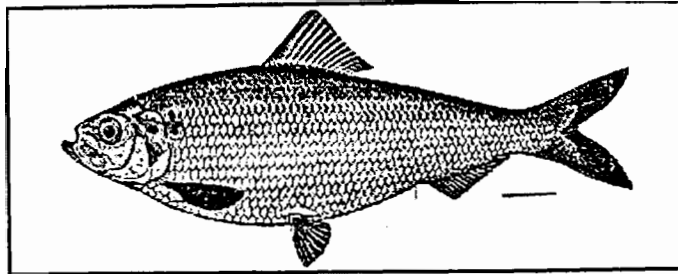
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Chapter I

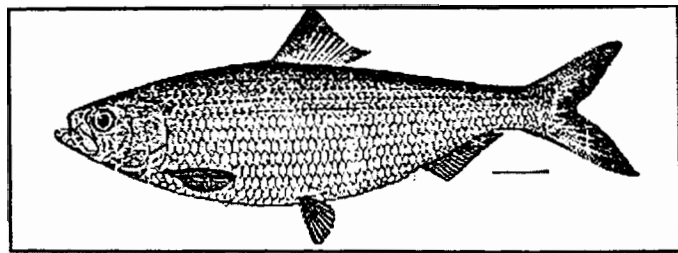
Introduction

From the time of the earliest historical observations by the first English explorers, North Carolina has long been noted for its abundance of marine resources (e.g., Barlowe 1957 [1584]; Harriot 1972 [1590]; Lawson 1967 [1709]). Dozens of species of fish and shellfish, fit for human consumption, continue to abound in the salt, fresh, and brackish waters that fill North Carolina's sounds, rivers and lakes. Several anadromous fish species have played an important role in the subsistence mix and economic livelihood of North Carolina's culturally diverse inhabitants for thousands of years. Anadromous fish are those species that naturally inhabit salt water environments during mature phases of life, but return to fresh or mildly brackish bodies of water to spawn. Species of the family Clupeidae in the genus *Alosa* -- blueback herring, *Alosa aestivalis* (Mitchell), alewife, *A. pseudoharengus* (Wilson), American shad, *A. sapidissima* (Wilson), and hickory shad, *A. mediocris* (Mitchell) -- have contributed greatly to the cultural and economic development of North Carolina societies from the remote prehistoric past through the twentieth century (Figure 1.).

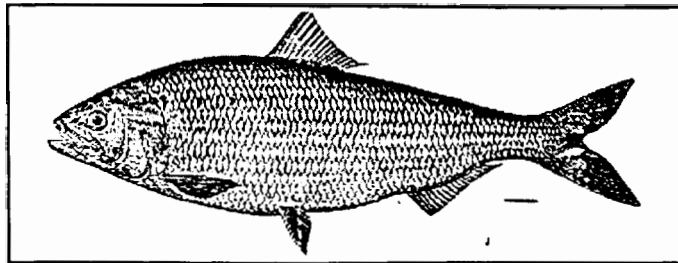
From some obscure time in the remote prehistoric past, through the colonial period and into the twentieth century, Coastal Plain inhabitants of North Carolina depended upon anadromous, particularly *Alosa*, fisheries for subsistence and trade. Proto-historic period Native-American groups in the region exploited abundant shad and river herring runs during the spring spawning season as a major element of their diversified seasonal subsistence cycle (Binford 1964; Byrd 1997b). European colonists utilized the same resources to complement their subsistence cycle from the seventeenth through the eighteenth century (Brickell 1969 [1737]; Gregg 1968; Leary 1915; Taylor 1990, 1992). These anadromous finfish, however, became a significant trade commodity by the end of the



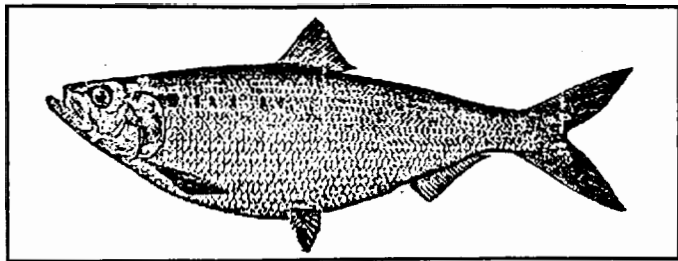
Alewife (*Alosa pseudoharengus*)



Blueback Herring (*Alosa aestivalis*)



American Shad (*Alosa sapidissima*)



Hickory Shad (*Alosa mediocris*)

Figure 1. Four Members of Genus *Alosa* Found in North Carolina Waters (From Smith 1907:121-126 [Figures: 41-43]).

eighteenth century. The market potential of the *Alosa* fisheries continued to grow in importance through the early twentieth century (Cobb 1906; Earll 1887; Gregg 1968; Leary 1915; Taylor 1990, 1992). Even though anadromous fisheries contributed to the economic growth of North Carolina through the antebellum period, the local population of yeoman farmers, lower-to-middle class urban whites, and plantation slaves continued to rely heavily on the resource for their basic subsistence needs (Boyce 1968 [1917]; Heath 1994; Pearson 1972). With the exception of technological advancements related to fishing gear and the addition of refrigerated shipping, the parallel pattern of subsistence fishing and commercial fishing for shad and river herring remained largely unchanged through the pre-World War II era. By the mid-to-late-twentieth century, local overfishing, foreign offshore trawling, flood control measures, water pollution, and changes in consumer demand, all combined to take a severe toll on the once thriving shad and river herring fisheries (Godwin, Street and Rickman 1971; North Carolina Division of Marine Fisheries 1993; Roelofs 1951; Rulifson 1994; Rulifson et al. 1982a, 1982b; Stanley 1992; Winslow 1994; Woodward 1956).

In a review of the eclectic range of literature on the subject of anadromous *Alosa* species, in relation to North Carolina, one can find a number of descriptive overviews of the shad and river herring fisheries, particularly those of the mid-to-late nineteenth and early twentieth centuries (e.g., Crayon 1861, 1959 [1857], Department of Conservation and Development [NCDCD] 1963; Earll 1887; Gregg 1968; Griffith 1997; Leary 1915; Olmstead 1904 [1856], 1953 [1861]; Parramore 1980; Ruffin 1861; Taylor 1951; Taylor 1990, 1992; Winslow 1994). A master's thesis by Mark Taylor (1990) and a subsequent, excellent publication, *Seiners and Tongers: North Carolina Fisheries in the Old and New South* (Taylor 1992), provided a relatively thorough historical account of North Carolina's fishery industry in the eighteenth and nineteenth centuries. Other works have focused on the biological life histories of shad and river herring, as well as the problem of declining

stocks in the twentieth century (e.g., Cooper, Eades, Klauda and Loesch 1994; Hightower, Wicker and Endres 1996; Rulifson 1994; Rulifson, Huish and Thoesen 1982a, 1982b; Winslow 1990, 1994; Winslow, Mozley and Rulifson 1985). Other studies have focused on, or included in broader studies, statistical and economic data related to large-scale anadromous fishing operations in eastern North Carolina during the late nineteenth and early twentieth centuries (e.g., Boyce 1968 [1917]; Cobb 1906; Earll 1887; Gregg 1968; Pratt 1908, 1911a, 1911b; Smith 1907; Taylor 1951; Woodward 1956).

Despite the relative abundance of eclectic literature on the anadromous *Alosa* fisheries in North Carolina, no in-depth study has specifically addressed the broader cultural history of shad and river herring fisheries from an anthropological perspective. With the exception of early dissertation research by Lewis Binford (1964), Byrd (1991, 1997b) has been the only archaeologist to specifically attempt to assess the role of *Alosa* fish species in the subsistence mix of Native American cultures in prehistoric eastern North Carolina. Byrd (1991, 1997a, 1997b) is the only published researcher that has prominently discussed the potential for, and the possible implications of, anadromous fisheries to aboriginal North Carolinians. It is suggested by the author of the present study that the cultural response to the seasonal availability of shad and river herring in the prehistoric period can be seen as a positive adaptive response to a range of environmental options available to Native-American cultures in the Coastal Plain region. The present study will assess such an adaptation that may have existed as early as the Middle Archaic (5,000-3,000 B.C.) period, and certainly existed from the Woodland period (1,000 B.C.-A.D. 1650) through the the era of permanent European settlement (circa 1650-1715).

Investigations of the exploitation of shad and river herring in the historic period have largely focused on the economic aspects or the greater national market importance of the anadromous

fisheries in North Carolina (e.g., Earll 1887; Gregg 1968; Leary 1915; Taylor 1990, 1992; Woodward 1956). As such, previous research endeavors, with the exception of studies by Boyce (1968 [1917]) and Watson (1996), have typically not addressed the significant place of anadromous *Alosa* fisheries in the local subsistence economies of rural, plantation, and urban Euro-American or African-American populations in the Coastal Plain region in the early modern period. Alternately, few studies, except those undertaken by marine biologists (e.g. Rulifson 1994; Rulifson et al. 1982a, 1982b; Stanley 1992; Taylor 1951; Winslow 1990, 1994; Winslow et al. 1985), have addressed the impact of cultural processes on *Alosa* species in North Carolina waters. There are, however, a small number of popular literature presentations that touch on the issues, but not in any significant detail (e.g., Booker 1974; Hart 1990; Manooch 1979; Stephenson 1995).

Although both prehistoric (Binford 1964) and early historic (Brickell 1968 [1737]; Lawson 1967 [1709]) cultures are suspected to have heavily exploited *Alosa* for seasonal subsistence needs, cultural practices beginning in the late nineteenth century exerted the greatest negative pressure on shad and river herring populations. Pressures resulted from dramatic shifts in agricultural production practices, the rate of industrialization and the evolution of mechanical fish harvesting technologies in the post-Civil War era. Such processes accelerated through the post-World War II era and eventually led to the destruction of spawning habitats and commercial overfishing. These combined pressures have contributed to the apparent demise of shad and river herring stocks in the late twentieth century. The biological consequences of cultural development in the region are readily apparent in the declining catch statistics of river herring and shad since the late nineteenth century.

It may be noted that catch statistics can reflect both declines in fish stocks as well as declines in consumer demand. Consumer demand is reflected in the ex-vessel price, or “dockside value”, records for the species. Decline in stocks may be evident if annual landings decline, but

market value remains steady or increases. Unfortunately, the fishing effort invested to harvest a particular species is not recorded, so the catch effort cannot be directly determined. It is the catch per effort (CPE) value that is used to estimate the stock status of a species (Roger Rulifson, East Carolina University, personal communication 1997). Although the overall catch per effort by commercial and subsistence level fishermen for river herring and shad has declined, as the market price and consumer demand for the species have both dwindled in recent decades (Layton 1997; Spruill 1997), it is readily apparent that *Alosa* stocks have dramatically declined through time, due to negative cultural pressures on spawning and nursery habitats and from commercial overfishing (Godwin, Street and Rickman 1971; North Carolina Division of Marine Fisheries 1993; Roelofs 1951; Rulifson 1994; Rulifson et al. 1982b; Stanley 1992; Winslow 1994; Woodward 1956).

Rulifson (1994) indicated that river herring runs were either “declining” or “threatened” in eleven of twenty North Carolina rivers studied in 1992. The status in the remaining nine rivers of the study were classified as “unknown” (Rulifson 1994). Commercial river herring fishermen who still work many of the same rivers evaluated by Rulifson (1994), have noted that the river herring have been all, but exterminated from several rivers and major tributary streams (Layton 1997). The decline is to the point that it is no longer cost efficient to fish certain tributaries for river herring or shad in the spring fishing season (Layton 1997). Rulifson (1994) concluded that American shad runs in North Carolina waters somewhat improved over the last decade. Stocks moved from “declining” or “threatened” status in 1980 to “stable” status in 1992 on eleven of seventeen major rivers studied by Rulifson (1994). American shad status on the other six rivers studied was “unknown”. Commercial fishermen, however, consider the American and hickory shad to be severely depleted in North Carolina waters, particularly when compared to their perceived abundance fifty years ago (Layton 1997; Spruill 1997). The impact of the apparent decimation of

Alosa stocks on the human population in eastern North Carolina is much more ephemeral than the cultural impacts on *Alosa* species. Prehistoric and historic subsistence economies through the World War II era would certainly have suffered intensely from such an ecological disaster. While industrialization and agricultural development (e.g., mechanization and chemical enhancement) may be seen, in general, as a positive adaptive response by our modern culture, it can equally be seen as maladaptive in terms of the negative impacts on the environment, fishermen, fisher-farmers, and those who have traditionally relied upon shad and river herring runs over the years.

Purpose of the Study

The cultural significance of the anadromous fish runs in the evolution of North Carolina's prehistoric and historic period cultures, with the exception of the historical studies by Watson (1996) and Taylor (1992, 1990), has generally been presented in much of the popular literature as an interesting historical aspect of regional history or simply ignored and glossed over in the scientific / academic literature. The study presented in this thesis was undertaken to document the importance of *Alosa* fisheries in both the prehistoric and historic periods from a combined anthropological, archaeological, ethnohistorical, and historical perspective. In light of patterns observed as a result of limited preliminary research by the author (Heath 1994), the present study focused on two key areas of exposition:

1. Assessment of the evidence for, and the implications of, anadromous *Alosa* fisheries in prehistoric eastern North Carolina.
2. Assessment of the evidence for, and the results of, anadromous *Alosa* fisheries in the late nineteenth and early-to-mid twentieth century in northeastern North Carolina.

Through the assessment of these general thematic issues, sufficient information was generated to address four primary research questions:

1. When did *Alosa* fisheries become a significant resource to prehistoric cultures in eastern North Carolina, and what were the potential effects on native cultures as a result of such exploitation?
2. In what ways did historic period human populations exploit *Alosa* fish stocks in northeastern North Carolina, and how did the spawning runs contribute to the local subsistence economy and cultural lifeways during the late nineteenth and early twentieth centuries?
3. Why has the significance of the anadromous *Alosa* fish runs, as a subsistence resource, declined in the last half-century and, in general, how have modern cultural practices contributed to the demise of shad and river herring stocks?
4. How do the historic period shad and river herring fishing traditions continue to manifest themselves in northeastern North Carolina today?

The present study is an effort to trace the evolution of the river herring and shad fisheries in eastern North Carolina from a major subsistence resource of prehistoric Coastal Plain populations to a valuable commercial product in the early modern period. The parallel and continued subsistence role of these species is the focus of the later historic period presentation. The geographical region of study is primarily restricted to the northeastern Coastal Plain, specifically the geographic area that includes the Albemarle Sound and its tributary rivers. Information from the Pamlico Sound and its related tributaries is presented where appropriate. Historical, ethnohistorical, archaeological and ethnographic information is introduced, where possible, for each period surveyed.

The general theme or working hypothesis of the present study is that anadromous fisheries, particularly those that focused on the exploitation of shad and river herring, provided an important seasonal food resource to both prehistoric and historic cultures of eastern North Carolina. The importance of the *Alosa* spawning runs was derived from four specific characteristics inherent in the

resource: (1) *predictability* in space and time, (2) *availability* of massive quantities, (3) *accessibility* or ease of harvest with a minimal investment of time, energy and gear technology, and (4) *storability* as a short-to-long-term food resource, depending upon the preservation technology employed. Anadromous *Alosa* fisheries and the resulting consumer products (fresh, salted or smoke-dried river herring and fresh or salted shad) were a significant element of the local subsistence economy until the post-World War II era. After World War II the general availability of electric refrigeration and improved intrastate / interstate transportation systems, brought about by the post-war economic boom, stimulated greater diversity and accessibility to a broader range of economical and nutritional food sources. As such, the need or desire for *Alosa* fisheries, except for monetary profit or the desire to continue with cultural tradition, was greatly reduced by 1950. The historical dependancy on anadromous fisheries had notable impacts on the cultures in eastern North Carolina, vestiges of which can still be seen in various forms today.

The cultural contribution of shad and river herring over the broad span of time was of considerable importance. As such, a research focus on any particular time period would certainly be significant. The significance of anadromous fisheries to any specific cultural group at any particular point in time on the North Carolina Coastal Plain could be demonstrated and assessed. However, a comparative study, with the broadest temporal perspective is in order to better appreciate the overall cultural significance of the seasonal dependability of annual *Alosa* runs in the region. Further, a thorough assessment of the exploitation patterns through time would demand a book-length study. Taylor (1990, 1992) presented a reasonably thorough overview of commercial fisheries during the early historic period from 1700 to 1900. As such, the present study will primarily focus on two key temporal and cultural periods: the prehistoric period fisheries through the time of permanent European settlement (circa 1650-1715), and local exploitation practices by descendants of European

and African populations of the early modern era (circa 1880-1950). Although the varied cultural groups of the two primary periods of study were widely divergent, in terms of social structure, economy and technology, certain parallels are evident. The rural, agrarian nature of eastern North Carolina during the post-Civil War era was, in some respects, comparable to the later part of the prehistoric period in the realm of localized subsistence strategies; the rationale for anadromous fisheries was largely synonymous between the two time periods considered in the study. As such, a parallel examination of *Alosa* fisheries in each of the broader time periods will be the general theme of the present study.

Methodology

The general methodology employed to explore the four thematic foci of the research consisted of library and archival research, fieldwork to collect oral histories, and a qualitative data assessment. To set the stage for the primary research areas, it was necessary to research the biological life histories of the four *Alosa* species discussed in the study. The inherent nature of the seasonal spawning patterns and the geographic distribution of the *Alosa* species were keys to understanding the cultural exploitation of the resource in the past. Library research was conducted at the National Marine Fisheries Library, Morehead City, North Carolina, and the North Carolina Collection, Joyner Library, East Carolina University, to gather pertinent biological data and catch statistics that were applicable to the present study.

The prehistoric period of study relied on published archaeological data from sites in eastern North Carolina (e.g., Byrd 1991, 1997b; Mikell 1986; Phelps 1983, 1984), as well as synthesized site data from neighboring geographic regions that were home to aboriginal cultures inhabiting similar environmental niches (e.g., Barber 1980; Custer 1984, 1988, 1989; Dent 1995; Hummer and

Custer 1986; Kraft 1986a, 1986b; Larson 1980; Scarry and Scarry 1997). One eastern North Carolina prehistoric site on the Roanoke River, the Jordan's Landing site (31BR7), whose long-term occupation ended with the Cashie phase (A.D. 800-1715), yielded the most significant zooarchaeological data that contributed to the present research (Byrd 1991, 1997b; Phelps 1983). Cultural Resource Management (CRM) reports and other research on Coastal Plain sites, in the library of the David S. Phelps Archaeology Laboratory, East Carolina University, were consulted for relevant data (e.g., Lofffield 1987; Mikell 1986). Unfortunately, few such studies presented any zooarchaeological data or analyses of recovered faunal materials, particularly in the case of fish remains.

The North Carolina Office of State Archaeology (NCOSA), located in Raleigh, North Carolina, was consulted for related published or unpublished materials, but no additional Coastal Plain site reports were located that contained pertinent prehistoric or historic period data (Mark Mathis, NCOSA, personal communication 1997; Scarry and Scarry 1997). Due to the dearth of archaeological sources, early ethnohistoric accounts by colonial explorers and settlers were utilized. The direct-historical approach was undertaken to make reasonable inferences about late prehistoric and proto-historic period anadromous fisheries in the Coastal Plain region. The available archaeological (e.g., Byrd 1997b; Mikell 1986) and ethnohistoric (e.g., Harriot 1972 [1590]; Lawson 1967 [1709]; Smith 1895 [1612]; Strachey 1953 [1612]) data were synthesized to demonstrate the potential importance of shad and river herring fisheries to Native American populations in eastern North Carolina.

Information for the historic colonial era through the late nineteenth century period was gathered from primary sources (e.g., Boyce 1968 [1917], Brickell 1969 [1737]; Crayon 1959 [1857]; Lawson 1967 [1709], Olmstead 1904 [1856], 1953 [1861]; Ruffin 1861; Saunders 1993;

Southern Historical Collection, n.d.) and secondary source syntheses (e.g., Boyce 1968 [1917]); Gregg 1968; Leary 1915; Taylor 1990, 1992). Official documentary sources, published by the United States Commission of Fish and Fisheries (e.g., Baird 1873; Earll 1887; Goode 1887) and related state (e.g., Cobb 1906) and other Federal government publications (e.g., Sabine 1853) were also incorporated in the study. The twentieth century period research utilized similar state and Federal government publications, such as those published by the North Carolina Fish Commission / North Carolina Geological and Economic Survey (e.g., Cobb 1906; Pratt 1908, 1911a, 1911b), as well as a number of related secondary sources (e.g., Barfield 1995; Booker 1974; Boyce 1968 [1917]; Gregg 1968; Hart 1990; Manooch 1979; Winslow 1994).

The early-to-mid-twentieth century period of study, however, relied primarily upon ethnographic accounts collected by the author in 1995 and 1997 (e.g., Heath 1995b; Fenner 1995; T. Gardner 1997; Lane 1997; Layton 1997; Hampton 1997; Mizzell 1995; Ormond 1997; Smithwyck 1997; Spruill 1995; Spruill 1997; Taylor 1997). Where applicable, additional oral history or ethnographic data, collected by researchers at the Institute for Coastal and Marine Resources, East Carolina University (e.g., Ashley 1996; Byrum 1996; Hollowell 1996), the Institute for Historical and Cultural Research, East Carolina University (e.g., Heath 1995a; Jones 1994; Rountree 1978), and the North Carolina Maritime Museum (Capehart 1988) were incorporated into the study.

The ethnographic data collected by the author provided unique and heretofore unpublished information on the local exploitation of shad and river herring from both the late nineteenth and early-to-mid-twentieth centuries. The oral histories were collected from a range of informants in northeastern North Carolina. Informants were not randomly chosen, but selected specifically for their knowledge and experiences related to shad and herring fisheries in the region during the pre-World

War II era. Informants were selected in consultation with local historical societies and regional museums, as well as by “word of mouth” consultation with the informants contacted in the initial phase of the study. Informants included persons associated directly or indirectly with both commercial and non-commercial fisheries on the Albemarle Sound and its major tributary rivers. Although the original study plan was to include informants from the Pamlico Sound region, its tributary drainages, and the Cape Fear River drainage system, time constraints did not allow for such informants to be located, contacted or interviewed.

The present study incorporated interview data from twenty-one informants, sixteen of whom were specifically selected and interviewed by the author. The remainder of the informants were previously interviewed by other researchers. Of the twenty-one interviewees included in the study, there were seventeen white males, one black male and three black females. There were no white females. The majority of the study’s informants were born between the years 1903 and 1930. Most were life-time residents of the Albemarle Sound vicinity or regions surrounding its tributary drainages. The representativeness of the informant sample may be somewhat questionable, in that certain demographic classes were not well represented or included. The perspectives presented by the majority of the interviewees, white males, are likely to be unintentionally, but nevertheless biased. Observations by white males about female fishery workers, black fishery workers, black fishery-dependent farmers and their families are from an etic perspective and may not reflect the most complete portrayal of the early twentieth century commercial and non-commercial shad and river herring fisheries. Accordingly, statements made by white males about the cultural behaviors of other white males, black males and females or white females may be potentially misrepresentative, not just in terms of gender or ethnic issues, but in terms of social class differences as well.

Such potential biases, along with the limited geographical scope of the informant sample, suggest that the post-1880 period chapter may not be completely indicative of cultural practices over the entire Coastal Plain during the early-to-mid-twentieth century. Despite these observations, the author considers the information presented in the early modern period chapter to be generally representative of the region studied. A body of literature exists in the anthropological and historical disciplines related to the concept of shared cultural knowledge. Studies have indicated that the majority of oral history informants tend to remember normative behaviors in a society. Recall is not just the individual's own normative behaviors, but the behavioral patterns of people outside of their own gender group, ethnic group or social class as well.

A number of studies have indicated that oral histories are typically reliable in their information and generally no worse than written documents (see papers in Dunaway and Baum 1996). As one researcher observed: "Archives are replete with self-serving documents, with edited and doctored diaries and memoranda written 'for the record'. In fact, when undertaken in the most professional way, oral histories may be superior to many written records" (Hoffman 1996:92). Further, oral interviews are not written documents and quite "...often contain the freshness and candor which is more typical of direct conversation" (Hoffman 1996:92). It is with these caveats that the early modern period study is presented. Unfortunately, time and financial constraints did not allow for a more diverse range of informants to be located or consulted for the present study. As such, the oral history synthesis presented in this thesis should be considered as a tentative, preliminary study for the period of concern.

Theoretical Perspective

In the not so distant past, the research focus on maritime adapted cultures in anthropology was portrayed as a neglected topical area (Smith 1977) or as an unfocused thematic undertaking that contributed little significant data to the greater body of anthropological knowledge (Acheson 1981). Despite such negative conclusions, the general level of interest in maritime adaptation and the concurrent publication of a large body of literature on maritime related studies, at that time, already had begun to expand rapidly and has grown dramatically ever since (see bibliographic review: Kerber 1991). Acheson (1981) believed that the purview of maritime anthropologists was the specific focus on communities that relied primarily on fishing for subsistence or economic viability. Smith (1977) and Casteel and Quimby (1975) were more inclusive, however, and observed that any community that depended upon mixed marine, agriculture / horticulture, and gathering subsistence patterns should be equally considered in the realm of maritime anthropology. In regards to the present state of maritime anthropology, the author of this study considers the views expressed by Casteel and Quimby (1975) and Smith (1977) to be more tenable than those expressed by Acheson (1981). Accordingly, the present study, dealing with multiple-livelihood, fisher-farmer, cultural groups of northeastern North Carolina, will contribute to the greater body of research in maritime anthropology.

As observed by McCay (1978), studies of fishing dependent societies are most often set in the context of cultural ecology, due to the inherent research focus on cultural interactions with, and as a result of, the marine environment. Due to the basic nature of Culture in general, and the specific nature of shad and river herring fisheries in eastern North Carolina through time, the concept of *adaptive strategies* (Bennett 1971, 1976, 1993), from the processual cultural ecology orientation (Orlove 1980), was utilized as the interpretive framework for the present study. The theoretical

perspective of adaptive strategies provides a viable, yet simple and elegant solution in the interpretation of a complex cultural phenomena. This conclusion is certainly tenable in view of the concept of “Culture” as defined by Carneiro (1968).

He stated: “Culture is essentially an adaptive mechanism, making possible the satisfaction of human needs, both biological and social” (Carneiro 1968:551). Further, culture “...is something which man interposes between himself and his environment in order to ensure his security and survival. As such, culture is adaptive” (Carneiro 1968:551). Accordingly, one might consider *cultural adaptation*, rather than a system of energy input and output ratios (e.g., General Systems Theory or Systems Ecology), to be the heart of all cultural ecological approaches (Bennett 1971, 1976, 1993; Moran 1982). Further, as food procurement strategies clearly relate to human interaction with the environment, subsistence behaviors and strategies are typically the focus of ecological studies of human adaptation (Halperin 1994; Jochim 1981).

Cultural ecology or ecological anthropology has generally been defined as “...the study of the relations among the population dynamics, social organization, and culture of human population and the environments in which they live. It includes comparative research as well as analyses of specific populations (e.g., particularistic) from both synchronic and diachronic perspectives” (Orlove 1980:235). Another researcher defined cultural ecology as “...the interrelationship of environment, subsistence, and society” (Heider 1972:207). In his review of the ecological anthropology, Orlove (1980) noted that the development of ecological anthropology could be characterized as having evolved in three stages, with each successive stage having been a natural intellectual outgrowth of its predecessor. The first stage, from 1930 to 1960, revolved around the theories of Julian Steward and Leslie White. The second stage was defined by the emergence of the neofunctional and neoevolutionary schools between 1960 and the early 1970s. The third stage emerged in the late

1960s and early 1970s and was termed the “processual” stage (for a detailed review see Orlove 1980). In response to perceived shortcomings of the neofunctional and neoevolutionary schools of thought in ecological anthropology, the processual approach developed in the 1970s.

Neofunctionalists in particular were criticized for focusing on specific or synchronic events, cultural traits and rituals that served to maintain cultural homeostasis, while ignoring diachronic processes or dysfunctional attributes in societies, such as conflict or power relations that can lead to structural changes in a culture (Kaplan and Manners 1972; Orlove 1980).

Although concerns with the interaction between environment and culture were shared by neofunctionalists, neoevolutionists and processualists, an increased emphasis on diachronic studies and analyses of mechanisms of cultural change characterize the processual approach. Orlove (1980:245) considered the third stage as “processual” due to the florescence of studies that examined “...shifts and changes in individual and group activities...” and the focus “...on the mechanisms by which behavior and external constraints influence each other.” Important trends of the 1970s included systematic application of biological concepts to culture, concern with demographic variables and production systems (e.g., E. Boserup), response to environmental stress, formation of adaptive strategies (e.g., J. W. Bennett), interest in political economies (e.g. M. Godelier), and examination of environmental problems (e.g., A. Vayda and B. McCay) (for detailed review see Orlove 1980). In the 1980s, the “new” ecological anthropology began to rely more on the utilization of models as heuristic devices (e.g., decision making models and Optimal Foraging models) and the borrowing of concepts from evolutionary biology and animal ecology (Halperin 1994; Orlove 1980).

Out of the myriad of approaches developed by theorists of the cultural ecology school in the late 1960s and early 1970s, the concept of cultural adaptation, as related to adaptive strategies, emerged. Bennett and Kanel (1983:236) defined adaptation as the way people respond to either

opportunities or constraints in order to survive in a specific cultural and natural environment. The general concept of adaptive strategies is somewhat synonymous to decision or choice making models, whereby "...actors operating under a set of constraints allocate scarce resources to a hierarchical series of ends or goals" (Orlove 1980:247). Accordingly, Orlove (1980:251) noted: "The idea of adaptive strategy suggests that individuals, by repeatedly opting for certain activities rather than others, construct alternatives which others may then chose to imitate." Bennett (1971:14-16) defined adaptive strategies as:

The patterns formed by the many separate adjustments that people devise in order to obtain and use resources and to solve the immediate problems confronting them...*adaptive strategies* are generally at the conscious level in behavior of the people involved...(the actions taken can be analyzed in terms of) *adaptive processes*, or the changes introduced over relatively long periods of time by the repeated use of such strategies or the making of many adjustments...the many separate adjustments that have become patterned as strategies can also enter into culture; that is, as repetitive patterns of action they can be viewed by the people as traditions...

According to Bennett, his concept of adaptation transcended Roy Rappaport's conception of adaptation which was simply the "search for homeostasis" (Bennett 1976); the assumption that human populations, like many other animal species (e.g. lemmings), seek homeostatic equilibrium (a viewpoint that is synchronic and static) has been criticized by other researchers, as well (e.g., Ellen 1982; Orlove 1980; Vayda and McCay 1975). In Bennett's (1976) view, adaptation is an open ended, diachronic process, since adaptive behaviors do not necessarily result in the maintenance of equilibrium. In a number of studies, the focus on adaptive strategies has led to the assessment of how choices made by individuals, or groups, have influenced the greater cultural community or environment (see review in Orlove 1980). Adaptive strategies can more simply be defined as "...short-range choices of individuals as adjustments to their environments", while adaptive

processes can be defined as "...long-range changes that result from these choices" (Barlett 1980:548).

Human adaptive strategies revolve around the innate ability to make conscious choices related to resource exploitation, seasonal scheduling, and particular spatial arrangements chosen to accomplish a certain adaptive strategy (Bennett 1976; Jochim 1976). The term "adaptation" does not automatically imply that a particular adaptive response is the only option. Nor does the concept imply that the cultural solution to a particular environmental situation is the best response (e.g., optimal or positively adaptive), rather the concept implies that an adaptation "...has sufficient positive features for the complex traits to be perpetuated, while there may also be negative features" related to the cultural response (Barlett 1980:548). In their adaptive responses, Jochim (1976, 1981) noted that human populations must contend with three constraints: (1) seasonality or scheduling, (2) site location, and (3) demographic organization (size of group, division of labor). The paramount goal of any resource exploitation is to reduce costs, risks, and energy use associated with the procurement of desired food products or other materials (Jochim 1976, 1981; Larson 1980). In terms of subsistence strategies, populations develop schedules that emphasize reliable resources, particularly those that provide a high yield at a minimum cost (Larson 1980; Reitz 1979).

In relation to subsistence resource extraction as an adaptive process, Bennett (1993) observed that there are significant differences between low-energy and high-energy adaptations. Low-energy cultures use human or animal energy in the extractive process, whereas high-energy cultures utilize machine generated energy to enhance the exploitation of resources. As such, the production foci in high-energy societies relate to market economies and the support of larger populations beyond those members immediately engaged in the production. High-energy uses of natural resources tend to result in resource abuse, since "...their extractive processes are extensive

and exhaustive and the external demands for such resources are so high” (Bennett 1993:258). These concepts are particularly important to understanding how shifts in resource exploitation lead to resource degradation or displacement of segments of the population that rely on a specific resource due to economic competition.

As subsistence behaviors are a major focus of ecological oriented studies of human adaptation (Halperin 1994; Jochim 1981), the study of the shad and river herring fisheries can naturally be contextualized within the theoretical framework of adaptive strategies (Bennett 1971, 1976). The present study is particularly relevant in light of historical assumptions related to the availability of domesticated plants and animals to both prehistoric and historic cultures. It has been commonly assumed that the presence of plant and animal domesticates have “...protected the human population from the need to adjust to the natural environment in any but the most superficial sense” (Reitz 1979). A number of studies have demonstrated, however, that the presence of domestic food sources, particularly in the early modern historic period, have not always relieved human populations of the need to utilize wild resource components of their natural environment (see review in Reitz 1979). The persistent exploitation of shad and river herring for local subsistence purposes in eastern North Carolina during the both the later prehistoric and early modern historic periods was likely a reflection of the same phenomena.

Geographic Setting

In North Carolina, the tributary rivers of the Albemarle and Pamlico sounds are the primary spawning habitats of shad and river herring and have served as prime fishing grounds for those species for hundreds, if not thousands, of years. The waters of the Albemarle-Pamlico drainage system (Figure 2.) combine to form a vast fresh-to-brackish water system that provides a suitable

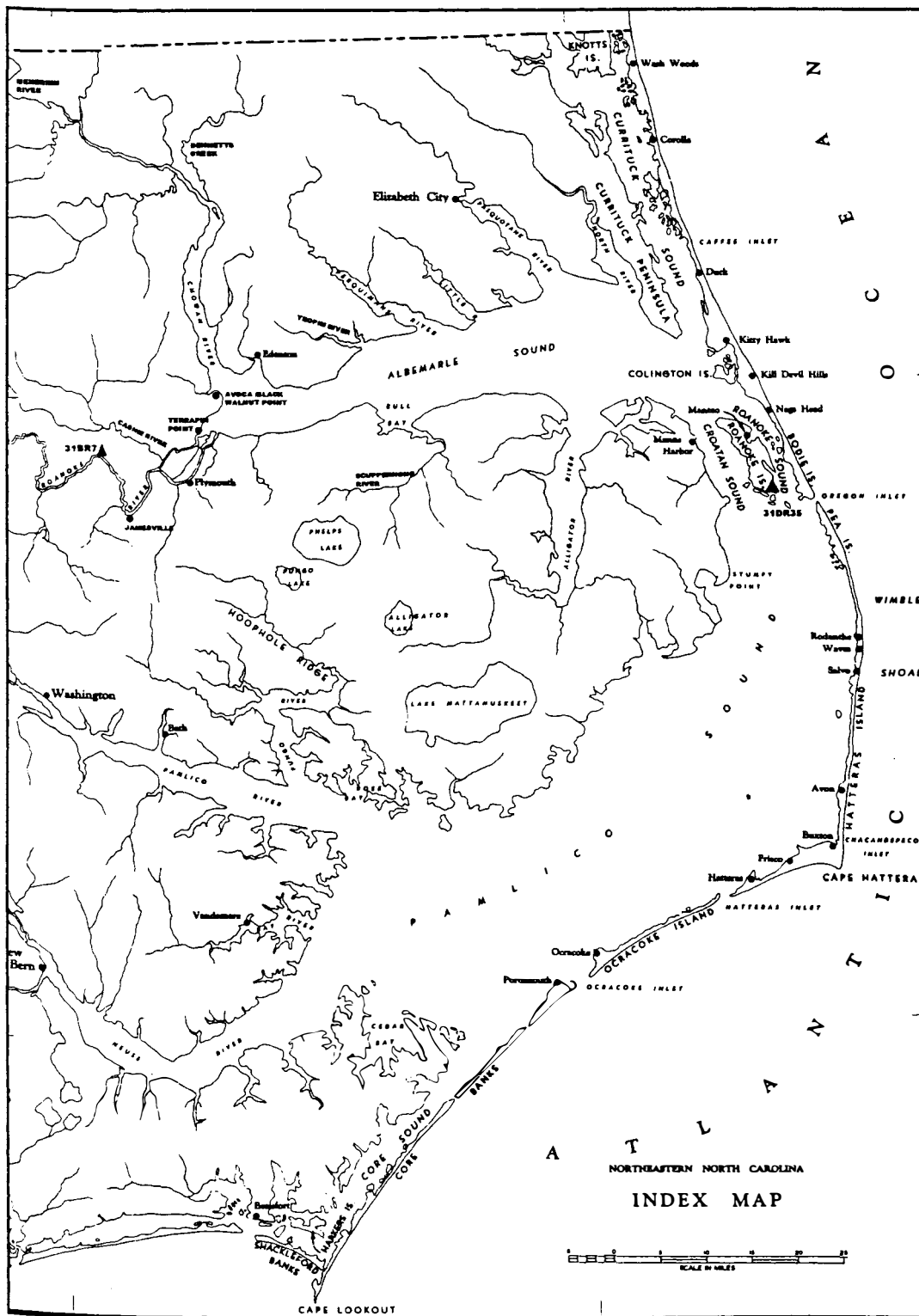


Figure 2. Map of Coastal North Carolina With Major Rivers, Sounds and Towns in Eastern North Carolina (Adapted from Haag 1956:7 [Figure 1.]).

habitat for spawning anadromous fish species from late February through early-to-mid May (Marshall 1951; Taylor 1951). The spawning area is primarily the Chowan and Roanoke Rivers of the Albemarle Sound drainage, and the Neuse and Tar-Pamlico Rivers of the Pamlico Sound drainage. The salty waters of Pamlico Sound serve as a migratory route for spawning anadromous species that seek the fresh or mildly brackish waters of inland rivers during the spawning season (Smith 1907).

Most of the fresh water for the two sounds comes from a total of seventeen main trunk rivers. There are, however, four major river systems that provide the bulk of the fresh water discharge into the Albemarle-Pamlico system. The Albemarle is primarily fed by the Chowan and Roanoke Rivers and the Pamlico is primarily fed by the Neuse and Tar-Pamlico Rivers. In addition to the primary trunk rivers, a number of smaller tributaries and sounds drain into the two main sound bodies. The Currituck Sound feeds the Albemarle Sound along with the discharge of the Cashie, Alligator, Scuppernong, Perquimans, Pasquotank, Yeopim, Little and North Rivers, as well as a host of lesser streams and creeks. The Pamlico Sound is additionally influenced by Croatan and Roanoke Sounds and a number of smaller rivers such as the Pungo, Bay and South Rivers, along with numerous tributary creeks. Numerous inlets, primarily Oregon Inlet, along the northern coastline, and a connection with the more southerly Core Sound, couple the Pamlico and Albemarle sounds with the Atlantic Ocean. The connection allows tidal exchange which provides circulation and flushing action, as well as access to inland waters for various marine species, including the spawning anadromous varieties (Marshall 1951; Smith 1907; Taylor 1951).

Due to natural inlet closings and migrations over the last few centuries, the Albemarle Sound is no longer directly connected to the ocean by inlets (Figure 2.). As such, it is primarily influenced by wind and its fresh water tributaries rather than the ocean tides (Copeland and Gray

1989; Marshall 1951; Taylor 1951). Spawning anadromous fish, seeking the waters of the Albemarle Sound drainage, now enter primarily through the Oregon and Hatteras Inlets, while those seeking the tributaries of the Pamlico Sound drainage enter primarily through Ocracoke and Hatteras Inlets (Smith 1907) (Figure 2.).

The Albemarle Sound is one of the largest coastal bodies of fresh water in the world (450-500 square miles), while the Pamlico Sound is noted to be one of the largest salt water sounds in the United States (1,700-1,800 square miles) (Smith 1907; Marshall 1951; Taylor 1951). Under normal environmental conditions, the water of the Albemarle Sound is fresh, but turns brackish, particularly on the eastern end, during periods of extreme drought (Smith 1907; Taylor 1951). Due to heavy winter runoff from the interior, salinity levels are greatly reduced in both sounds during the spring months (Epperly 1984; Marshall 1951).

The primary estuarine waters of North Carolina, including Albemarle, Pamlico, Roanoke, Croatan, Core and Currituck sounds, cover an area of approximately 2,900 square miles; second in size in the United States only to the Chesapeake Bay (Copeland and Gray 1989:4-5). Combined, the Albemarle-Pamlico watershed drains a total of 30,000 square miles of surface area (Copeland and Gray 1989:4-5). In the Albemarle-Pamlico estuarine system, an extensive complex of swamps, sounds, rivers and streams provide freshwater nutrients that combine with oceanic tidal action and moderate-to-warm seasonal conditions to generate plankton growth, which supports a vast and complex estuarine and anadromous fish community (Marshall 1951; Stanley 1992; Taylor 1951). Due to the inherent freshness of the waters of the Albemarle Sound, the rivers and tributaries of its drainage system tend to attract more spawning river herring as compared to the rivers of the saltier Pamlico Sound drainage and the more southerly rivers such as the White Oak, New and Cape Fear rivers and their associated tributaries. The more saline tolerant shad has been equally prolific on the

majority of North Carolina's major Coastal Plain rivers, from the Albemarle Sound drainage down to the Cape Fear River (Winslow 1990, 1994; Rulifson 1994). Historically, the Neuse River served as the spawning habitat for the largest population of American shad south of the Chesapeake Bay. That population was dramatically reduced over the last century and continues to be severely threatened by damming and pollution today (Rulifson et al. 1982b; Winslow 1994).

Biological Aspects of Alosa in North Carolina

The genus *Alosa* of the family Clupidae (shads and herrings) includes four species considered in the present study: the alewife, *Alosa pseudoharengus* ["goggle-eye", "wall-eyed", "spring" or "branch" herring (Smith 1907); "greyback" herring, "kyak" (Rulifson et al. 1982a)], the blueback herring, *A. aestivalis* ["school", "glut" or "May" herring (Smith 1907); "blackbelly", "sawbelly", "summer" herring (Rulifson et al. 1982a)], the American shad, *A. sapidissima* ["shad", "white" shad (Smith 1907); "roe" shad (Rulifson et al. 1982a)], and the hickory shad, *A. mediocris* ["jack", "skip jack", "hick" (Smith 1907); "bone jack", "tailor herring", "shad herring" (Rulifson et al. 1982a)]. Due to the physical similarities between the blueback herring and the alewife, as well as parallels in the spawning habits and geographical range, the two species are commonly lumped together and referred to as "river herring" in the United States. In Canada, river herring are collectively referred to as gapereau or alewives (Loesch 1987; Rulifson et al. 1982a). Historically, the alewife and blueback herring have been grouped together for commercial fishery statistical purposes under the terms "river herring", "herring" or "alewife" (Bozeman and Van Den Avyle 1989; North Carolina Division of Marine Fisheries [NCDMF] 1993; Loesch 1987; Rulifson et al. 1982a), as opposed to their more commonly known and biologically related cousins; the sea or

Atlantic herring, *Clupea harengus* (Linnaeus), which do not spawn in or enter freshwater environments (Smith 1907).

Adult river herring generally range between six (age II) and eleven (age VIII) inches in length (Rulifson et al. 1982a), but are known reach a maximum length of fifteen inches (Robins, Ray, Douglass, and Freund 1986). Depending upon age, sex and length, adult river herring average between one-half pound and one pound in weight (King 1947; Robins et al. 1986; Smith 1907). The larger adult American shad generally range from seven (age I) to twenty-one (age VI) inches in length (Rulifson et al. 1982a), but are known to reach a maximum length of thirty inches (Robins et al. 1986). Hickory shad are somewhat smaller than American shad, with a total length that ranges between eight (age I) and seventeen (age VII) inches (Rulifson et al. 1982a), with a maximum length of twenty-four inches (Robins et al. 1986). Shad generally weigh, depending upon age, sex and length, average between three and five pounds (King 1947; Smith 1907), but older American shad have been recorded in the twelve-to-thirteen pound range (Robins et al. 1986; Smith 1907). Among all *Alosa*, females (roes) are generally longer and heavier, particularly during the spawning season, than the males (bucks) (King 1947; Rulifson et al. 1982a).

The alewife proper ranges the Atlantic coast from Labrador and Newfoundland, Canada down to northern South Carolina, while the blueback herring ranges from Nova Scotia and New Brunswick, Canada down to central, east Florida (Bozeman and Van Den Avyle 1989; Loesch 1987; NCDMF 1993; Rulifson 1994; Rulifson et al. 1982a). The American shad, the largest member of the herring family Clupeidae, ranges from Labrador, Canada to northeastern Florida, while the hickory shad has a more limited range, primarily from Connecticut to central, east Florida (Rulifson 1994; Rulifson et al. 1982a). The hickory shad proper does not spawn northward beyond the inland waters

of New England (Batsavage 1997). In North Carolina, the alewife and the blueback herring are the most abundant of all anadromous species that inhabit the waters of the state (Rulifson et al. 1982a).

River herring and shad, as anadromous fish, spend much of the adult life in salt water as schooling pelagic species, but migrate back to freshwater rivers and streams to spawn each spring (Bozeman and Van Den Avyle 1989; NCDMF 1993; Roelofs 1951; Rulifson 1994; Rulifson et al. 1982a; Talbot and Sykes 1958). Although studies indicate that American shad generally return to the natal rivers and streams to spawn as adults (Melvin, Dadswell and Martin 1986), scientific research, to date, does not support the conclusion that other *Alosa* (e.g., blueback herring, alewife and hickory shad) exhibit such behavior in North Carolina waters (Roger Rulifson, East Carolina University, personal communication 1997). Tagging studies in Canadian waters, however, indicate that the blueback herring and alewife not only accurately return to home rivers for spawning, but also return to specific natal areas within the rivers (Jessop 1994).

Alosa enter the North Carolina sounds in early-to-mid February and linger in the estuaries until water conditions in the rivers and tributaries are sufficient for spawning. Natural triggering mechanisms, primarily water temperature, initiate shad and river herring migrations up streams and rivers. The timing of the upstream migration varies latitudinally from river to river, but within a locality, will generally be consistent from year-to-year (Bozeman and Van Den Avyle 1989; Loesch 1987; NCDMF 1993; Roelofs 1951; Rulifson 1994; Talbot and Sykes 1958). *Alosa* are known to enter the sounds and ascend the rivers when the water temperature reaches 50 to 55 degrees Fahrenheit (Roelofs 1951), but not actually spawn until the water reaches an approximate temperature between 50 and 70 degrees Fahrenheit (Rulifson et al. 1982a, 1982b). The specific range of spawning temperatures varies greatly among the four species (see Rulifson et al. 1982a, 1982b). In the Albemarle-Pamlico region, surface water temperatures generally approximate the air

temperature, or are slightly lower, during most months of the year, except during the summer months when waters can reach surface temperatures in excess of 80 degrees Fahrenheit (Epperly 1984; Marshall 1951; United States Department of the Interior 1970).

Local fisherman in eastern North Carolina say that the river herring begin to run when the dogwood blossoms (T. Gardner 1997; Smithwyck 1997; Spruill 1997). The alewives run first in early March and April, followed approximately three-to-four weeks later by the blueback herring in early April and May (Loesch 1987; Roelofs 1951; Smith 1907). As observed by Smith (1907:124), “The glut herring (blueback) comes later than the branch herring (alewife), usually appearing suddenly, in enormous schools, about the middle of shad season.” Although a large quantity of shad ascend the rivers in mid-to-late February, particularly hickory shad, the presence of the alewife in the creeks and rivers is considered by fishermen to be the forbearer of the larger, more economically productive, American shad runs (Layton 1997; Roelofs 1951; Smith 1907). Accordingly, the primary schools of American shad arrive in the rivers at approximately the same time as the blueback herring (Layton 1997; Roelofs 1951; Smith 1907). The hickory shad, however, spawns earlier than the American shad and enter the rivers by early-to-mid-February. Hickory shad are, in fact, the first *Alosa* to spawn in North Carolina waters during the *Alosa* spawning season (Batsavage 1997).

With the exception of a particularly large influx of “May herring” and “May shad”, the spawning runs generally begin to taper off significantly by the end of April or early May. Although there is no apparent biological taxonomic distinction, May shad are also known locally as “golden-backed” or “short-tailed” shad and are somewhat thicker in body than the early season American shad (Layton 1997; Smith 1907). The May runs of shad and herring usually arrive before mid-month and spawning continues until the end of May (Layton 1997). Based on observed spawning

habits, it is readily apparent that *Alosa* species in North Carolina waters were an extremely reliable and predictable food resource for the purposes of seasonal subsistence scheduling among human populations in a given locality.

Once river herring and shad enter sounds, rivers and streams to breed, they tend to seek the freshest water in which to spawn. In the past, river herring were generally found along the shallow shoreline of the Albemarle Sound and up most of North Carolina's Coastal Plain rivers and tributary creeks. In North Carolina waters, river herring generally tend to spawn in abundance in shallow slow moving waters of heavily vegetated creeks, tributary communicable swamps, lakes, ponds, drainage ditches and canals (Loesch 1987; Rulifson 1994; Rulifson et al. 1982a; Rulifson et al. 1982a, 1982b; Spruill 1997). Although there is no scientific evidence of river herring spawning in the relatively fresh waters of Albemarle Sound (Roger Rulifson, East Carolina University, personal communication 1997), many local fishermen claim to have observed alewife and blueback herring spawning in the inshore waters, among the cypress trees, of the Albemarle Sound (Layton 1997; Spruill 1997). Alewives have been observed by biologists spawning in more saline brackish waters near the mouths of the sounds outside of North Carolina waters (Bozeman and Van Den Avyle 1989). As noted by Smith (1907:123), "this species ascends the small streams to spawn, often pushing its way far to the headwaters of brooks and branches only a few feet wide and not more than six inches deep."

The American shad tend to prefer the main channels of streams and rivers or the mouths of tributary creeks, as its eggs need to be suspended and dispersed by subsurface currents (NCDMF 1993; Rulifson 1994; Rulifson et al. 1982a, 1982b). *Alosa* species broadcast eggs and gametes pelagically in the water column. Female river herring and hickory shad have slightly adhesive eggs that tend to sink to the bottom, particularly in still or sluggish water, after fertilization is complete

(Rulifson 1994). Alternately, female American shad have non-adhesive eggs that develop as they drift back downstream with the currents (Rulifson 1994). On average, *Alosa* eggs hatch within six-to-ten days (Roelofs 1951). The specific period of incubation for fertilized eggs is greatly dependent upon water temperature (Rulifson et al. 1982a). The larvae generally develop into the juvenile stage within two-to-three weeks (Bozeman and Van Den Avyle 1989).

Juveniles (fry) develop rapidly and feed on plankton, crustacean eggs, mosquito larvae and small insects. Depending upon the specific species, the maturing *Alosa* fry spend the summer in black water swamps, fresh or brackish water river or sound environments, feeding on plankton and growing in preparation for migration through the sounds and into the oceans (Rulifson 1994; Rulifson et al. 1982a, 1982b). During the summer, river herring fry tend to congregate in the freshwater streams, while American shad tend to congregate in the lower estuaries. The specific nursery grounds utilized by hickory shad are unknown. As few young hickory shad are found with other species of juvenile *Alosa* in the sound environment during the spring and summer, Batsavage (1997) believes that the juveniles exit the sounds early in the spring and spend the summer in near shore waters. With the fall season and the cooling of the inland waters, the young river herring and American shad fry head downstream to feed in the sound or estuary environments before entering the warmer ocean waters to grow into maturity (Bozeman and Van Den Avyle 1989; Marshall 1951; Rulifson 1994; Rulifson et al. 1982a, 1982b; Winslow 1990).

After spawning, most adult *Alosa* quickly return to the sounds and estuaries to recover and feed before returning to offshore waters in the winter (Loesch 1987). Generally, a four-to-five year period elapses before the sexually mature American shad returns to its natal stream to spawn. Hickory shad generally return after three-to-four years and river herring usually return after three-to-five years (Bozeman and Van Den Avyle 1989; Loesch 1987; Rulifson 1994; Rulifson et al. 1982a,

1982b; Winslow 1990). For unknown reasons, many American shad, particularly those populations found south of the Albemarle Sound (Roger Rulifson, East Carolina University, personal communication 1997), rarely spawn more than once, as many apparently die after spawning (Winslow 1990; Rulifson et al. 1982a; Talbot and Sykes 1958). Alternately, hickory shad (Batsavage 1997) and river herring (Rulifson et al. 1982a) may spawn two or three times during a lifetime.

Chapter II

Prehistoric and Proto-historic Period River Herring and Shad Fisheries

Archaeologists who have studied the prehistoric cultures of eastern North America have perennially debated both the significance of anadromous fish runs in the prehistoric diet and the general time period in which they were first, if ever, extensively exploited for subsistence purposes (e.g., Barber 1980; Binford 1979[1964]; Byrd 1997b; Carlson 1988, 1996; Cleland 1982; Custer 1984, 1988, 1989; Kraft 1986a, 1986b; Larson 1980; Schalk 1977; Stewart, Hummer and Custer 1986). Ethnohistoric sources from the time of European contact and colonization have provided vignette accounts of native shad and river herring fisheries along the Atlantic seaboard. The archaeological and ethnohistorical evidence of prehistoric shad and river herring exploitation on the North Carolina Coastal Plain, however, is not considerable. It is, in fact, minimal at best. Despite the limited present archaeological support, it is probable, given the historical ubiquity and significance of anadromous *Alosa* fisheries to European and African descent cultures of eastern North Carolina over the last three hundred years, that alosid fish exploitation contributed significantly to the aboriginal diet in prehistoric times. This hypothesis, if true, should be supported by regional archaeological and ethnohistoric evidence, as well as data from neighboring regions of the Northeast and Middle Atlantic.

Although no analyzed and published alosid fish remains have been recovered from Coastal Plain archaeological sites that date before the Late Woodland (A.D. 800-1650) period (Scarry and Scarry 1997), the absence of shad and river herring bones from such sites cannot be construed as an absence of the species from the prehistoric diet. Site sampling strategies, as well as various taphonomic processes and the general lack of appropriate recovery techniques (e.g., large-scale fine screening and floatation sampling of features and deposits), more likely explain the dearth of *Alosa*

remains on Coastal Plain sites. Further, depending upon the specific cooking process, the bones of alosids can be, and are often consumed with the flesh (Byrd 1997b; Singer 1987; Smithwyck 1997; Spruill 1997). Consequently, an absence of alosid fish remains would result on many archaeological sites. Unintentional chronological bias has resulted from specific research that has concentrated primarily on sites and faunal assemblages from Late Woodland contexts in both the Coastal Plain and Piedmont regions of the state (Scarry and Scarry 1997).

A general review of site reports compiled in the *Anthropological Bibliography of North Carolina* (Phelps 1974), demonstrated that few prehistoric archaeological sites were extensively investigated on the North Carolina Coastal Plain before the mid-1970s. Of the Coastal Plain sites excavated before that era, little effort was spent by researchers on faunal recovery or appropriate faunal analysis techniques. With the advent of Cultural Resource Management (CRM) legislation in the late 1960s and mid-1970s, particularly the National Historic Preservation Act (NHPA) of 1966 and the Archaeological and Historical Preservation Act (AHPA) of 1974, archaeological sites on the North Carolina Coastal Plain were investigated at a much higher frequency. Further, the institution of a regional research facility, the Archaeology Laboratory, at East Carolina University ushered in a new era of archaeological research that focused specifically on eastern North Carolina (Phelps 1983). Through the efforts of projects sponsored by East Carolina University, as well as private sector CRM projects and a small number of projects by the Research Laboratories of Anthropology at the University of North Carolina at Chapel Hill, after the mid-1970s, Coastal Plain sites were located and investigated at an increasing rate (see bibliographic guides: e.g., Bollinger 1982; Hargrove 1980, 1981; Meyers 1984, 1985) [see also regional/drainage survey reports: e.g., Phelps 1978, 1980, 1981, 1982a; Tippitt 1988; Wesler 1978; Wilson 1977] [see also regional syntheses: e.g., Phelps 1982b; 1983; 1984a).

During the ensuing period, many riverine and estuarine sites in eastern North Carolina were located and tested, particularly as part of CRM compliance survey and mitigation. Due to the inherent nature of CRM research, however, time and financial restrictions have generally not allowed investigators to employ large-scale fine-screening or extensive floatation sampling strategies on sites that may have potentially yielded *Alosa* vertebrae or other related skeletal remains. CRM research, as a rule, primarily focuses on site identification and data recovery, not data analysis (Phelps 1983). On the few sites where more rigorous field methodologies were employed, the “grey literature” reports, generated from CRM investigations, included little in-depth or sophisticated analyses of fish remains. Such remains have not been thoroughly analyzed by qualified specialists due to economic constraints, or were simply too fragmented for positive identification. In some instances, site reports simply inventoried fish remains under the blanket classification of “Pices” or “Osteichthyes” (note examples compiled in Scarry and Scarry 1997). Although there are certainly a small number of exceptions, a large portion of the faunal data recovered by CRM projects has not been presented in the most useful format.

Further compounding the general lack of site specific data on *Alosa* exploitation, is the issue of differential faunal preservation. Cultural and natural transformation processes often destroy the delicate bone remains of river herring and shad, leaving precious little for the researcher to recover or analyze (Byrd 1991, 1997b; Lyman 1994). While fish, in general, “...are subject to the same processes of taphonomy as other faunal remains” (fish bones are) “...more vulnerable to the effects of differential preservation than mammal bones due to the former’s relative fragility” (Lyman 1994:435). Soils in many areas of the Coastal Plain are moderate to highly acidic and fish bones preserve poorly in acidic sediments (Byrd 1997b; Lyman 1994; Wheeler and Jones 1989). Acidic soils (pH of 6.5 or lower) dissolve calcium, the primary constituent of bones (Wing and Brown

1979). In shell midden contexts, however, calcium carbonate precipitate from massive quantities of shell enhances bone preservation via ground-water percolation (Byrd 1997b).

Further complicating the chances of archaeological recovery is the fact that river herring and shad have been particularly noted for delicate cranial and rib bones (Byrd 1997b; Wheeler and Jones 1989). Taphonomic studies, reviewed by Byrd (1997b) and Lyman (1994), indicated a greater tendency for the more massive post-cranial bones (e.g., vertebrae) to survive in the archaeological record. Many human consumers in the recent historic past have, however, prepared and cooked river herring in such a manner that the entire post-cranial skeleton is consumed along with the meat and fins (Byrd 1997b; T. Gardner 1997; Singer 1987; Smithwyck 1997). Shad can also be baked, broiled or stewed to the point that rib bones actually dissolve (anonymous 1976b; Smithwyck 1997). Human cooking and mastication processes, as well as those of natural deterioration, over time, have literally resulted in few *Alosa* bones, save the vertebrae, to be found in the archaeological record (Byrd 1991, 1997b; Wheeler and Jones 1989). Domesticated dogs that once lived on both historic and prehistoric period sites have further lead to the complete destruction of faunal remains in open midden contexts (Byrd 1997b; Wing and Brown 1979).

The thorough retrieval of fish bone is extremely difficult because many of the bones are relatively small (Lyman 1994). Accordingly, the presence of fish remains in a faunal assemblage can be greatly affected by site sampling techniques and excavation and recovery biases (Singer 1987). This factor is particularly true of *Alosa* bone remains. The comparatively more massive vertebrae are the only *Alosa* bones that typically survive in the archaeological record (Byrd 1997b). *Alosa* vertebrae are generally small in size and only range from 3.0-5.0 mm in both length and diameter. Many *Alosa* vertebrae have undoubtedly been lost on many archaeological sites since most archaeologist utilize sifting screens that incorporate one-quarter inch (6.35 mm) hardware cloth for

general artifact recovery. It has been suggested that floatation or dry-screening with screen sizes ranging between 0.50 and 2.0 mm must be used to facilitate the extraction of small fish remains, such as *Alosa* vertebrae, from archaeological features (Byrd 1997b; Lyman 1994; Wheeler and Jones 1989). The need for small mesh screens has been clearly demonstrated through experimental studies in faunal recovery techniques (Carlson 1988; Singer 1987) that have demonstrated "...a *minimum* of *seventy-five percent* of all herring-sized bones were lost using one-quarter inch mesh screen" (Singer 1987:85; emphasis added). In a discussion of his analyses of faunal assemblages from three coastal North Carolina sites, Swift (1981) concluded: "Finer screening or analysis of column samples would probably disclose use of many smaller, more abundant edible shore fish such as *Menidia* (silverside), *Fundulus* (killifish), herrings (*Alosa* sps.), and anchovies (*Anchoa* sps.)."

Numerous factors, such as those summarized in the preceding section, provide reasonable explanations for the presently limited amount of hard archaeological data that can be utilized to demonstrate the degree and significance of *Alosa* exploitation in the prehistoric past. The taphonomic biases against alosid bone survivalship in the archaeological record has totally shaped our present perception of the archaeological record on anadromous fishing practices in the North Carolina Coastal Plain region. While direct faunal evidence is limited, site data from other comparable environments of the Atlantic seaboard, particularly in the Northeast, and theoretical models, in fact, suggest that the extensive development of anadromous fishery practices were undertaken during the mid-to-late Holocene period in eastern North Carolina.

CULTURAL SEQUENCE FOR THE NORTH COASTAL REGION OF NORTH CAROLINA

Dates	PERIOD	SUB PERIOD	REGIONAL PHASES	
			TIDEWATER SUB-REGION	INNER COASTAL PLAIN SUB-REGION
1750	HISTORIC	COLONIAL	(CAROLINA ALGONKIAN) MATTAMUSKET	(TUSCARORA / MEHERRIN) INDIAN VILLAGES
1715			INDIANTOWN	CASHIE
1650		LATE	COLINGTON	
800	WOODLAND	MIDDLE	MOCKLEY	MOUNT PLEASANT
300		EARLY	DEEP CREEK	
1000		ARCHAIC	LATE	CROAKER LANDING
2000	SAVANNAH RIVER			
3000	MIDDLE		GUILFORD	HALIFAX
6000			MORROW MOUNTAIN STANLEY	
8000	EARLY	KIRK		
10000	PALEO-INDIAN	LATE	PALMER	
			HARDAWAY-DALTON	
		EARLY	CLOVIS	

(Modified after Phelps 1983)

Figure 3. The Cultural Sequence of Eastern North Carolina (Phelps 1997)

Evolution of Aquatic Resource Focused Cultures in the Middle Atlantic and the Northeast

Anderesen (1979) proposed that Native-American inhabitants of the North American Atlantic seaboard were regularly exploiting aquatic resources (e.g., estuarine, lacustrine, riverine, marine) as early as 8,000 B.C. A number of researchers have discussed archaeological evidence that suggests the intensive prehistoric development of aquatically-based subsistence systems, including the presence of anadromous fisheries, in the Eastern Woodlands, as early as 6,000-3,000 B.C., from Virginia to Maine (Barber 1980; Brennan 1974; Dincauze 1976; Lavin 1988; Petersen and Putnam 1992; Petersen, Robinson, Belknap; Stark, and Kaplan 1994; Speiss 1992; Stevens 1981; Thomas 1980; Yesner, Hamilton and Doyle 1983). Archaeological research has indicated that the earliest known large-scale general exploitation of coastal resources in the South and Middle Atlantic regions, including North Carolina, date to 4,000 to 3,000 B.C. (Custer 1988, 1989; Phelps 1983; Reitz 1988; Stevens 1991). This approximate date coincides with the beginning of the Late Archaic (3,000-1,000 B.C.) period in the cultural sequence of the North Carolina Coastal Plain (Phelps 1997). Much of this subsistence regime may have specifically revolved around organized, seasonal anadromous fisheries as early as the Middle Archaic (5,000-3,000 B.C.) period (Figure 3).

A number of researchers have suggested that major sea level and climatic changes after 8,000-7,000 B.C. had significant effects on the subsistence mix of coastal and coastal plain populations of the Middle and South Atlantic regions of North America (e.g., Blanton and Sassaman 1989; Custer 1986, 1988, 1989; Dent 1995; Joyce 1988; Thomas, Griffith, Wise and Artusy 1975). At present there is much debate over the precise timing and exact nature of early-to-mid-Holocene climatic changes, as well as the impact of such changes on the floral and faunal communities of the Atlantic seaboard (see review in Joyce 1988). Due to a general lack of data, as well as disagreements among disparate researchers on the interpretation of the presently available data, paleoenvironmental

reconstructions of the early and middle Holocene are certainly problematic (see papers in Nicholas 1988) and well outside the scope of this study.

It is sufficient to note, however, that between 8,000-7,000 B.C. on the Middle and South Atlantic seaboard (Joyce 1988), climactic changes and a series of sea level fluctuations generated flooding and dismemberment episodes that greatly altered the region's Pleistocene drainage system. Between 5,500-4,000 B.C., interior riverine flooding from increased precipitation and subsequent runoff (Blanton and Sassaman 1989) combined with rapidly rising sea level (Brooks, Stone, Colquhoun and Brown 1989) to maximize the upstream penetration of alosids and other anadromous fish species (Custer 1984, 1988). Although minor sea level fluctuations continued through the present time, the general estuarine, riverine and topographic transformation to the South and Middle Atlantic coastal plain region was generally complete between 2,500-1,000 B.C. (Dent 1995; Brooks et al. 1989). Custer (1984, 1988) suggested that the reduction or leveling of the annual rate of sea level rise resulted in the increased stability of estuarine environments in the Middle Atlantic 3,000 B.C. South Carolina data, recently collected and synthesized by Brooks et al. (1989), indicated that estuarine environments in the South Atlantic region were stabilized and well developed by 2,500 B.C., if not before that time. The stabilization of temperature and salinity in the estuaries and rivers by 3,000 B.C. produced extensive habitat areas that were conducive to the spawning habits of anadromous fish species (Custer 1988), such as shad and river herring. Anadromous *Alosa* were likely exploited well before the period of climatic stabilization after 3,000 B.C. (e.g., circa 6,000 B.C. shad remains [Petersen and Putnam 1992; Spiess 1992] and circa 3,200 B.C. fish weir sites [Petersen et al. 1994]), but the full subsistence potential of river herring, shad and other anadromous species greatly increased with the onset of such major environmental changes after that time.

Due to Archaic period climatic shifts that fluctuated between warm and dry and warm and wet conditions (Blanton and Sassaman 1989; Brooks et al. 1989), vegetation changes along the South and Middle Atlantic seaboard after 8,000-7,000 B.C. (Blanton and Sassaman 1989; Joyce 1988) combined with related changes in fauna to produce an environment with an extremely rich and diverse resource base (Custer 1989, 1988; Catlin, Custer and Stewart 1982). Over time, climactic conditions enhanced the growth potential and development of nut bearing trees (Joyce 1988), and produced a forest environment conducive to the large-scale evolution of wild turkey and deer populations (Custer 1989). The floral and faunal developments coalesced with increased anadromous fish stocks to provide a much more favorable subsistence mix on the Atlantic seaboard after 3,000 B.C. than what had existed during the Early-to-Middle Archaic (8,000-3,000 B.C.) or Paleo-Indian (12,000-8,000 B.C.) periods. As a result, native populations were able to shift from mobile hunter-gatherer societies to those of a more semi-sedentary or sedentary nature (Custer 1989, 1988; Catlin et al. 1982). Archaeological evidence indicates a shift from numerous temporary collecting and hunting camps that covered broad exploitation areas to more concentrated semi-permanent riverine and estuarine focused settlements along the Atlantic seaboard (Catlin et al. 1982), including eastern North Carolina (Phelps 1983).

Seasonal anadromous fish populations in North Carolina waters during the early prehistoric period contributed to the presence of an extremely productive freshwater environment, equal to or greater than that of the Pacific northwest coast of the United States (Rostlund 1968 [1952]). Shad and river herring resources, combined with a rich variety of other mammalian and reptilian species, as well as wild botanical resources (e.g., nuts, grains and fruits), provided a high level of nutrient flow to the human population. Accordingly, the carrying capacity along the North Carolina Coastal Plain would have been extremely high. The carrying capacity of the region certainly rivaled that of

the Pacific Northwest, which was observed by Wing and Brown (1979) as having been one of the richest nutrient environments in the prehistoric Americas.

Cultural Implications of Anadromous Fish Exploitation

In other regions of the Northeast and Atlantic seaboard, prehistoric anadromous fish exploitation has been interpreted as one of the major contributing factors in the development of increased regional populations and the evolution of sedentism during the Late Archaic (3,000-1,000 B.C.) and Early Woodland (1,000-300 B.C.) periods, particularly in the vicinity of drainage systems that were important seasonal spawning grounds (Custer 1988; Yesner et al. 1983; Cleland 1982; Schalk 1977). Schalk (1977:231) concluded: "In the more southerly areas (middle and South Atlantic states), increasing dependence upon anadromous fish should involve a gradual process of decreasing mobility associated with population growth...In these environments, anadromous fish would tend to increase the carrying capacity for human populations." In a global comparative study of contemporary, fishery dependent populations, Palsson (1988:202) demonstrated: "The importance of fishing correlates positively with permanence of settlement, group size, levels of hierarchy, degree of stratification...and domestic organization."

Due to year-round availability of other fish species that could be consumed fresh, Schalk (1977) stated that Southeastern native groups had no need to cure and store anadromous fish catches. The author of this study suggests, however, that it is more probable that the cultures of the North Carolina Coastal Plain who had access to anadromous fish runs regularly depended upon the storable nature of the resource. Inherent biological qualities that lend themselves to preservation and storage, make shad and river herring a potentially significant resource for subsistence as well as trade. Further, the biological nature of the *Alosa* species ensured seasonally predictable spawning

runs in massive abundance on all of the regions sounds, rivers and tributaries. This fact was certainly deduced and capitalized upon by historic period populations in eastern North Carolina from the time of European exploration through the mid-twentieth century (see Chapters III and IV). As such it is not unreasonable to expect that aboriginal populations on the Coastal Plain were exploiting *Alosa* resources for similar reasons (e.g., accessibility, availability, predictability, storability). This assumption must, however, be demonstrated.

Schalk (1977) and Cleland (1982) have proposed that certain characteristics would develop among cultures who systematically exploited anadromous fish runs in the prehistoric past. Schalk (1977) observed that anadromous fish exploitation is a form of subsistence specialization that has a logical bridge to the development of food storage. He concluded that resource specialization, as such, is directly related to the ease in which many anadromous fish can be stored in different environments (Schalk 1977). Byrd (1997a) suggested advanced fishing technology developed when a culture sought to support larger populations with aquatic resources. He noted: "The larger quantities of fish captured also promote food storage since capture rates can often exceed immediate consumption rates, sometimes greatly so" (Byrd 1997a:53). The development of a storage strategy represents an evolutionary threshold by allowing populations to achieve a degree of independence from the natural environment's inherent propensity for cyclical productivity. Storage creates an artificial means of increasing the carrying capacity of the environment to carry populations through natural low periods of resource productivity (Schalk 1977). As such, food storage "...reinforces sedentism itself by enabling lean periods to be managed without moving the entire camp" (Renouf 1991:99). Byrd (1997a:53) further concluded: "Food storage makes permanent occupation of a location possible in the face of seasonal shortfalls of resource availability and raises the carrying capacity of the local

environment where storable resources are available in great abundance in certain seasons, as is often the case with fish runs.”

Once populations increase through dependency upon food storage (domesticated or wild flora and fauna), mobility is decreased, which, in turn, leads to further sedentary habits and an increased dependency on stored foods. As a result, both seasonal and permanent settlement patterns shift. In the case of cultures that exploit anadromous fish, temporary or permanent settlement is most likely to occur in areas where spawning fish concentrate in a particular season (Schalk 1977). Schalk (1977:232) proposed that “...greater and more dependable quantities of (anadromous) fish...(can only be taken at)...exploitation points on larger streams or further downstream.” Accordingly, he implied that the greatest concentration of settlement sites would be found at such geographic locations (e.g., specifically on large streams and near the mouths of large rivers and streams). Historical observations by North Carolina shad and river herring fishermen indicate that Schalk’s basic assumption was not totally correct, because anadromous fish biomass will be variable from microenvironment to microenvironment. Modern period, small-scale commercial and subsistence level fishermen, in fact, often harvested both shad and river herring in tributary connected swamps, ponds, ditches, canals and at the greatest upstream locations on creeks and streams (Smithwyck 1997; T. Gardner 1997; Fenner 1995; Spruill 1995), as well as major waterways and sounds (Layton 1997; Spruill 1997). The accessibility to spawning *Alosa* runs relates directly to the specific spawning habits of the four major *Alosa* species in North Carolina waters (see Chapter I). As such, seasonal movements (foraging bands) and settlement patterns (semi-sedentary hunter-gatherers or sedentary horticulturalists) for groups that focused on the exploitation of shad and river herring would only be restricted in a general sense, due to the need to access spawning grounds. The

settlement pattern would, however, be highly variable in relation to specific types of waterways on which they were located.

According to Schalk (1977), technological changes, to maximize the extraction quantity in a shorter period of time, would develop with the progressive evolution of seasonal anadromous fisheries in a culture. Schalk (1977) and Cleland (1982) have implied that populations with seasonal anadromous fish exploitation foci, would only employ gear technology that included a limited range of large-scale capture devices, particularly weirs, traps and seine nets. Historic period fisheries data, however, demonstrate that family level fisheries in eastern North Carolina were quite capable of harvesting thousands of pounds of shad and river herring in a short period of time utilizing the simplest of home-made dip nets, basket nets and gill (set or drift) nets (Smithwyck 1997; Gardner 1997; Smith 1997; Fenner 1995; Spruill 1995).

While weirs and seines were more efficient in terms of labor expenditure during the fishing season (Byrd 1997a), they were certainly less labor efficient, as compared to dip or gill nets, in terms of construction and general maintenance from season to season (Cohen 1977). Ethnohistoric accounts from the early contact and proto-historic periods in eastern North Carolina and Virginia have indicated that the weir was the most popular gear among native cultures for the harvesting of fish (e.g., Beverly 1947 [1705]); Harriot 1972 [1590]; Lawson 1967 [1709]; Strachey 1953 [1612]). Based on such observations, it may be assumed that the weir was the most prevalent, but not the only gear utilized to capture spawning shad and river herring in the remote prehistoric past.

Schalk (1977) and Cleland (1982) further suggested that the processing and storing of the catch would lead to technological innovation in the areas of drying or smoking racks, storage baskets and storage pits. Parallel to technological changes related to the exploitation and storage of anadromous fish catches, social or labor organization changes would naturally follow (Cleland 1982;

Cohen 1977; Schalk 1977). Such social changes would result from the need for organized labor in the pre-fishing season to construct and maintain large-scale fishing gear (e.g., weirs and seines) and to construct processing and storage facilities. Further, organized labor would be required during the fishing season to harvest the fish with large-scale capture devices and to process the fish once they were taken from the water (Byrd 1997a; Cleland 1982; Cohen 1977; Schalk 1977). Cleland (1982:775) noted that a seasonal anadromous "...fishery was a labor intensive-operation and undoubtedly community enterprise. This work not only involved the setting and tending of nets (or weirs), but the manufacture, care, and repair of nets (or weirs) and the processing of the catch."

One researcher, in a study of the Tanana Athabaskan Indians, studying observed that "...the fish weirs required considerable collective effort in their construction and use, and so, they served as nucleating centers. ... Most of the fish were dried and stored in underground caches for later consumption" (McKenna 1981; quoted in Petersen et al. 1994:197). The demands for coordinated, organized labor for anadromous fish exploitation and long-term storage would potentially contribute to the development of a more complex, less egalitarian, social structure (Schalk 1977) through the organization and implementation of a large-scale community enterprise each spawning season (Cleland (1982). Arnold (1996) has suggested that a strong the correlation exists between the fundamental reorganization of labor and increased cultural complexity. Byrd (1997a:52), citing Larson (1980), hypothesized that communal weirs facilitated "...an environment in which elites are able to rise to power. The effort involved in the construction of fish weirs encourages sedentism and even territorialism where they have been constructed."

In a similar vein, another researcher, citing research by Ames (1985) stated: "Hierarchical leadership may have evolved in such regions in order to coordinate the complex scheduling required for catching, processing, and storing spatiotemporally aggregated anadromous fish resources"

(Yesner 1987:302). Although Cleland (1982:778) concluded that the cooperative nature of large-scale fisheries would not necessarily lead to "...the presence of some political mechanism for the (re)distribution of food obtained through cooperative effort (a hallmark of complex prehistoric cultures)," it is not outside the realm of possibilities of the ramifications of such fishery enterprises.

Palsson's (1988) global ethnographic survey indicated that any large-scale, seasonal dependence upon fisheries would tend to lead to cultural complexity in the form of levels of political hierarchy, a degree of social stratification and domestic organization or gender roles. In another global comparative study, Keeley (1988) found that there was a strong positive relationship between a culture's food storage capability, population density, and social stratification. It has been suggested that advanced fishing gear technology (e.g., large weirs, tidal traps, seines) can support greater population density in smaller areas, leading to greater stress on local terrestrial food sources, which will lead to population pressure, a suggested causal factor of increased cultural complexity (Byrd 1997a; Keeley 1988). Keeley (1988) further noted that cultures, such as those found in prehistoric eastern North Carolina, particularly those that lack domesticated animals, are forced to exploit more aquatic resources and fewer terrestrial animals for food as their populations increase.

Schalk (1977) stated that cultural and technological changes concomitant to a specific focus on anadromous fish exploitation are naturally most apparent in the prehistoric populations of the Pacific Northwest, where the general lack of agriculture and other wild resources was more severe in the prehistoric past. Accordingly, the degree of subsistence specialization, related to anadromous fisheries, was more acute in that region, as compared to the Middle and South Atlantic regions. Unlike the Pacific Northwest, the Middle and South Atlantic regions exhibited a greater diversity and richness of wild plant and animal species, as well as flourishing agriculture in the later prehistoric period (Schalk 1977). In addition to such observations by Schalk (1977), Cleland (1982)

questioned the storable nature of smoked fish through the late spring and summer months. Cleland (1982) concluded that the cultural ramifications, related to anadromous fish storage, were nullified among Eastern Woodland cultures that harvested spring spawning runs in the more southerly latitudes, as the catch could not be protected from rapid spoilage due to the onset of late spring and summer heat. In light of the conclusions drawn by Schalk (1977) and Cleland (1982), the expected impact of anadromous fisheries on the development of social structure, technology, and settlement patterns in regions such as eastern North Carolina or the coastal plain region of southeastern North America would not be expected to be as far-reaching as the impact upon the cultures of the Pacific Northwest. The author of this study suggests, however, that these particular conclusions by Schalk (1977) and Cleland (1982) were not wholly correct. Given the present, albeit limited, archaeological and ethnohistoric data regarding prehistoric anadromous fisheries in eastern North Carolina, the author suggests that such fisheries were equally significant to, and resulted in equally similar impacts on, the prehistoric peoples of eastern North Carolina. The author further suggests that modified models of anadromous fish exploitation, as presented by Schalk (1977) and Cleland (1982), can certainly be applied to prehistoric eastern North Carolina. As will be demonstrated in the forthcoming section, these hypotheses can be supported by presently available specific and regional comparative data.

Evolution of Aquatic Resource Focused Cultures in Eastern North Carolina

Some researchers have concluded that intensive fishing practices in North America were largely abandoned for a more intensive combination of horticultural and foraging strategies during the Middle (300 B.C.-A.D. 800) and Late Woodland (A.D. 800-1650) periods (see Stewart 1990). Theoretically oriented subsistence studies (e.g., Byrd 1997a; Keeley 1988) and the present

archaeological and ethnohistoric data from the North Carolina Coastal Plain does not support such conclusions (Byrd 1997b; Phelps 1983; Larson 1980; Rostlund 1968 [1952]). Archaeological surveys have indicated a significant increase in the number of seasonally occupied sites in eastern North Carolina, from 1,000 B.C. onward, along the major trunk streams, tributaries and estuaries (Phelps 1983).

By 3,000 B. C., artifact assemblages from North Carolina Coastal Plain sites typically include stone net-sinkers (Phelps 1983), which have been interpreted in other Middle Atlantic or Northeast regions as having been developed explicitly to exploit schooling anadromous fish varieties such as shad and river herring (Kraft 1986a, 1986b; Stewart et al. 1986; Catlin et al. 1982; Barber 1980). In a similar vein, other tools, such as bifacial blades, heavy stone blades, adzes, axes and chisels, have been interpreted as either tools for processing massive fish catches or for preparing and maintaining a range of fishing gears that included wooden or fibrous gear, such as dugout canoes, weirs, leisters, seine nets, cast nets, gill nets and scoop nets (Barber 1980; Catlin et al. 1982; Kraft 1986a, 1986b; Petersen et al. 1994; Stewart et al. 1986). Although similar type hearth features have not been encountered in eastern North Carolina, a number of large platform hearth features have been excavated on Late Archaic (3,000-1,000 B.C.) and Woodland (1,000 B.C.-A.D. 1650) sites in the Chesapeake Bay area of Virginia (Dent 1995; Catlin et al. 1982). The Chesapeake Bay drainage system, like Coastal Plain North Carolina, has long been known for its extensive spawning runs of shad and river herring (Strachey 1953 [1612]; Smith 1895 [1612]; United States Department of the Interior 1970). It has been suggested that such platform hearths were specifically built for the processing (e.g., smoke drying) of massive anadromous fish catches (Dent 1995; Catlin et al. 1982); ten meter diameter hearths have been recorded in the region (Dent 1995).

On the Coastal Plain of North Carolina, Late Archaic (3,000-1,000 B.C.) sites are most commonly located on major trunk streams and their entire tributary systems, as well as floodplain swamps and estuary shores (Phelps 1983). Large-scale anadromous fisheries may have developed during this period when the combination of “gardening and fishing” became increasingly significant by 2,000 B.C. The subsistence foci of gardening and fishing further encouraged greater selectivity in site locations than was previously exhibited by highly mobile foraging cultures of the Early and Middle Archaic period (8,000 to 3,000 B.C.) (Byrd 1997b). Sites situated along the tributary systems and swamps connected to the major rivers, by tributary streams, would have been ideal locations for small groups to exploit shad and river herring with portable, small-scale fishing gear such as dip nets, basket traps and short seine nets. Unfortunately, “The specific foods utilized during the Archaic Period must await data from excavated sites with sufficient preservation. At the moment, the subsistence patterns may be implied from site locations in relation to potential resources within their presumed catchment areas” (Phelps 1983:24).

There was little change in settlement patterns between the Late Archaic and the Early Woodland periods (3,000-300 B.C.). There was, however, a greater tendency for Early Woodland (1,000-300 B.C.) peoples to position their habitation sites along major trunk streams and smaller tributary streams (Byrd 1997b). Presently, little is known about Early Woodland subsistence or settlement pattern in eastern North Carolina (Phelps 1983). The author suggests that both Late Archaic (3,000-1,000 B.C.) and Early Woodland (1,000-300 B.C.) period peoples on the Coastal Plain were adapting to a semi-sedentary lifestyle that Yesner (1987:299) described as communities whose members shift from one to another fixed settlement at different seasons, or who occupy more or less permanently a single settlement from which a substantial portion of the population departs seasonally to occupy shifting camps.” The evolution to sedentary behavior in this period can be

inferred by the ubiquity of steatite vessel forms in the Late Archaic, Savannah River phase (3,000-1,000 B.C.) artifact assemblage, as well as the presence of decorative bone pin designs and complex burial behavior (Phelps 1983). Later in the same period an explosion of ceramic vessel technology began with the introduction of Croaker Landing series, clay tempered, ceramics to the northern Coastal Plain by 2,000 B.C. (Phelps 1997). The apparent trend towards sedentism and subsistence specialization that developed in the Late Archaic (3,000-1,000 B.C.) period (Phelps 1983), was perhaps stimulated by the specific utilization of anadromous fish species and the development of early forms of plant domesticates (e.g., sunflower, sumpweed, goosefoot) in combination with existing hunting and foraging activities.

Phelps (1983) considered the shifts in settlement patterns during the Archaic to Early / Middle Woodland periods to be specifically indicative of subsistence specialization foci. Middle Woodland (300 B.C.-A.D. 800) sites are most commonly found along major trunk streams and estuaries with a dramatic reduction in site frequency on the lesser tributary streams in the interior (Phelps 1983). As Cleland (1982) observed for the Great Lakes region, habitation sites located on large bodies of water (e.g., major trunk streams and estuaries), may be further indicative of the development of large-scale fishing gear technologies, such as weirs or haul seines that more effectively exploited the same species that were harvested with portable, low complexity gear in the preceding periods. Seasonal camps for the exploitation of aquatic species were common in both the coastal areas and in the interior riverine and estuarine areas during the period (Phelps 1983).

The best evidence of native exploitation of alosids, however, comes from the Late Woodland (A.D. 800-1650) period. There are three primary reasons for this observation: (1) faunal preservation from later sites tends to be better; (2) there is a somewhat larger sample of excavated and analyzed faunal collections from the period; and (3) ethnohistorical accounts from late in the

period provide some insight into the centuries just before European contact. By the later Middle Woodland period, circa A.D. 400 (Byrd 1997b), and perhaps as early as A.D. 100, in North Carolina (Phelps 1983), maize agriculture had been introduced to most areas along the South and Middle Atlantic (Custer 1988). Late Woodland (A.D. 800-1650) sites in the coastal plain regions of the Middle Atlantic were typically of either sedentary or semi-sedentary nature and were all, at least partially, supported by agriculture (Custer 1988). In North Carolina, Late Woodland (A.D. 800-1650) sites on the Coastal Plain were primarily concentrated along sounds, estuaries, major rivers and major tributaries, particularly near the confluences of rivers and tributary streams (Phelps 1983). Sites were selected for multiple adaptations, including agriculture, fishing, hunting and gathering (Byrd 1997b; Phelps 1983). As supported by limited archaeological and ethnohistorical inference, such site selections were certainly conducive to the continued exploitation of anadromous fish.

Ethnohistoric Evidence of Alosa Exploitation in Eastern North Carolina

Early historical accounts by Thomas Harriot (1972 [1590]), William Strachey (1953 [1612]), John Lawson (1967 [1709]) and others provide some evidence of *Alosa* exploitation by Coastal Plain natives at the time of European contact. Their observations greatly supplement the archaeological record as a rich source of information on native fishing practices. In his *Briefe and True Report of the New Found Land of Virginia*, Thomas Harriot (1972 [1590]:20) described the river herring that he encountered in the Roanoke Island area, as well as the Carolina Algonkians' utilization of the species during the late sixteenth century. He observed:

For foure monethes of the yeere, February, March, Aprill and May, there are plentie of Sturgeons: And also in the same monethes of Herrings, some of the ordinary bignesse as ours in England, but the most part farre greater, of eighteene, twentie inches, and some two foote in length and better; both these kindes of fish in those

monethes are most plentiful, and best in season, which wee founde to bee most delicate and pleasaunt meate.

Harriot (1972 [1590]:20) further noted that “the inhabitants use to take them (fish)...by a kinde of wear made of reedes which in that country are very strong.” An early seventeenth century observer, William Strachey, provided more detail on *Alosa* exploitation by Algonkian groups in southeastern Virginia.

In the estuarine and riverine waters of the Chesapeake Bay region, Strachey (1953 [1612]:127) observed both “Shadds great store of a Yard long...” and “...great Shoells of Herrings.” He further noted of the Algonkians: “In March and April they live much upon their Weeres, and feed on fish...” In “May they plant their fields and sett their Come, and live after those Monthes most of Acrons, Wallnuts, Chesnutts...and Fish...In June, July, and August they feed upon the rootes of Tockohow-berryes, Ground-nuts, Fish and greene Wheat...” (Strachey 1953 [1612]:80) (see also Smith 1895 [1612]). Although Strachey’s early seventeenth century observations did not elaborate upon the specific fish species taken in the weirs in the months of March and April, it is likely that river herring and shad were the principle species harvested, along with significantly lesser quantities of white perch, *Morone americana* (Gmelin), or striped bass (“rock”, “rockfish”), *M. saxatilis* (Walbaum), all of which are taken in modern pound nets during the present day spring fishing season.

Further, it is probable that a portion of the fish consumed after the month May were dried river herring or shad, since the four locally available species are presently known to “cure out” better than most other species harvested in the spring fishing season, due to a relatively higher fat content and low flesh to bone ratio (Smithwyck 1997; Spruill 1997). The potential significance of the shad and river herring as a long-term storable resource was further implied by Strachey (1953 [1612]:80)

when he noted that the Algonkians smoked their catch over hurdles until they were cooked or dried in a fashion similar to jerked beef cured in the West Indies. According to Strachey (1953 [1612]:80), the natives stored smoked fish to be utilized over the period of several months. As such, *Alosa* species harvested in late April or May were likely utilized at least until the end of summer harvests, if not well into the fall of the year. Sun-dried fish generally last for at least two months if properly stored in moderate climates, while smoked fish tend to preserve longer, due to the antimicrobial action of smoke compounds that are absorbed by the meat (Sikorski, Gildberg and Ruiter 1995).

A century after Thomas Harriot's observations among the Coastal Algonkians, North Carolina's first Surveyor General, John Lawson, observed the Tuscarora Indians of the Inner Coastal Plain utilizing weirs to procure shad and river herring. He described the prolific spring river herring runs and noted: "They (river herring) spawn there in *March and April*, running up the fresh Rivers and small fresh Runs of Water in great Shoals, where they are taken" (Lawson 1967 [1709]:161). Just as the Algonkian peoples on the Outer Coastal Plain of Virginia and North Carolina, the Tuscarora peoples, who lived along the Neuse, Tar-Pamlico and Roanoke River drainages during the Late Woodland (A.D. 800-1650) period, likely relied on river herring and shad as an important element in their annual subsistence mix. In the successful capture of spawning anadromous fish, Lawson (1967 [1709]:217-218) observed that the Tuscarora Indians were "...very expert in taking the Fish of the Rivers and Waters near which they inhabit...where the Savages make great Wares, with Hedges that hinder their (river herring) Passage only in the Middle, where an artificial Pound is made to take them in; so that they cannot return. This method is used all over the fresh Streams."

John White's paintings (Figures 4 and 5) from the late sixteenth century period lend credence to the observations made by Harriot and Strachey. His illustration of Algonkian fishermen



Figure 4. John White Painting of Algonkian Fishing Methods
(From Hulton 1984:73 [Plate 43.]).



Figure 5. Theodore De Bry Engraving of Algonkian Fishing Methods. Made After John White's Painting (From Lorant 1946: 251 [Plate 13.]).

on the Carolina coast demonstrated the varied range of fishing technologies available to native cultures of the sixteenth century. White's painting (Figure 4) indicated the use of complex fish weirs, scoops, nets, fishing spears, and dugout canoes. Quinn (1991 [1955]:359n) has suggested that the fish in the Algonkian canoe, illustrated in the White painting (Figure 4), appear to be shad. Nets and weirs were no doubt used to catch river herring and shad, but spears, as with the case of the extensive number of bone fishhooks that have been found on various Coastal Plain sites (Phelps 1983), were used only to capture larger species of fish. As, Rostlund (1968 [1952]:113) observed: "A baited hook is rarely taken by salmon and shad while ascending rivers."

It is probable that the gear or capture technology used to harvest spawning river herring and shad varied from microenvironment to microenvironment. In the sounds (e.g., Albemarle or Croatan Sound) or mouths of broad rivers with slower moving currents (e.g., Chowan River, Middle River, Cashie River), weirs or traps would have been employed, just as pound nets have been employed in the present century. In faster moving bodies of water (e.g., Roanoke River), seines or drift gill nets were probably used, since fixed nets or traps typically do not survive the strain of fast moving currents, particularly during the high water floods during in the spring fishing season. Small set gill nets, dip nets and weirs were most utilized in swampy waters or small tributary creeks and streams, just as European and African descent peoples have employed in North Carolina waters since the colonial era (see Chapter III and IV).

Rostlund (1968 [1952]) noted that while nets were important to native anadromous fisheries, weirs and traps were the most common and important methods of capture. "From Florida to the St. Lawrence the weir appears to have been the most commonly employed device for the taking of shad and the alewife (river herring) in aboriginal time" (Rostlund 1968 [1952]:15). He further indicated that while seine nets and gill nets were "...the most advanced and efficient fishing

implements known to the American Indians,” “...there is no doubt that the weir and trap fishery was economically by far the most important” (Rostlund 1968 [1952]:102). Even with an aggregated labor force, weirs were more economical to maintain and repair than large seine or gill nets, which require continual maintenance before, during and after the fishing season (Byrd 1997a; Cohen 1977). Dent (1995) concluded that traps and weirs were necessary to catch significant quantities of spawning anadromous fish such as shad and river herring. Modern informants, however, have indicated, in the recent historic past, gill nets and bow nets (e.g., dip nets) were more than sufficient to provide a large family unit with enough river herring to last an entire year (Fenner 1995; Spruill 1995; Smithwyck 1997).

Even though archaeological remnants of aboriginal fish weirs have not been encountered on North Carolina's Coastal Plain, they undoubtedly exist in the muddy sediments of the rivers and tributaries of the Pamlico and Albemarle Sound drainages. Archaeological remains of native weirs have been recovered in other areas of the Atlantic seaboard, such as Virginia (Dent 1995; Binford 1964), Massachusetts (Barber 1980; Cohen 1977), Maine (Petersen et al. 1994) and Delaware (Custer 1984), as well as in Piedmont region of North Carolina (Binford 1964). The majority of the known fish weirs are, however, made of stone, as were those found in the Piedmont region of North Carolina. North Carolina Coastal Plain weirs were constructed in various fashions, but rather than stone, were probably constructed of plant materials (e.g., fibrous cordage, reeds, grass mats, wooden splints and posts, etc.).

John White illustrated various Algonkian fishing techniques and showed a weir in his painting (Figure 4). The weir shown is probably a highly stylized version, as it appears not to incorporate the labyrinth of crooks, turns, and traps, later described by Strachey (1953 [1612]) and Beverly (1947 [1705]), necessary for a functioning fish trap. The De Bry woodcut version (Figure

5), though highly stylized, may be somewhat more accurate in that it shows the actual “cods” or “chambers” as described below by Strachey and Beverly. The chambers are reminiscent of the “hearts” found on contemporary pound nets in the Albemarle-Pamlico region today (see description of pound nets in Appendix A).

Unlike the weirs depicted in the White painting (Figure 4) or the De Bry engraving (Figure 5), modern pound nets have “leads” that run perpendicular to the heart and pound openings, rather than horizontal to the openings, as shown in the sixteenth century illustrations. Whether or not White and De Bry were correct is largely irrelevant, since the principle was essentially the same either way. Weirs were undoubtedly effective enough that European settlers in North Carolina adopted them for both local subsistence (Lawson 1967 [1709]) and export commercial (Leary 1915) fisheries in the eighteenth century. The author suspects that there were many variations on the same theme in North Carolina waters alone. A review of Goode (1887) is particularly illustrative of the great diversity of hand crafted weirs and pound net designs that were employed in North America during the last century. Although Old World European influences cannot be discounted, many of the brush and slat weirs used in the New England and Middle Atlantic sardine fisheries during the 1880s (Goode 1887) likely borrowed extensively from age-old Native-American fishing gear technology.

Thomas Harriot (1972 [1590]:23) indicated that the coastal Algonkian’s “...use onely reedes, which because they are so strong as also flexible...(for)...the making of weares and weeles (basket traps) to take fish.” It is likely, however, that other styles of weirs were constructed in a much simpler fashion by using saplings and brush in a manner similar to those employed by sardine and river herring fishermen of the nineteenth century North Atlantic coast (Goode 1887). The range of raw materials utilized to construct weirs undoubtedly varied with the local environment. On Inner

Coastal Plain sites where wood and brush were more readily available than out on the coastal islands, materials other than reeds were utilized in the construction of the weirs.

Strachey (1953 [1612]:75) further described the native weirs as "...certayne inclosures made of Reedes and framed in the fashion of a Labourinth or Maze, sett a fathome deepe in the water, with diverse Chambers or bedds, out of which the entangled Fish cannot retourne or get out being once in..." where "...he remaynes a pray to the Fisher-man the next low water, which they fish with a nett tyed at the end of a pole." In the early eighteenth century, Robert Beverly (1947 [1705]:148) described the typical Virginia or Carolina Algonkian weir as:

A Hedge of small riv'd Sticks, or Reeds, of the Thickness of a Man's Finger, these they wove together in a Row, with Straps of Green Oak, or other tough Wood, so close that the small Fish cou'd not pass through Upon High Water Mark, they pitched one End of this Hedge, and the other they extended into the River, to the Depth of Eight or Ten Foot, fastening it with Stakes, making Cods (e.g., inner pockets) out from the Hedge on one side, almost at the End, and leaving a Gap for the Fish to go into them, which were contrived so that the Fish could easily find their Passage into those Cods...but could not see Their way out again, when they were in.

Recent investigations of a fish weir in Maine have shed new light on the timing of the development of weirs and construction techniques in the Eastern Woodlands. Petersen et al. (1994) studied the remains of an extensive weir complex that is located approximately 120 kilometers inland on the Sebasticook River. A sample of radiocarbon dates from weir stakes, organic materials from core samples and diagnostic artifacts indicated that the weir complex was initially constructed around 3,100 B.C. (Late Archaic period) and continually maintained, expanded and rebuilt until about A.D. 170 (Middle Woodland period) (Petersen et al. 1994:213-215). The remaining remnants of the weir consist of the central vertical posts that were originally driven into the mud bottom of the river. Only fragmentary evidence of the weir's horizontal elements have been recovered to date. The

exposed post tops rotted away over time, leaving the lower sections of the posts intact below the waterline. Portions of the weir were completely buried by mud and sediments as the river channel migrated northward. Archaic period posts were more refined and well trimmed with carefully sharpened, axe cut bases. The later Woodland period posts were crudely trimmed with bases that indicated small trees were girdled or notched and then snapped off to form a blunted tip. The weir was constructed of locally available wood types that included eastern hemlock, birch, ash and elm, all wet environment species. There was no evidence of differential wood selection over time, a species were equally represented in the various time periods (Petersen et al. 1994).

Robert Beverly (1947 [1705]) noted the use of stone weirs in the rapids areas of Virginia with cone-shaped reed baskets placed at tunnels or openings in the weir to catch fish, such as spawning river herring or shad, that moved up or down river. The utilization of stone weirs by either Algonkian or Tuscarora fishermen on North Carolina's Coastal Plain, however, was not likely since rocks, large enough to construct such weirs, are not found in sufficient quantity to construct weirs. The Tuscarora and Siouan groups that inhabited the western part of the Coastal Plain, along the fall line, may have constructed stone weirs to trap herring or shad, but the archaeological evidence of stone fish weirs in the region, to date, has been negative (David Phelps, East Carolina University, personal communication 1997).

Thomas Harriot further recorded the aboriginal deployment of "weeles" or basket-like traps for fishing (Quinn 1991 [1955]: 365). Unfortunately, Harriot did not elaborate upon the design. The basket-traps may have, however, resembled the conical Iroquoian "basket fish nets" described by ethnographers in the late nineteenth century (Morgan 1966 [1901]). Such relatively small basket-traps were probably not used for shad or river herring fisheries, unless in narrow tributary streams or swampy areas where modern subsistence fishermen were known to have used vegetable baskets to

harvest river herring (Spruill 1995). It is most probable that a combination of nets and weirs were the primary apparatuses utilized to harvest shad and river herring. Even though shad will bite a baited hook, river herring do not (Taylor 1951). Further, complex gear technology, seine and gill nets or weirs and traps, is more economical in terms of caloric and energy expenditure in relation to pounds of energy harvested. Seine and gill nets or traps and weirs can so dramatically increase the pounds harvested, over hand cast and dip nets or hook-and-line technology, that the reliability of fishing is greatly increased (Byrd 1997a). Rostlund (1968 [1951]:81) stated: "a fish net captures fish in mass...wherever nets can be used, more fish can be taken with them and with less effort than by any other method...except perhaps by the complete blocking of a major salmon or shad river with a weir."

Although the earliest remnants of purported fishing nets on the Atlantic seaboard dates back to at least 7,000 B.C. (Cleland 1982), definitive net evidence in North Carolina, to date, is much more recent in time. To date, actual net samples have not been recovered from prehistoric sites in North Carolina. Since the cordage was made from organic materials, it quickly rotted within a few decades after its use. Nets capable capturing shad and river herring were likely produced in eastern North Carolina well before 1,000 B.C., due to the observed proliferation of net impressed surfaces on Deep Creek (Early Woodland [1,000-300 B.C.]), Mount Pleasant (Middle Woodland [300 B.C.- A.D. 800]), and Mockley (late Middle Woodland [A.D. 600-800]) ceramic series vessels (see Phelps [1983] for further elaboration on ceramic characteristics). As is the case with Chesapeake Bay sites in Virginia, "The existence of nets is verified by surface impressions on pottery sherds, although use of the same nets for fishing cannot be demonstrated" (Whyte 1988:115).

Ethnohistoric observations indicate the general net construction techniques, but not specific uses of nets by the Coastal Algonkians or the Tuscarora peoples of the Inner Coastal Plain. Nets

from the prehistoric period, as inferred by the ceramic surface treatments, were likely constructed in a similar fashion. In the early seventeenth century, Strachey (1953 [1612]:75) noted that the coastal Algonkians used nets "...which they make of their naturall hemp and flax together with their cunning dressing of that and preserving the whole yeare great Litches or bundlles of the same to be vsed vpon any occasion." He described the native nets "...as formally brayed and mashed as ours, and these are made of barks of certayne trees, deere synewes, for a kynd of grasse, which they call *Pemmenaw*, of which their women betweene their handes and thighes spin a threed very even and readely, and this threed serveth for many vses" (Strachey 1953 [1612]:82) (see also Smith 1895 [1612]). Although Strachey did not further elaborate on net construction among the Southern Algonkians that he observed, among Northern Algonkian groups, there is evidence that the women procured the fibers and produced the cordage, while the men actually tied the nets (Cleland 1982). Among other cultures in the Southeast, women both made the cordage and tied the nets (Hudson 1976). In his descriptive work on early North Carolina, John Lawson did not specifically describe the manufacture or use of nets among the Tuscarora Indians. Nets, however, were undoubtedly utilized and possibly made from a type of cordage that Lawson described as being made from the bark of an "...Elm that grows in low Ground..." (Lawson 1967 [1709]:100). Lawson further observed that both the English and the Indians made ropes from bark stripped from the low ground Elm.

Rostlund (1968 [1952]:15) concluded that there was no evidence that "...Indians on the Atlantic coast south of Pennsylvania ever made use of large nets deserving the name of seine or gill nets." It is unlikely that native nets, made from plant fibers, would be comparable to the great haul seine nets of the nineteenth century river herring fisheries, but would have been of the small hand seine, cast, gill (set or drift) or dip net varieties, which complemented the other available fishing

technologies utilized by North Carolina's various native groups. Although large nets are highly efficient, they are much more difficult to construct, maintain, set and recover. Large nets are more labor demanding when compared to the near equally efficient weir which works well in shallow waters (Cleland 1982; Rostlund 1968 [1951]), such as those found in the sounds and rivers of eastern North Carolina.

Hand or dip nets were undoubtedly used to capture both shad and river herring in small streams and swamps. John White's painting (Figure 4) illustrated at least one variety of dip net, circular in form, with a long handle. There were probably a broad range of variations on the general form. From southwest Florida sites, "...fine meshed, square dip nets..." (Swanton 1987 [1946]: 337) were recovered by archaeologists in the late nineteenth century. Unfortunately, these nets did not survive in museum collections to the present time (Walker 1992). Similarly configured dip nets were likely to have been utilized in North Carolina waters to scoop up spawning river herring and shad from creek banks or weir impoundments. Robert Beverley (1947 [1705]:149) of Virginia observed that the Southern Algonkians used dip nets "...made of Silk Grass, which they used in Fishing their Weirs." In general, the gear selected would have been determined by prevailing water and bottom conditions, as well as the target species.

Ethnohistoric Evidence for Preservation and Storage of Anadromous Fish

Preservation of river herring and shad catches by smoke drying over fire seems to have been the usual method employed by native Carolinians (e.g., Beverley 1947 [1705]); Harriot 1972 [1590]; Lawson 1967 [1709]; Strachey 1953 [1612]), as well as around North America in general (Hudson 1976; Schalk 1977; Swanton 1987 [1946]). Rostlund's (1968 [1952]:137-138) survey of Native-American fish preservation techniques indicate: "The drying process was the most widely and

commonly used method of preserving fish in aboriginal North America, (while)...smoking had nearly as wide a distribution as drying.” In the manner of most other native peoples of North America, North Carolina’s Indian cultures likely utilized the method that best suited the prevailing conditions (Whyte 1988). Whyte (1988) suggested that aboriginal fish preparation techniques were likely both species and size-specific. As observed by Stewart (1977:135), “Improperly dried fish turned moldy and spoiled...the preservation of the catch was as important as the quantity.” Yesner (1987) indicated that oily fish species, such as shad and river herring, were most commonly smoke-dried, and even cold stored in storage pits in the northern temperate zones.

Fish can be cured to last several months in tropical climates by smoke drying. Heavy smoking causes a substantial loss of moisture in the fish and introduces smoke compounds, such as formic and acetic acid, carbonyl, and phenols, all of which inhibit microbial growth. The preservative effects of smoking are further enhanced by the addition of salts (Sikorski et al. 1995). While evaporated sea salt was produced and used for trade and food seasoning by a number of cultures in the Southeast (Hudson 1976), there is no evidence, however, of Native American groups using salt to preserve fish or other meats before the time of European colonization (Brown 1980; Early 1993; Rostlund 1968 [1952]). The use of salt substitutes, for the enhancement of preservation may, however, have been utilized by aboriginal populations in North Carolina.

Robert Beverly (1947 [1705]:180) indicated that Coastal Algonkians on the Chesapeake Bay “...have no Salt among them, but for seasoning, use the Ashes of Hiccory, Stickweed, or some other Wood or Plant, affording a Salt ash.” During the American Revolution, North Carolina commercial fishermen ran critically short of salt needed to cure river herring, mullet and other shipping fish. Due to the salt shortage, hickory ash, although not a perfect substitute, was used as a replacement for salt in the curing process (Hilldrup 1945). The author suggests that eastern North

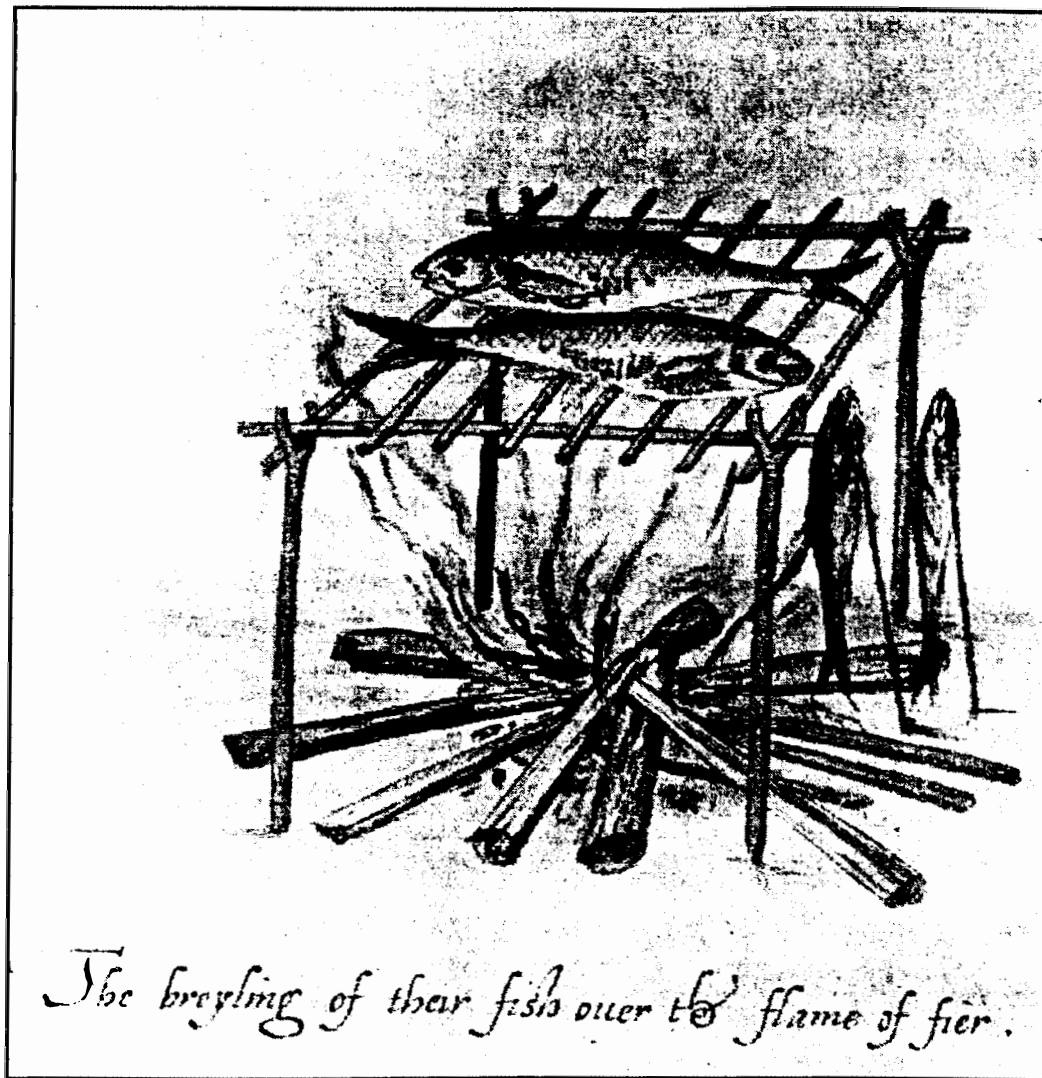


Figure 6. John White Painting of Algonkian Fish Smoking Methods
(From Hulton 1984:75 [Plate 45.]).

Carolina's native cultures may have very well utilized hickory ash to enhance the preservation of fish. Observations by Lawson (1967 [1709]), White (Hulton 1984), Smith (1895 [1612]) and others provided further information on aboriginal preservation techniques. Even without the use of added salt in the preservation process, Yesner (1987) noted that saltwater habitat species, such as shad and river herring, naturally have a high salt content that facilitates preservation and storage.

Lawson (1967 [1709]:218) recorded that the "Indians...take (an) abundance of Fish...which to preserve...they first barbakue, then pull the Fish to Pieces, so dry it in the Sun, whereby it keeps for Transportation." Thomas Harriot (1972 [1590]) noted that many varieties of fish were roasted on hurdles over fires, but that they reserved none of the catch for storage (Figure 6). This perplexing comment leads one to speculate that neither river herring nor shad were preserved in quantity for the summer months, but rather consumed only in season. Harriot, however, was not likely privy to all of the natives' practices, particularly related to food storage techniques, given the English colonial's propensity for taking whatever they needed from the natives (e.g., Ralph Lane's 1585-1586 account reprinted in Quinn and Quinn 1973). John Smith (1895 [1612]:63) observed that the neighboring Virginia Algonkians smoked or roasted fish "...til it be as drie as their jerkin beefe in the west Indies, that they may keep it a month or more without putrifying." Strachey (1953 [1612]) made observations similar to those of John Smith. The allusion to "jerkin beefe" implied that the fish were completely dried and smoked, a method that would only be utilized for fish that needed to be stored for a lengthy period of time.

Since other native cultures in both the northeast (Heidenreich 1971, 1978; Petersen 1994) and southeast (Hudson 1976; Lorant 1946; Swanton 1987 [1946]) were known to have dried or smoked fish for long-term storage, it is certainly probable that the Indian cultures of eastern North Carolina Indians were undertaking essentially the same practice. Lawson (1967 [1709]) recorded

that he traded a deerskin for two dozen smoked shad during his journey through the Pamlico River region. The author suggests that smoked shad and river herring were stored at least through the early-to-mid summer months in pits, dug into the earth and lined with grass or reed mats or animal skins. As humidity and extreme heat promote decay of smoked or dried fish by enhancing bacterial growth (Sikorski et al. 1995), the preserved fish were potentially layered on racks of wood or reeds to promote air circulation in the pits or suspended from the roof support posts in the houses.

During the eighteenth century, it was observed that the house interiors of northern Iroquoian groups were “unsavory” when they smoke-dried their fish with warming and cooking fires inside the long houses (William Bartram 1743; quoted in Morgan 1966 [1901]:292). In Maine, an early eighteenth century observer noted that the Abenaki Indians harvested “...a sort of large herring (American shad), very agreeable to the taste when they are fresh, they crowd upon each other to the depth of a foot, and are drawn up as you would draw water. The [Abenaki] put them to dry for eight or ten days, and they live upon them during the whole time they are planting their fields” (Sebastien Rasle 1723; quoted in Petersen et al. 1994).

It is apparent from the historical sources that native groups of the Carolina Coastal Plain depended upon anadromous fishes as an important element of their subsistence mix. While there seems to be no specific ethnohistoric record, other than Lawson’s (1967 [1709]), of Coastal Plain peoples trading preserved river herring and shad to inland groups, the product cannot be ruled out as a possible trade item. In Quinn’s (1991 [1955]:436; 1985:71) exhaustive analyses of documents related to early English exploration and settlement in North Carolina, he concluded that there was sufficient documentary evidence that the Algonkians traded dried fish to inland groups and stored dried fish for the winter months. In the neighboring Chesapeake region, John Smith (1895 [1612]:74) recorded that the Coastal Algonkians traded for copper with “...such commodities as they

have, as skins, fowle, fish...and their country come.” Given the general propensity for various Northeastern and Southeastern coastal groups to dry fish for inland trade, throughout proto-historic North America (Hudson 1976; Rostlund 1968 [1952]), North Carolina cultures undoubtedly took advantage of the same economic resources. Even though trade in smoked fish was undertaken, it is most probable that shad and river herring were primarily extracted by both the Algonkian and Tuscarora peoples for local consumption. This practice was not only adopted by the early European colonists (Brickell 1969 [1737]), but continued well into the early-to-mid-twentieth century in many areas (Lane 1997; Smithwyck 1997; Spruill 1997). In view of the ethnohistorical observations, comparable site data from the Northeast and general theoretical models related to anadromous fish exploitation, it is expected that archaeological sites on the North Carolina Coastal Plain should yield positive archaeological data to support the assumption that native groups relied extensively on *Alosa* stocks in the prehistoric period.

Archaeological Evidence of Alosa Exploitation in Eastern North Carolina

The present archaeological evidence for anadromous fisheries is limited in eastern North Carolina. The author argues, however, that two particular sites on the Coastal Plain, the Flynt site (31ON305) and the Jordan’s Landing site (31BR7), are representative of anadromous fishery practices in the region, at least as far back as the beginning of the Late Woodland period. Other sites in the region, such as the Tillett site (31DR35), have not yielded the expected *Alosa* remains.

The Flynt Site. The faunal remains from the Flynt site (31ON305) in Onslow County, North Carolina have been analyzed by Mikell (1986). The site is a small village on Chadwick Bay near the town of Sneads Ferry (Lofffield 1987). Features on the site radiocarbon dated between A.D.

893 and 1379 (calibrated) and fall into the Late Woodland period (A.D. 800-1650) (Eastman 1994). Bony fish remains accounted for approximately seventy-four percent of the recovered faunal assemblage analyzed. Shad and river herring made up approximately thirty-nine percent of the minimum number of individuals (MNI) of the fish species specifically identified in the analysis (Mikell 1986) and likely contributed to a large portion of the fish remains that could not be identified.

Loftfield (1987) observed that much of the small bone from the site could not be economically removed from the vast quantities of shell fragments that were mixed in the various feature fills. As such, Loftfield (1987) estimated that only ten percent of the total amount of faunal remains recovered from the site were actually analyzed. It is probable that most of the shad and river herring vertebrae that the site contained were not recovered. The bulk of the fill from the site's various features were sifted with either one-half or quarter-inch screen. Only small samples of the feature fills were screened with one-sixteenth-inch screen (Loftfield 1987). Since vertebrae are the only bones from shad and river herring that tend to survive in the archaeological record, the fine screen samples likely account for the only recovery of *Alosa* bones on the site, as alosid vertebrae are normally be lost through one-quarter inch screens (Carlson 1988; Singer 1987).

The Jordan's Landing Site. *Alosa* remains have been recovered from the Jordan's Landing site (31BR7), a Cashie phase (A.D. 800-1650) site located on the Roanoke River in the northeastern region of the state. The Cashie phase, as defined and described by Phelps (1983), is the prehistoric manifestation of the native culture, historically recognized as the "Tuscarora." The Cashie phase peoples inhabited the territory between the Neuse and Roanoke Rivers and from the western estuarine edge of the tidewater zone to the fall line (Phelps 1983). Phelps (1983) considered the

palisaded village site at Jordan's Landing to be typical of other Cashie phase sites in eastern North Carolina, in terms of site location and content. Radio carbon dates indicate that the Jordan's Landing site was occupied as late as A.D. 1418 (calibrated) (Eastman 1994). Eighty-two percent of the faunal remains recovered from four selected features at Jordan's Landing, are those of fish. *Alosa* remains, as well as the anadromous striped bass, were well represented in the mix (Byrd 1991, 1997b).

Alosa remains constituted 38% (NISP) of the fish remains identified in one pit feature (Feature 21) and 34% (NISP) of the fish remains identified in a second feature (Feature 41, all levels and sections). *Alosid* bones were not recovered from either the third pit feature (Feature 43) or the analyzed sample taken from the village ditch (Feature 1) where the bulk of the site's faunal materials were recovered (Byrd 1997b). Feature 43 was apparently a fall season storage/trash pit that contained hickory nuts and beans, along with related faunal materials (David Phelps, East Carolina University, personal communication 1997). Byrd (1997b) concluded, however, that the absence of *Alosa* remains from the ditch's (Feature 1) faunal assemblage was most likely the result of taphonomic processes and recovery techniques utilized in the sampling of the ditch (Feature 1) fill. Although fine screen samples were taken from the ditch, one-quarter inch mesh screens were most commonly used for data recovery on the site (Byrd 1997b). The fine screen samples from the ditch have yet to be analyzed and are suspected to contain *Alosa* bones. *Alosa* bone remains were strongly represented in the faunal assemblages from other Jordan's Landing features that were not formally analyzed in the initial study (Byrd 1997b).

The Tillett Site. Given the historic period ubiquity of shad in Croatan and Roanoke Sounds (Cobb 1906; Dunbar 1958), it was expected that *Alosa* remains, particularly American and hickory shad vertebrae, should have been recovered from the Tillett site (31 DR35), "the first fishing

community at Wanchese” (Phelps 1984). The Tillett site is a Colington phase (A.D. 800-1650) village site located on the southeast corner of Roanoke Island. The Colington phase, as defined and described by Phelps (1982b, 1983), is the prehistoric manifestation of the native culture, historically recognized as the “Carolina Algonkians.” The Colington phase peoples inhabited the tidewater region of the Coastal Plain from the present Virginia border, down to the south side of the Neuse River, and west to the eastern edge of the Inner Coastal Plain (Phelps 1982b, 1983). Although alosid vertebrae were expected in the Tillett site assemblage, such remains were not, in fact, represented, in any quantity, in the site’s faunal assemblages. Despite the fact that significant quantities of turtle were recovered, seasonality studies of both the site’s Middle (A.D. 460-800) and Late Woodland (A.D. 800-1650) component mammalian, avian and fish remains, however, generally indicated that the site was only occupied in the warm season of late spring through early fall (Phelps 1984: Appendices D and E); periods when neither shad nor river herring run in the surrounding sounds. Further, the fish remains from the Tillett site, contrasted with those from the Jordan’s Landing site, contain a high frequency of salt water species. This pattern suggests an adaptation to ocean/sound saltwater oriented subsistence complex, rather than a freshwater riverine/estuarine complex.

It may be noted that a small number of Late Woodland sites in the western Piedmont of North Carolina have yielded alosid bones. The Donnaha site (31YD009) on the Yadkin River (Scarry and Scarry 1997; Woodall 1984), and the Lower Saratown site (31RK001) on the Dan River (Scarry and Scarry 1997; Ward and Davis 1993) both produced small quantities of *Alosa* remains. The Despite the general inferences that can be made from the Flynt and Jordan’s Landing sites’ faunal assemblages, and the implications of Late Archaic (3,000-1,000 B.C.) through Woodland

(1,000 B.C.-A.D. 1650) period riverine and estuarine focused settlement patterns, additional direct archaeological evidence of prehistoric shad and river herring fisheries is certainly needed.

At present, there are several unanalyzed faunal collections from Coastal Plain sites in eastern North Carolina in the collections of the David S. Phelps Archaeology Laboratory at East Carolina University. These collections were recovered during various research oriented projects, field schools and CRM related projects during the 1970s and 1980s. Unfortunately, as has been the case with most CRM projects, the research funding available for major excavations and subsequent data analyses of these recovered materials has been so limited that much of the collection of faunal materials remains unanalyzed. For example, uninventoried faunal assemblages from sites such as the Robert's Wharf site (31GA1), located on Bennetts Creek, and the Chowanoke site (31HF30), located on the Chowan River (Phelps 1982c, 1984a), are expected to yield *Alosa* remains when analyzed (David Phelps, East Carolina University, personal communication 1997).

Anadromous Fisheries, Settlement Patterns and the Seasonal Subsistence Cycle

The timing and extent to which anadromous runs were exploited in various regions of the Atlantic seaboard, during the prehistoric period has been proposed and debated in recent literature (e.g., Byrd 1997b; Carlson 1988, 1996; Cleland 1982; Custer 1988, 1989; Kraft 1986a, 1986b; Yesner et al. 1983; Barber 1980; Larson 1980; Binford 1964; Schalk 1977; Stewart et al. 1986). The question will not be definitively settled for eastern North Carolina until more archaeological data from a diverse range of Coastal Plain sites can be acquired and analyzed. The present sample of sites with *Alosa* remains, in conjunction with ethnohistoric observations and Middle Atlantic region site data, supports the conclusion that anadromous fisheries were viable components of the prehistoric subsistence cycle in eastern North Carolina. Even though there is only direct evidence of *Alosa*

exploitation in the Late Woodland (A.D. 800-1650) period, anadromous fisheries likely existed as far back as the Middle Archaic (5,000-3,000 B.C.) period, given the conducive environmental conditions present in the region by 3,000 B.C. Settlement patterns in the region lend some further credence to this observation.

The North Carolina Coastal Plain settlement pattern is similar to that proposed by Cleland (1982) and Schalk (1977), who both indicated that settlement patterns for anadromous fishery dependent populations would be restricted to those environments where the fisheries would be the most productive. Settlement patterns for such groups would be restricted in a general sense, due to the need to access spawning grounds, but highly variable in relation to specific types of waterways on which they were located, due to the biological and geographical nature of *Alosa* spawning habits in North Carolina. The general Late Archaic and Woodland period settlement patterns in eastern North Carolina, along both small tributaries and major trunk streams and sounds, depending upon the specific period considered (Byrd 1997b; Phelps 1983), were certainly all conducive to the development of anadromous fisheries. As observed by Byrd (1997b), settlement patterns after 2,000 B.C. reflect a shift in subsistence practices, whereby a combination of gardening and fishing became increasingly important.

As such, the settlement patterns, for both permanent and seasonal habitation sites, of the period may have been a reflection of the seasonal choice to exploit anadromous fish runs. This is not to suggest that anadromous fisheries were the only resources exploited in the spring season, but that spring fisheries were a major component of the spring subsistence cycle. As observed by Leap (1977:253) "...fishing constitutes only one of the possibilities toward which the total focus of a people's subsistence economy may be directed...no single subsistence effort exists in complete isolation from the other components of the subsistence economy."

Schalk (1977) and Cleland (1982) suggested that the exploitation of anadromous fish would stimulate preservation and storage techniques among fishery dependent cultures. Both researchers agree that storage would be unlikely in the Southeast, either because of the availability of alternate resources, or the impossibility of lengthy storage periods in humid southern climates (Cleland 1982; Schalk 1977). In terms of alternate resources, there were certainly subsistence alternatives in eastern North Carolina during the early spring. The other resources, however were not super abundant, nor so easily harvested. It has been noted that “The importance of anadromous fishes to aboriginal societies lies in their concentration in a confined space, even if only for a short season, thus making them highly accessible” (Wheeler and Jones 1989:5). Further, the spring season has been noted as a period of famine, in terms of floral and mammalian resources, for prehistoric populations on the coastal plain region of the Southeast (Larson 1980).

Increasing population pressure likely forced a more estuarine or riverine focused subsistence strategy during the Late Archaic (3,000-1,000 B.C.) and Woodland (1,000 B.C.-A.D. 1650) periods that would have depended more heavily upon anadromous fish runs, as well as the eventual development of agricultural domesticates. As populations must increase their energy capture in order to support social and economic growth, increasing energy capture comes from taking resources from the environment or becoming more efficient in the use of resources (Smith 1977). Spawning river herring and shad were a readily accessible resource that could have been easily exploited, through the employment of nets and weirs, with relative ease and minimal energy loss from the exertions of capture (Whyte 1988; Cleland 1982; Larson 1980).

Marine resources, including shad and river herring, were a major dietary resource that provided high levels of proteins and other nutrients. “As a food resource the herring family must be placed in a very high rank, perhaps even alongside the Pacific salmon...or at least not much below

them” (Rostlund 1968 [1952]). River herring and shad have a higher ratio of edible meat weight to total body weight when compared with most terrestrial species, such as white-tailed deer or other small mammals (Taylor and Smith 1978). Anadromous fishes were an excellent source of protein and nutrients for native populations and provided important vitamins and minerals to the diet; an excellent compliment to the overall subsistence mix.

Although alosids are somewhat lower in total protein value than either white-tailed deer or black bear, shad and river herring slightly exceed the two mammalian species in terms of calories per ounce/gram (Taylor and Smith 1978; Turner 1976). Compared to mammalian and reptilian resources, shad and river herring contribute significantly higher levels of fat per ounce/gram, particularly during spawning season (Rostlund 1968 [1952]; Yesner 1987), to the diet. Alosids contribute relatively high levels of vitamins A, B, D and E, as well as calcium, when compared to venison or bear flesh (Taylor and Smith 1978; Yesner 1987). Even though cooking and curing processes, such as smoke drying (Sikorski et al. 1995; Yesner 1987), reduce the consumable quantity of vitamins and minerals necessary for a balanced diet, river herring provide generous levels of phosphorus, magnesium, sodium, selenium, iodine and potassium to the diet, especially when the skeleton is consumed along with the flesh (Lall 1995). The major nutritional value of spawning alosids is more apparent when one compares the net caloric returns between deer hunting and fishing. On average, deer and other large mammals provide a caloric return of 5,000 kilocalories per hour of hunting, while the netting or trapping of seasonal fish runs, such as shad and river herring runs, will yield more than 18,000 kilocalories per hour (Yesner 1987).

Prehistoric fish yields are impossible to verify today, but Rostlund (1968 [1951]:64) estimated that the Middle Atlantic region could produce some 900 pounds of anadromous fish per square mile of riverine/estuarine environment. This figure was calculated after the great decimation

of shad and river herring populations during the late nineteenth and early twentieth centuries.

Binford (1964) speculated that the “...catch of anadromous fish over a *four month fishing season* for an aboriginal fish weir is roughly *1,500 pounds*” (Binford 1964; emphasis added). However, a historic account of early seventeenth century fisheries in New England noted: “...a little below the fall in Charles River the inhabitants of Watertown had built a *wear* to catch fish, wherein they took great store of Shads and Alewives. In two tides they have gotten 200,000 of these fishes” (William Wood 1634; quoted in McDonald 1884:584; emphasis in original). The observer did not indicate the size of, or the number of, traps in the weir, but the minimum weight of the tow “tidal” hauls would have been 100,000 pounds (@ one half pound per fish).

The estimate made by Binford (1964) is undoubtedly much too low and the 1634 observation by William Wood (McDonald 1884) was probably grossly exaggerated. Modern pound nets, essentially adaptations of ancient fish weirs, have, however, regularly yielded between *10,000 and 12,000 pounds* (10,000-25,000 fish) of river herring *per day* during the peak spring runs season (*Fisherman and Farmer* [anonymous] 1895b:4; Layton 1997; Byrum 1996. Pound nets harvests generally produced 2,000 fish (*Fisherman and Farmer* [anonymous] 1895b:4) per day (1,000-2,000 fish) throughout the three-to-four month season. The size of the haul would, of course, be directly related to the size of the impoundment area or trap section of the weir and location of the weir in relation to the shore. Weirs set in the mouths of tributary streams, or along the shallow shore of the sounds would have been the most efficient.

For later Archaic and Woodland period peoples, shad and river herring runs would have been exploitable during a lull season for hunting and gathering, foraging, and agricultural societies. Although a variety terrestrial and aquatic resources were continuously available to prehistoric groups in the Middle and South Atlantic region, the majority of the edible species, floral or faunal,

were most exploitable in particular seasons. The availability of wild food resources changes from microenvironment to microenvironment and from season to season (Larson 1980). In eastern North Carolina, during the Woodland period, large mammal (e.g., black bear and white-tailed deer) hunting normally occurred in the late fall or winter months when alternative hunting and fishing strategies were less lucrative (Byrd 1997b). Byrd (1997b) further suggested that the animals' furs were of better quality and more appropriate for making clothing during the colder period of the year. White-tailed deer reached a maximum abundance in the fall and early winter months, due to inherent peculiarities in feeding and mating habits (Thomas et al. 1975; Brooks and Canouts 1984). Waterfowl (e.g., ducks and geese) are typically available in large numbers in the migratory seasons during the fall and spring (Thomas et al. 1975; Brooks and Canouts 1984), but were difficult to capture with primitive weapons (Byrd 1997b).

Reptiles, fish and shell fish, like other mammalian and avian species are often available year round, but like their counterparts, these other species are typically more easily harvested during certain optimum periods each year. The seasonal variability between species is broad. As such, general statements about peak season availability or accessibility cannot fully address the complexity of the individual variations. Plant resources (e.g., nuts, fruits/berries, roots, seeds/grains, leafy greens) are also available for gathering on a seasonal basis. The general abundance and nutritional value of floral resources fluctuates from season to season as well (Thomas et al. 1975; Brooks and Canouts 1984). In the resource rich environment of eastern North Carolina, however, many diverse species of flora and fauna were readily available on a year round basis. Specific exploitation of individual species was likely based on subsistence scheduling, whereby seasonally abundant resources were most often chosen over other resources more uniformly available year round.

Seasonally abundant resources (wild or domesticated, gathered or harvested) were generally selected over hunted resources (Thomas et al. 1975:57).

Based on assumptions of seasonal variability between different species, Thomas et al. (1975) proposed a schedule of subsistence activities for both horticultural and non-horticultural societies in the Middle Atlantic region. Although there are variations in the timing of seasons for the species listed, and glaring omissions of turtle and wild turkey exploitation (see Byrd 1997b; Phelps 1984), Thomas et al.'s (1975) schedule is generally applicable, with adjustments, to the prehistoric cultures of eastern North Carolina in the Woodland period (1,000 B.C.-A.D. 1650). The exploitation of anadromous fish is included within the seasonal subsistence round. During the summer, fall and winter seasons there are a number of abundant resources each season, while the early spring is somewhat more limited on the Coastal Plain (e.g., starving time [Larson 1980]).

During the spring, anadromous fish are the only high protein resources available in any significant abundance to either horticultural or non-horticultural societies. Cleland (1982) observed of prehistoric cultures in the Great Lakes region: "...the greatest exploitation of fish took place during the spring spawning season...the development of a fishing capability is significant because spawning runs come at a time of year when hunting...is most difficult and least productive because of the absence of cover and the poor condition of game." Figure 7 shows a potential resource availability schedule while Figure 8 shows the Late Woodland period exploitation pattern on the Inner Coastal Plain of North Carolina based on a study by Byrd (1997b). Unfortunately, the present lack of subsistence data from the region precludes the generalized development of subsistence activity schedules any earlier than the Late Woodland period. As the Figures 7 and 8 indicate, the presence of potential food sources in an environment do not automatically ensure that they were heavily exploited by prehistoric peoples (see Figures 7 and 8 [e.g., waterfowl, turkey, small /

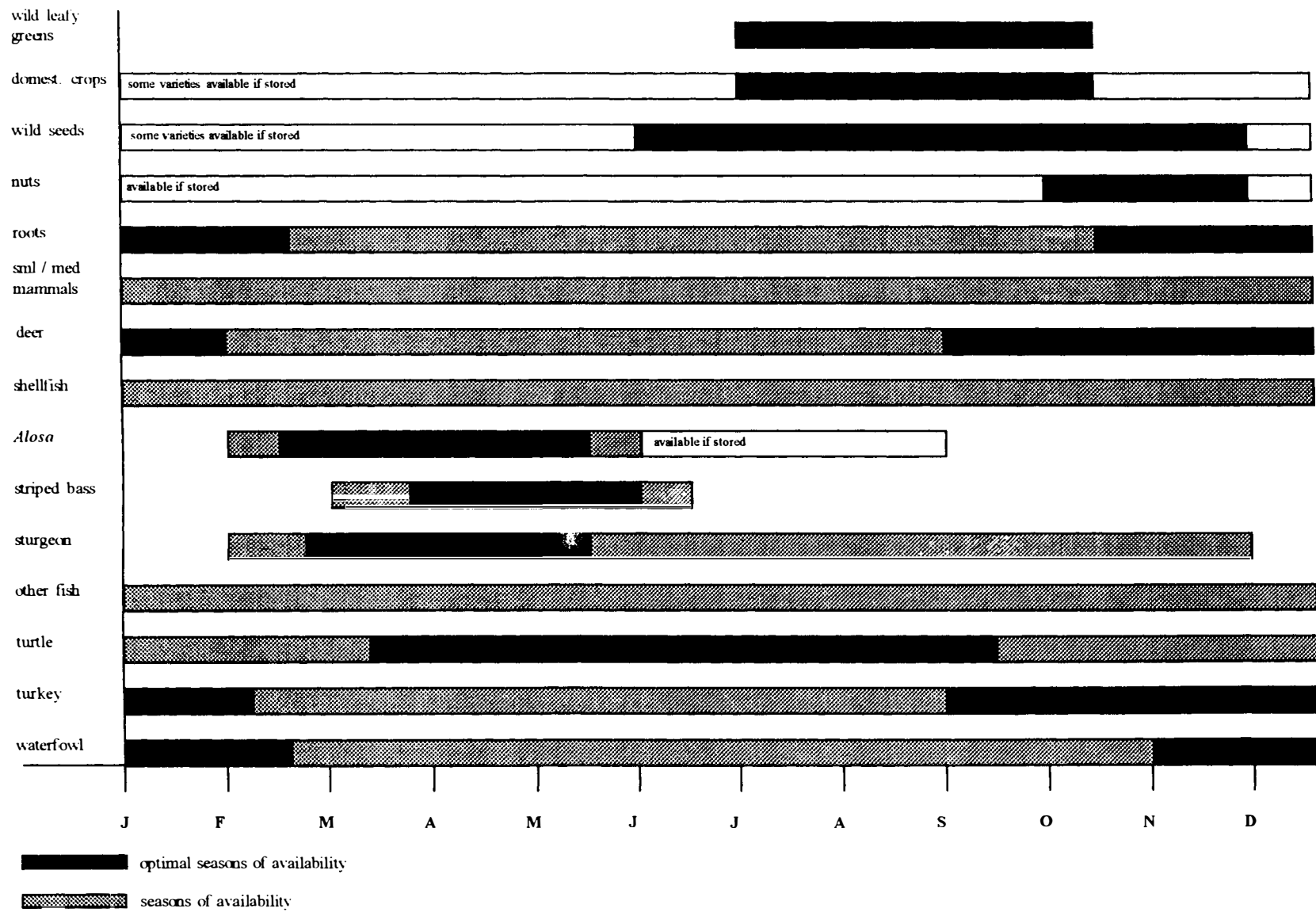


Figure 7. Schedule of Subsistence Resource Availability (Adapted and revised from Thomas et al. 1975)

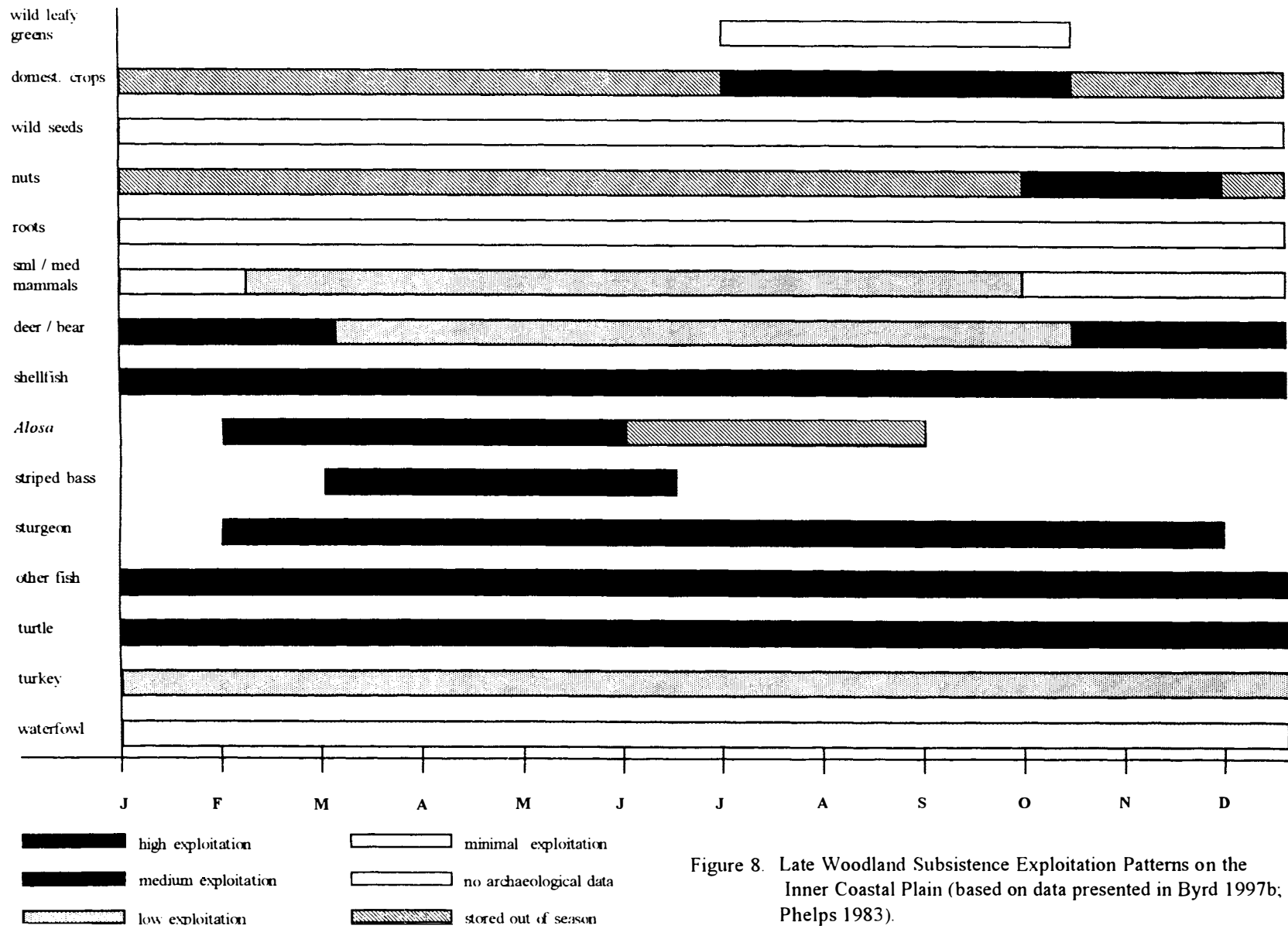


Figure 8. Late Woodland Subsistence Exploitation Patterns on the Inner Coastal Plain (based on data presented in Byrd 1997b; Phelps 1983).

medium mammals]). Choices were made season to season, despite the general availability of diverse resources. Such choices relate to predictability, availability, accessibility and storability, as well as food preferences related to taste or taboo.

Even with the addition of horticulture / agriculture *Alosa* spawning runs came at the optimum season. Haag (1958:21), although not referring specifically to anadromous fish exploitation, noted: “Despite the evidence that agriculture was a flourishing activity and that game animals were plentiful, it is most likely that the waters...supplied the most generous filling for the aboriginal larder (in eastern North Carolina).” As John Smith (1895 [1612]:62) observed of the neighboring Virginia Algonkians: “What they plant in April they reap in August, for May in September, for June in October.” Such seasonal agricultural practices were mirrored by European descent populations in the historic period (see Chapter III and IV). As late as the 1930s, subsistence farmers, as well as those who grew cash crops, in the Albemarle Sound region continued to rely on river herring and shad runs for extended periods of subsistence, particularly in the late spring and early summer, before crops could be harvested (Smithwyck 1997; Spruill 1997). As observed by Reitz (1979), the necessity to utilize wild floral and faunal resources was not negated with the introduction of plant domesticates and the intensification of horticulture / agriculture in the Southeast. With increased sedentism and a greater dependency upon horticulture, the necessity for exploiting seasonal aquatic resources would also continue to increase. Alosids primarily spawn from March through May, a season when they were the most desperately needed by population requiring extra energy to clear and plant agricultural fields.

In addition to providing a subsistence and trade resource, shad and river herring remains from the processing and cooking processes may have been used by horticulturally oriented cultures for fertilizer. While early historic accounts from Massachusetts suggest that the Native Americans

taught the English colonists to utilize fish as fertilizer (Ceci 1975; Hudson 1976; Mrozowski 1994), researchers have suggested that there is no conclusive evidence that Native American cultures of the Northeast or Southeast actually uses fish for fertilizer before European contact (Ceci 1975; Hudson 1976). Recent excavations and testing of a 24 x 37 meter, Late Woodland corn field on Cape Cod, Massachusetts has resulted in the recovery of cod (*Gadidae* sps.) and alosid (tentatively *Alosa pseudoharengus*) bones and unidentified fish scales from the planting hills (Mrozowski 1994). Mrozowski (1994) cautiously concluded that the recovery of fish bone and scales from the hills suggests that Native Americans on the east coast were, in fact, utilizing fish for fertilizer.

These seasonal patterns, compounded by the inherent storage potential of river herring and shad, strengthens their position as an important food source to both agricultural and non-agricultural populations of the prehistoric past. The development and wide-scale use of complex portable (e.g., hand seines and gill nets) and fixed fishing gear (e.g., weirs and traps), such as those used in the prehistoric anadromous fisheries in North Carolina during the proto-historic period, have been considered to be indicative of residential stability (Cohen 1977) (e.g., sedentism or semi-sedentism), due to labor and time investments that would not be necessary for short-term exploitation of fishery resources. The inclusion of anadromous fish resources in the local subsistence mix by regional cultures may have stimulated the development of the non-egalitarian, horticulturally oriented societies observed in eastern North Carolina during the early contact and proto-historic periods. As noted by Cohen (1977:283), "...complementary seasonal patterns among various resources...helped to promote domestication."

The cultural implications of anadromous fish exploitation, as presented by Schalk (1977) and Cleland (1982), undoubtedly had an effect in eastern North Carolina after 5,000 B.C. The fisheries provided a super abundant resource that was seasonally available, predictable in space and

time, accessible with simple or moderately complex fishing gear and storable. Based on the present archaeological data, ethnohistoric observations and theoretical implications of such fisheries, prehistoric anadromous fish exploitation on the Coastal Plain minimally influenced, first, band movements (Archaic period) and, later, settlement patterns (Woodland period) through the cultural need to access *Alosa* spawning habitats in order to harvest the spring runs. The trend toward sedentism from the Late Archaic through the Woodland period was potentially enhanced as the fisheries provided a rich seasonal, storable resource when few major alternate subsistence resources were available. Anadromous fish exploitation, along with social changes stimulated by the development of complex fishing technologies (gear and storage), may have actually encouraged the adoption of plant domesticates, as semi-sedentary fishing populations overexploited local wild plant and animal resources (Byrd 1997a). Maximally, anadromous fish exploitation influenced the cultural complexity and social stratification of the late prehistoric populations in eastern North Carolina who have been discussed and elaborated upon in Phelps (1983) and Byrd (1997b). The need for organized labor to construct and maintain a range of complex fishing gear, as well as to construct processing and storage facilities, likely stimulated the evolution of a stratified labor system that may have been further enhanced by directed redistribution of smoked or dried fish after the spring fishing season. The availability of *Alosa* species in coastal North Carolina, as in other regions of the Atlantic seaboard likely stimulated the later prehistoric adoption of domesticated crops by providing a consistent, predictable, protein rich, storable resource during a season of the year when it was most needed to provide energy to horticultural laborers.

CHAPTER III

Historic Period River Herring and Shad Fisheries, circa 1584-1915

As stated in the introductory chapter of this study, the two main foci of this thesis are the prehistoric / proto-historic period (circa 3,000 B.C. - A.D. 1700) and the early modern period (circa A.D. 1900-1950) anadromous *Alosa* fishery practices in eastern North Carolina. As the early modern period fisheries did not spontaneously develop at the turn of the twentieth century, an understanding of the early historic period fisheries is necessary to set the stage for the early modern period of study. Further, the high degree of continuity, in terms of technology and the overall purpose of the fisheries, from the early historic period through the mid-twentieth century must be acknowledged and addressed. Accordingly, an early historic period overview will be presented in this chapter. The overview will generally cover the late sixteenth through the late nineteenth centuries and concentrate predominately upon the available historical evidence for subsistence level fisheries and the general development of the commercial fishery operations up through the turn of the twentieth century. For further details on the early commercial fisheries in northeastern North Carolina, the reader is referred to Taylor (1990, 1992), Gregg (1968), Leary (1915) and Earll (1887).

Colonial Through Federal Period Fisheries, circa 1584-1815

The colonial period fisheries naturally evolved for subsistence purposes out of the native Indian fishery operations. The English explorers and settlers in colonial North Carolina were quick to adopt the natives' fishing technology and practice of exploiting spring season anadromous fish runs. One of the first recorded incidences of European exploitation occurred on Easter Sunday, April 2, 1586, when Ralph Lane's expedition, on return from exploration of the Roanoke River valley,

raided fish weirs at Chipanum (“Chepanoc” or “Chypanum”) was a Weapemeoc village located near the mouth of the Little River, a small northeastern tributary of the Albemarle Sound (Quinn 1991 [1955]:33, 176; Quinn 1973:272). Given the season and location of the weirs, Lane’s men undoubtedly feasted on river herring and shad, as well as lesser quantities of other seasonally available species such as white perch, striped bass or white catfish. The Lane expedition continued to rely on the Carolina Algonkians to build weirs for them at the expedition’s Roanoke Island settlement site. Lane’s men were later quite distraught when the Algonkians raided and destroyed the weirs after Lane’s high-handed actions alienated the Indians in late April of 1586 (Quinn 1991 [1955], 1973).

Although seventeenth century accounts are lacking, the reliance on native fishing technologies and practices likely continued when permanent European settlements were established in the Albemarle Sound region. At the beginning of the eighteenth century, John Lawson indicated that colonists in the region often adopted native style fishing weirs. In 1701, he observed: “...the neighboring Indians are friendly, and in many Cases servicable to us, in making us Wares to catch Fish in, for a small matter, which proves of great Advantage to large Families, because those Engines take Great Quantities of many Sorts of Fish, that are good and nourishing...” (1967 [1709]:92). Lawson’s implication was that much of the fish harvest was for subsistence purposes, but he went on to state: “The Fishing-Trade in Carolina might be carried on to great Advantage, considering how many Sorts of excellent Fish our Sound and Rivers afford, which cure very well with Salt, as has been experienced by some small Quantities, which have been sent abroad and yielded a good Price” (John Lawson 1967 [1709]:93). As few other fish species from the Albemarle region preserve as well with salt (Smithwyck 1997; Spruill 1997), it is likely that the first commercial fishermen depended upon river herring for their primary trade product.

During the height of the Tuscarora War (1711-1715), when the European colonists suffered from the general lack of food provisions due to an earlier period drought and civil unrest (Powell 1989), subsistence fisheries were an even more critical element of the local subsistence economy. In 1713, a missionary wrote from Chowan, a settlement near the Chowan River on Bennetts Creek (Powell 1968): “I am ashamed to tell you of my fare: for the whole year is one continued Lent fish being the constant attendant on the Table...” (Saunders 1993:II:55). A few decades later, John Brickell, an Irish doctor who resided in Edenton during the early 1730's, provided some indication of the importance of river herring to the local subsistence regime in the region. He stated: “They (river herring) come in such great Shoals to Spawn in the Months of *March* and *April*, that I have seen the *Christian* Inhabitants catch as many barrels full as they pleased, or so long as their Salt lasted to preserve them...for at that Season they run up the Creeks and small Rivulets of Water in such Numbers, that *Bears* take them out of the Water...” (Brickell 1969 [1737]:235). Although Brickell specifically noted that the colonists used salt to preserve river herring, it is certainly probable that poorer planters and their families, who could not afford the high-priced imported salt (Hilldrup 1945), smoked-dried river herring in the Indian fashion for future consumption. Individuals who could afford to purchase salt fish, particularly merchants and other persons who lived in town, purchased salt-cured river herring by the barrel from local markets (Taylor 1992). See Appendix C for descriptions of the smoke and salt curing processes of shad and river herring.

Despite such historical documentation, the archaeological evidence from European occupied sites on the North Carolina Coastal Plain has provided little data on colonial era fish consumption patterns. Recent evidence from Virginia sites may provide some clue, since its rivers also teemed with river herring and shad during the same period. Fish remains, potentially including *Alosa* species, comprise approximately fifty-to-sixty percent of all faunal remains from trash pits excavated

on a range of upper and lower class seventeenth century occupation sites found along the James River in Virginia (Olmert 1994:24). It is reasonable to expect that colonial Carolinians, settled in the Coastal Plain region, consumed a comparable amount of fish in their diet, particularly fresh and salt-cured river herring and shad. Kitchen administrative records from the royal governor's residence at Williamsburg note that river herring and shad were typically consumed in a variety of recipes served to the governor's household and guests. Provisions inventories for the governor's household show seasonal purchases of fresh river herring and shad, as well as pickled river herring to be consumed through the winter months (Dennis Cotner, Colonial Williamsburg, personal communication 1994).

It is not surprising that the early European settlers in the region looked to the seasonal shad and river herring runs for both subsistence and economic purposes. English and Scottish peoples have a long standing relationship with the sea herring (see Samuel 1918). From the time of the fifth century, traders from the European continent sailed to the British Isles to trade for salt-cured and smoked, "kippered", sea herring. The cured sea herring was a common source of nutrition to the peoples of the British Isles from prehistoric times through the twentieth century (Samuel 1918). As river herring and shad share similar physical and culinary characteristics with the sea herring, it was only natural that the colonial English, Irish and Scottish settlers of the North Carolina Coastal Plain (Powell 1989) were attracted to the *Alosa* species found in the regional waters.

Subsistence level fishing gear during the seventeenth and eighteenth centuries included weirs, scoop nets or sieves (dip or bow nets), shovels, cast nets and hand seines to catch spawning river herring and shad in the spring (Beverley 1947 [1705]; Brickell 1969 [1737]; Leary 1915; McDonald 1884; Sabine 1853). Even though there is no specific mention of drift gill nets in the early records, drift gill nets were likely utilized for both shad and river herring fisheries at the household level on the faster moving rivers such as the Roanoke. Robert Beverley (1947 [1705]:310) probably

referred to the use of set gill nets when he noted that the English colonists made use of “Setting-Nets” in southeastern Virginia and the adjacent Carolina sounds. Casting nets may also have been used by the earliest English settlers in the Albemarle region. John White recorded that the Jamestown, Virginia colonists were using cast nets in Virginia as early as 1609 (Smith 1895 [1612]:154-155) (for further elaboration on the specific details of selected gear types mentioned in this chapter, the reader should refer to Appendix A).

Commercial fisheries slowly developed in colonial North Carolina. By the end of the 1760s, however, commercial river herring fisheries were well established in the Albemarle region, particularly in the Edenton area and on the Roanoke, Chowan, Neuse and Meherrin Rivers (see *American Historical Review* [AHR] 1920; Saunders 1993:VIII:153; Saunders 1993:IX, 269-270). A French traveler, passing through New Bern in 1765, observed: “In the Spring of the year, there is great quantities of herin caught in the Diferent rivers (Trent and Neuse Rivers), also shad... and sturgeon” (AHR 1920:735). He noted that many of the fish were exported to the “...westindia Islands, and parts of the Continent where is non caught” (AHR 1920:735). Shipping records indicate, however, that seasonally available fish, such as river herring and shad, were likely much more important as a local food resource than as an export item to the New Bern area colonists (Dill 1946). The French traveler further stated: “Bacon is the chief support of all the inhabitants when fishing is out of season” (AHR 1920:735). Near present day Colerain, the same traveler visited a Chowan River fishery where “...In an hours time they caught about 100 barels (of river herring) with quantity of rock (striped bass), white perche and several otherr sorts” (AHR 1920:738).

While North Carolina's early colonial planters typically produced the more profitable commodities of tobacco, naval stores (tar, pitch, turpentine, lumber, barrel staves), corn, wheat and pork for export (Ekirch 1981; McCusker and Menard 1985; Platt 1971), many landowners with

properties that joined the sounds, rivers, and creeks supplemented their income with the addition of river herring fishing. In the mid-1730s, Dr. Brickell (1969 [1737]:236) noted: “The Planters export several Barrels (of river herring) from hence (Edenton) to the Islands in the *West-Indies* and other parts that are scarce of Provisions.” On one Jamaican plantation, records indicate that the slaves there “...had to depend for their protein upon a monotonous supply of herrings” and that “Christmas for the slaves...far from being celebrated with a seasonal change of diet, simply brought a massive and seemingly indigestible increase in herrings” (Craton and Walvin 1970:135).

Even though many Carolinian planters in the Albemarle region were selling or trading pickled river herring to other English colonies during the eighteenth century, the market share was moderate, as compared to that held by New England cod fishermen (Pearson 1972; Taylor 1992). In the year 1772, Port Roanoke (Edenton), shipped out approximately 5,000 barrels of pickled river herring and 8,000 pounds of dried fish from the Albemarle region to various points in the West Indies, southern Europe and the southern colonies, while the ports of Bath, Brunswick, and Beaufort together only shipped just over 300 barrels of river herring and 9,000 pounds of dried fish to all points (Crittenden 1936:73; Gregg 1968:15). Between 1771 and 1776, over 24,000 barrels of salted fish, as compared to approximately 3,100 barrels of salted pork and beef, cleared the Edenton customshouse for shipment primarily to the West Indies, as well as colonies in the Middle Atlantic, New England, the Canary Islands, the Azores and Southern Europe (Taylor 1992). Such statistics are illustrative of the position of fishery products in the regional economy and the dominance of the Albemarle region’s commercial fisheries over those of the Pamlico and Cape Fear area in the late eighteenth century.

Although weirs were used for small-scale commercial operations (Leary 1915), hand-powered haul seine nets were the gear of choice utilized by commercial fishermen at least as early as

1762 (Taylor 1990), if not before that time. These operations were largely confined to the rivers and creeks during the eighteenth century (Leary 1915; Parramore 1967; Taylor 1992). Since Beverley (1947 [1705]) indicated that English colonists were utilizing seine nets in Virginia by 1705, it is likely that seine nets were introduced to the rivers of the region much earlier than 1762. Many of the haul seine nets during the eighteenth century were recovered with hand-powered windlasses. Leary (1915) indicated that the earliest recorded horse-driven windlasses were not introduced to the Albemarle region seine fisheries until 1815. It is likely that horse/mule-powered seine operations existed during the later half of the eighteenth century, particularly in view of the fact that the Brownrigg fishery at Wingfield Plantation on the Chowan River used large haul seine nets in excess of one thousand feet in length (Taylor 1990) (for further elaboration on the specific details of selected gear types mentioned in this chapter, the reader should refer to Appendix A).

Unlike the later nineteenth century fisheries which packed large quantities of both shad and river herring (Smith 1893), primary source documents (e.g., records cited by Gregg 1968; Platt 1971; Powell 1981; Taylor 1990, 1992) indicate that these eighteenth century fisheries focused primarily on river herring rather than both river herring and shad for export purposes. The reasons behind the apparent lack of diversification in the export fishery products from the Albemarle region is unclear. Modern informants noted that shad are somewhat more difficult to preserve for the long-term with salt than river herring. Further, pickled river herring are generally more palatable after the preparation processes than pickled shad (Smithwyck 1997; Spruill 1997). In a 1793 letter from the West Indies, a recorded price list indicated that pickled river herring and mullet sold for three dollars per barrel, while shad only sold for two dollars per barrel (Keith 1959:308). Consumer tastes in the export markets, as well as storage longevity issues, which ultimately impacted commercial fisheries profits most likely influenced the production focus on river herring in the eighteenth century.

During the American Revolution, North Carolina shad and river herring fisheries supplied the Continental Army. In 1781 orders were issued that charged “Capt. Drury Smith...with superintending of such fisheries on Roanoke...as he may on my letters procure, to be impressed for the public service and when properly officered will attend to work the seines...Capt. Smith will also procure in the credit of this state all the casks he can. Gen. Person will send down fifty bushels of salt and this will serve till a further supply can be sent on” (Pearson 1972:1047). In other cases, North Carolina regiments were allowed by fishery owners to use seine nets to make hauls during the spring spawning runs for fresh river herring and other fish while marching through the Coastal Plain region (Saunders 1993:XI). The Revolutionary War interrupted the commercial fishery operations and shipping in North Carolina. Albemarle region fishermen and exporters, however, resumed normal business operations at the end of the war.

Various eighteenth century correspondences in the *John Gray Blount Papers* (Keith 1952, 1959) indicate that John Gray Blount, a noted planter and merchant from Beaufort County, was involved with the shipment of large quantities of river herring and other varieties of salt fish (e.g., mullet) to the West Indies from Bertie County fisheries located in the Albemarle Sound regions (Keith 1952, 1959). A particularly illustrative letter to Blount from George Ryan, dated January 27, 1787, noted: “...the Quantity of Fish you want, you may be Supplied with at Salmon Creek, to say 800 or 1000 Bbls...I will engage to supply you with 500 or 600 Bbls. by the first of may, and the Remainder by the 15th...those fish (herring) is to be Catch’d at three Sains all on the Creek and within two miles of the Mouth of the Creek...” (Keith 1952:241-242).

On occasion, Blount engaged in trading African slaves for salted fish to ship to the West Indies. Blount apparently expected to make more profit from selling the fish in the West Indies markets than he could from selling the slaves in the North Carolina. A 1787 letter to Blount from his

agent stated: “I have Inquired about fish and have tryed to sell Your Negroes for Fish but they Seam to hold their fish as high as from 25/ to 30/ P. Barrell tho I am sure that I could Get you L100 a piece for them...” (Keith 1952:272). A similar transaction was noted to have occurred in 1769, when “Thomas Iredell instructed his nephew, James Iredell, to dispose of a runaway Negro and ‘by first oppertunity remit the nett Proceeds of him in Red Oak hogshead Staves...and 20 Barrels of Herrings’” (quoted in Taylor 1992:4).

By the early nineteenth century, the primary market for salt-cured, North Carolina fishery products began to shift slowly from the West Indies and southern Europe to the slave states of the South (Taylor 1992). As its fisheries were not as developed as those in North Carolina, South Carolina was noted as lacking a local source of cheap fish for enslaved population consumption (Pearson 1972). Early nineteenth century Charleston newspaper advertisements commonly noted such items as “Plantation herrings. 20 bbls. New North Carolina herrings, in prime order, packed with Turks Island salt. For sale low if taken on landing” (Pearson 1972:1049). Large shipments of dried cod from New England and salt river herring from North Carolina were quite common in Charleston, South Carolina during the 1780s and 1790s; a trend that continued well into the mid-nineteenth century (Pearson 1972). It was during this period that shad and river herring fisheries in the Albemarle region greatly expanded from the sheltered waters of Edenton Bay, the north shore river mouths, and the primary tributary rivers and streams to the main body of the Albemarle Sound (Leary 1915; Gregg 1968; Parramore 1967; Taylor 1992).

Daniel Earle, the “herring-catching parson” who established a river herring fishery on his Chowan River plantation, Bandon, in the 1760s (Leary 1915; Lemmon 1970), may have stimulated the addition of seine net operations in the Albemarle Sound proper. It was recorded that “...He (Earle) also taught how to prepare *seines* with which to take the large quantities of fish which went

up the Chowan River and Albemarle (Sound) waters” (Lemmon 1970:13). In 1849, Joseph Skinner of Edenton claimed that he was “...the oldest fisherman now living on the Albemarle and the first who in 1807 established a fishery on that wide and boisterous inland sea” (Taylor 1992:4). Skinner may have been the first to establish a large-scale seine operation on the Albemarle, but small hand seines were employed on the Sound at least as early as 1798 (Leary 1915), if not well before that time.

Antebellum through Civil War Period Fisheries, circa 1815-1865

As the export market for North Carolina shad and river herring production shifted and expanded from the West Indies markets in the middle and upper south during the mid-nineteenth century, a large portion of the pickled catch was sold to merchants in Virginia, Maryland, South Carolina and other markets in the South. North Carolina salt-cured river herring were being consumed by poor whites and plantation slaves all over the southeastern United States, as well as urbanites in the Northeast (McKee 1988; Pearson 1972; Taylor 1992). In 1840 alone, 73,350 barrels of salted fish, primarily shad and river herring, were produced for export and sale in North Carolina; of the 73,350 total barrels, over 63,000 of those were produced in the Albemarle Sound region alone (Wheeler 1964 [1851]). Other consumers of salt-cured shad and river herring included the rapidly expanding African slave population in North Carolina (Devereux 1906; Lemmon 1970). As in the West Indies, Carolina planters needed a high nutrition, yet inexpensive, food source to feed the laboring slaves. It was noted by one antebellum planter, that “The average annual expense of plantation slaves in...South Carolina...amounts to \$35. per head...The chief items of expense are...salt fish and fish hooks” (Pearson 1972:1050).

In the antebellum era, most commercial fishery operations, as in the eighteenth century, were generally large-scale affairs that focused on the haul seine gear technology (Leary 1915; Taylor 1992). Net sizes and fishery crews became increasingly larger through time, as fishery operators greatly increased the scale of their operations and capitalized on the burgeoning ranks of enslaved and free laborers in the region. Many Albemarle-Pamlico region planters became involved in the development of large-scale fisheries, not only for the export market, but also to feed their own slaves who worked in the agricultural fields, timber forests and the fisheries (Griffith 1997; Taylor 1992). In the 1850 Federal census, Bertie County alone claimed seven large-scale haul seine fisheries with an annual production of approximately 11,000 barrels of fish, primarily shad and river herring, in 1850 (Bradley 1991:92-93). By 1852 there were a total of seventy large-scale and small-scale haul seine operations on the Albemarle Sound and its tributary rivers (Watson 1996). Twenty-eight haul seine operations on the Albemarle Sound purportedly employed a seasonal work force in excess of 5,000 laborers in 1850 (Parramore 1967; Sharpe 1958b).

Edmund Ruffin (1861), Frederick Olmstead (1904 [1856], 1953 [1861]) and Porte Crayon (David Hunter Strother) (1959 [1857], 1861), all described mid-nineteenth century, large-scale river and sound fisheries that regularly landed over 300,000 to 500,000 river herring in single hauls (McDonald 1884) of the 2,200 to 2,700 yard long seine nets at fisheries that operated twenty-four hours a day during the spring season. Crayon (1959 [1857], 1861) noted that most fisheries averaged three or four hauls per day, with each haul taking from five-to-seven hours from start to finish. Ruffin (1861) indicated that particularly large hauls could take twenty-four hours to land and process. Ruffin (1861) and Olmstead (1904 [1856]) observed that the average haul seine operation required the labor of two boat captains, eight-to-twelve boatmen, four or more horse/mule-driven

capstan tenders, fifteen or more shore men, and forty women and boys, all to set and recover the net, haul in the catch, and process the fish.

Fishery records from the Wood family fishery at Montpelier on the Albemarle Sound indicate that in 1848, the fishery utilized twenty-nine boat hands, nine beach hands, two seine menders, twenty cutters, two cooks and two overseers (Southern Historical Collection [SHC]: Hayes Collection (Wood Family Series), Vols. S-2 and 4). To support the massive labor operation, shore facilities were erected on the seine beaches, such as net and rope storage barns, crew quarters, kitchen buildings, horse/mule stables, coopering sheds, offices, landings and piers, and cleaning, packing and curing houses (Crayon 1959 [1857], 1861; Olmstead (1904 [1856], 1953 [1861]; Ruffin 1861). An interesting array of supplies were required to operate the fisheries each season.

A fishery account book (circa 1848 to 1853) noted that food supplies for the workers included: whiskey (frequently mentioned in records), rice, wheat, pork, molasses, corn meal and potatoes. For the quadruped labor (horses and mules), corn and hay were procured. Other supplies and equipment purchased by the operations included: seine twine, hauling rope, corks, tar, boats, oars, barrels and kegs, horses, windlasses, lumber, mosquito netting, furniture, water cooled refrigerators and sundries (SHC: Hayes Collection (Wood Family Series), Vols. S-2 and 4). During the colonial and antebellum periods, the fishery operations were worked by free and enslaved blacks, white yeomen farmers, their wives and children (Griffith 1997; Johnson 1937; Olmstead 1904 [1856]; Taylor 1992, 1990).

A number of sources have perpetuated the myth that enslaved blacks were not used at the large-scale haul seine operations, because the work was too dangerous or out of fear that the slaves would escape their owners by boat (Gay-Lord 1980; Gregg 1968; Johnson 1982; NCDCCD 1963). These conclusions were probably drawn due to an over reliance on Crayon (1956 [1857]:167), who

stated “A first class fishery employs from sixty-to-eighty persons, all negroes except the managers. These are for the most part free negroes, who live about in Chowan and the adjoining counties.” Taylor (1990) observed that the work was done exclusively by hired slaves and free blacks. As revealed by a general review of historical documents related to two of the major antebellum fishery operations on the Albemarle Sound, these observations were not entirely correct.

The journal entries from the Montpelier and Skinner’s Point fisheries, operated by Edward Gillam Wood, indicate that Wood’s own slaves, as well as slaves hired out by their owners from other plantations, worked at his fisheries. Other seasonal paid workers included both male and female free blacks and whites (SHC: Hayes Collection (Wood Family Series), Vols. S-2 and 4; SHC: Description of Hayes Collection; Johnson 1937). In 1846, the Albemarle Sound fisheries alone used over 1,000 persons in the seasonal operations (Taylor 1992; Watson 1996). Olmstead (1904 [1856]:390) observed: “The men employed in them (shad and river herring fisheries) are mainly negroes, slave and free.”

During the antebellum period, the Fisherman’s Court was established in several counties surrounding the Albemarle Sound. The court was held the third Monday in February (Sharpe 1958a) and served as a clearing house for fisheries labor. Fishery operators came to the court to hire slaves, as well as free whites and blacks. Potential laborers, free blacks and whites, were said to have come to the court from as far inland as fifty miles or more for the opportunity to work at the fisheries. In May, the court was held again and the fishery owners settled debts and paid the free laborers and the owners of the slaves for their work (Johnson 1982; Parramore 1980; Sharpe 1958a). The workers undoubtedly utilized their money for different purposes, but the majority of the workers owed portions of their wages back to the fishery owners. Many of the fisheries operated stores where the laborers could make purchases in advance of receiving their wages. Records from 1842 to 1853 at

one sound fishery indicate that paid workers purchased fresh and salted fish, medicines, salt, whiskey, tobacco and snuff, lard, cheese, soap, boots and shoes, kegs and barrels, corn meal, knives, hats, oil skin jackets and pants, and tin buckets (SHC: Hayes Collection (Wood Family Series), Vols. S-2 and 4).

Local consumption of shad and river herring in eastern North Carolina was still very high during the antebellum period, particularly among the rural populations and the poor (Watson 1996). While the American shad commanded a higher market value and was usually “exported” from the region, the hickory shad was more commonly sold in the local markets; two hickory shad could be purchased for the price of one river herring (McDonald 1884). Hickory shad have a stronger flavor than the milder American shad (*The State* [anonymous] 1976) which may have accounted for the lack of popularity as a “shipping” fish. Many people in eastern North Carolina purchased shad and river herring from the large-scale fishery operations or simply fished for themselves. As one contemporary observer noted, Many poor whites “...by means of sien or dip nets...supply their families with fish, and other necessaries of life” (Johnson 1937:95). As one early report on the national fisheries of the United States noted:

...as the schools of herrings came to our coasts, the inhabitants on the sea and rivers, from Maine to the Carolinas, generally secured sufficient for consumption fresh; that the more careful provided themselves with salt to cure quantities for future uses; and some, becoming regular fishermen, caught and cured the fish for sale to their neighbors of the interior...farmers and fishermen were in the constant habit of filling wagons and boats at pleasure with scoop-nets and other simple implements (Sabine 1853:192).

Fish peddlers came from as far west as Guilford County to buy wagon loads of fish to sell on the return journey for profit (Taylor 1992). Some farming families even made an annual journey by covered wagons from the mountain region to purchase a year’s supply of fish (Darden 1950). In the

early nineteenth century, a fresh river herring could be purchased for eighty cents per bushel (Parramore 1967), two dollars per thousand (Taylor 1992) or traded by the barrel for a few bushels of corn (Earll 1887; Gregg 1968). A state fisheries committee report from 1852 stated:

a stranger to their habits would be astonished to see the innumerable wagons and carts wending their toilsome way from one hundred to one hundred and fifty miles, to the fisheries in quest of their accustomed supply...The owner of the wagon, and the poor man with his horse and cart...find their way to the fisheries, and with their hard earnings, purchase their loads of fish... (North Carolina General Assembly, "Report of the Select Committee on Fisheries" 1852; quoted in Watson 1996:39)

During the Civil War period, local families depended upon river herring and shad for subsistence, particularly after livestock and other provisions were confiscated by either of the opposing forces. One oral history account relates the story of Union sailors from the gunboat *Delaware* who confiscated several basket loads of river herring from two young women who had been out to fish their weir on a tributary creek of the Chowan River (Johnson and Parramore 1962).

An interesting development that evolved in the late eighteenth and early nineteenth centuries was the fight for common property resources. In the southern English colonies, fishing rights had long been considered as a "natural right of man." Fish, as well as many other natural resources, had traditionally been considered a common property resource available to all citizens, regardless of social status (Watson 1996). As early as 1764, statutes were proposed to prevent the blockage of rivers with seine nets, hedges, dams or other obstructions in North Carolina rivers (Pearson 1972; Saunders 1993:XXIII, XXIV). In 1771 a petition was sent to Governor Martin which stated: "...your petitioners is Deprived of that Natural & profitable priviledge of Catching fish in Deep River as formerly by its Chanel being stopt by several mill Dams...to the Great hurt of many poor families who Depend on said fishing for great part of their living, it being well known that No River of its

Size...afforded a greater Quantity of Excelant Shad and other fish” (Saunders 1993:IX:87-88).

Through the later part of the eighteenth century, a number of acts were passed to protect fish from “unreasonable destruction,” to ensure common fishery access and to protect the rights of the commercial fishermen themselves (Gregg 1968; Pearson 1972; Watson 1996).

Through the mid-1800s, North Carolina statutes continued to outlaw any “...obstruction, such as fallen trees, or a mill dam, which prevented the free passage of fish up a steam” (Johnson 1937:94). One antebellum era petition from Martin County, asking for unobstructed passage of the Roanoke River, noted: “...a great many persons in indigent circumstances have annually made it a business to resort to said river, and by means of sein or dip nets to supply their families with fish and other neccessities of life...” (quoted in *The State* [anonymous] 1983:3). Highly prized shad and river herring runs were often considered as a resource being rapidly depleted and their potential demise was looked upon with great anxiety (Watson 1996). One shudders to think what fishermen from the period would say about the status of the *Alosa* fishery stocks of today.

Watson (1996:24) noted: “The language of the fish petitions makes clear that the signers regarded themselves as poor people who intended to eat their fish, not to sell them.” A lay day was eventually imposed in 1852 upon all fisheries in the state in order to protect the supply of fish for the common folk (Watson 1996). Much of the legislation of the antebellum period revolved around the petitions of yeoman farmers who protested the gradual encroachment of the large-scale fishery operations into what had been publicly accessible netting beaches or waters (Cecil-Fronsman 1992; Watson 1996). These actions have been interpreted as early manifestations of class conflict between the common whites class and the landed gentry of the antebellum South (Cecil-Fronsman 1992; Watson 1996).

Many fishing operations of the commercial variety were temporarily, but effectively terminated, with the advent of the War Between the States (1861-1865). In April of 1861, the state government dispatched commissary officers to the Albemarle Sound region to procure both salted fish and pork for the newly formed Confederate regiments in the state (Crabtree and Patton 1979). By February of 1862, however, Union naval and army movements in the region stymied Confederate efforts to maintain spring shad and river herring fishery operations. With the eventual occupation of Union troops in many areas of eastern North Carolina, the large labor pool of African slaves slowly disappeared as many slaves escaped to Union occupied territory along the coast or were liberated by advancing Union armies (Taylor 1992). Ironically, by the end of the War, former slaves who resettled in the freedmen's community of James City, on the Neuse River near New Bern, had established their own river fishery operation (Mobley 1981).

Albemarle region fishery structures and seine nets were also destroyed by Union gunboats to keep fish from being harvested and salted for the Confederate Army (Crabtree and Patton 1979; Thomas 1996). After receiving intelligence reports that Confederate supporters were processing river herring and shad for the Confederate Army, Federal gunboats landed marines who destroyed John Pool's Bertie County fishery operation on the Chowan River in May of 1863. The next day, Union troops returned to Pool's fishery and confiscated cured fish, salt, tobacco and slaves (Thomas 1996). In 1863, the North Carolina government prohibited haul seining operations for the duration of hostilities.

The authorities feared that catches of river herring and shad, would either be confiscated by Federal troops or openly sold to them by northern sympathizers, who resided in many areas along the coast (Griffith 1997; SHC: Hayes Collection (Wood Family Series), Description of Hayes Collection, p.8). Edward Wood, owner of numerous Albemarle Sound fisheries, complained to the

Confederate government of the state and later received permission to continue fishery operations. Federal gunboats interfered with Wood's fishing activities by harassing his boatmen. When Wood complained to Union officials, he was arrested for "obnoxious" behavior, but was later set free in March of 1863 (SHC: Hayes Collection (Wood Family Series), Description of Hayes Collection, p.8).

Postbellum Period to World War I Fisheries, circa 1865-1915

Technological advancements, transportation improvements and market changes greatly stimulated North Carolina's commercial fisheries in the postbellum period. Faster and more efficient transportation methods of railroad and steamboat service, the general availability of ice, refrigerated shipping and consumer demand for fresh, rather than salt, fish created new markets for North Carolina fishery products (Taylor 1992). Pickled shad and river herring, however, would remain a diet staple for many eastern North Carolinians due the nature of eastern North Carolina's agricultural economy and the depressed economic conditions that pervaded the South during Reconstruction. As noted by one contemporary observer:

The Herrings, or Alewives, taken in the great fisheries of the South, are almost without exception salted for local consumption, though early in the season they are shipped fresh from the Albemarle region to Philadelphia, New York, and Baltimore...There is of course a considerable consumption in the fresh state in the region of the fisheries, immense quantities being taken by peddlers and carried by wagons inland... (McDonald 1884:587).

Several North Carolina fish species, while highly demanded in local fresh markets throughout the eighteenth and nineteenth centuries, did not preserve well when salted. Such delicacies as striped bass, bluefish, trout, white perch and flounder came to be highly demanded in

northern markets after the introduction of ice cooled transport ships and railroad cars in the late 1860s. By 1866, northern schooners, loaded with ice, began to fish Carolina waters and to purchase catches from local fishermen (Taylor 1992). Fresh fish, on ice, were regularly shipped out of all major Coastal Plain fishery ports in North Carolina by the early 1870s (Earll 1887). The discriminating consumer palate obviously preferred fresh over salted fish. The demand for pickled fish “exports” began to decline (Taylor 1992), as fresh North Carolina shad commanded respectable prices in the markets of Baltimore, Richmond, Philadelphia and New York (*Fisherman and Farmer* [anonymous] 1888a; 1893; 1895a, 1895b). An 1891 fisheries report noted: “The most important single product of the North Carolina Fisheries is the shad, the value of which in 1890 was \$306,015...The alewives had a value of \$164,636...” (Smith 1893:285).

Despite the drop in the “export” demand for pickled fish, the annual river herring harvests continued to rise rapidly during the last quarter of the nineteenth century. Iced river herring and shad were commonly shipped north, while the local consumption of fresh and pickled fish remained high (Earll 1887; Taylor 1992). In 1877 there were 110 commercial fishery operations on the Albemarle Sound and its tributary rivers and streams (Gregg 1968:29). This figure represented approximately one half of the state’s total number of inland and coastal fisheries. These fisheries, along with those of the Pamlico Sound drainage, harvested over 27,700,000 river herring in 1904, of which approximately 7,800,000 were sold fresh and 19,900,000 were salt-cured (Smith 1907:410). These statistics did not include non-commercial harvests by family-level fishery operations.

By 1869, steam-powered winches began to replace some of the horse / mule-driven windlasses as the means of landing the haul seines at the large-scale operations and the application of steam power to the seine flats soon followed (Leary 1915). Changes in net sizes followed the improvements in machinery. Bertie county's largest fishery of the day, owned by the Capehart

family, boasted a haul seine that was some 8,500 yards in total length (2,500 yards of net and 6,000 yards of hauling ropes). The thirty-six foot deep seine was deployed by steam-powered seine flats and recovered by steam-driven winches on the shore (*The Orient* [anonymous] 1896). Although the notably large hauls at Avoca comprised of approximately 300,000 river herring and 6,000 shad (*The Orient* [anonymous] 1896), such operations were recorded as having caught as many as 400,000-500,000 river herring in a single haul of the seine (Leary 1915:189). Observers noted that from 1878 to 1883 the total catch at one Chowan River fishery was over fifteen million river herring (Leary 1915:190).

Many small-scale operators, however, continued to rely on both hand seines or horse / mule-driven windlasses, and oar-rowed seine flats at the inland river fisheries. Subsistence driven farmer-fishermen, as before, relied on smaller hand seines, set or drift gill nets, bow nets, or other types of vernacular fishing gear (Boyce 1968 [1917]). Despite the State Board of Agriculture's (1896:141) statement that "Fishing in the upper courses of the rivers is usually of a non-commercial nature, and is unimportant," subsistence level fisheries were extremely important to the local populations of the Albemarle-Pamlico region during the period (Boyce 1968 [1917]).

The continued significance of the subsistence level fisheries was observed by Earll (1887:477) who concluded: "The fisheries of this region are quite important, as everyone living near the water catches fish enough for family use, while many salt considerable quantities to be shipped to other portions of the state in exchange for corn." Small, semi-permanent stake gill nets, drift gill nets, hand seines and bow nets for the taking of river herring and shad continued to be used by subsistence and recreational fishermen in all the sounds and rivers throughout the state from the postbellum period through the twentieth century (Cobb 1906). A noteworthy device, known as the "fishing machine" or "fish wheel" was introduced to the Roanoke River region in the late 1800s. A

1906 report on North Carolina shad fisheries reveals that some 500 “wheels” were operational in 1896. This figure fell dramatically to just over 100 by 1904 (Cobb 1906:35).

The giant haul seines and related deploy and recovery equipment, while extremely efficient, were prohibitively expensive for most small-scale commercial fishermen. Pound nets were introduced to the Albemarle area in 1869 by two Pennsylvania Dutchmen, the Hettrick brothers (Leary 1915). As such, pound nets were often referred to as “Dutch Nets” in the region (Leary 1915). The introduction of the relatively efficient, yet inexpensive pound net, “...revolutionized fishing in North Carolina, especially in the Albemarle sound” (Taylor 1992:17). Pound nets greatly reduced the crew size needed to handle the nets, as well as the need for land on the shore to locate fishing beaches.

Unlike the larger haul seine nets, which required a large cleared beach or man-made landing area, pound nets could be used virtually anywhere one wished to set the net. Large-scale haul seines required the labor of thirty-to-forty boatmen and net handlers, while several pound nets could be fished by two or three men in a day (Boyce 1959 [1917]). Further, pound netting could be easily accomplished with a small investment of capital, as compared to the capital intensive haul seine operations. Although pound nets could harvest up to 10,000 pounds of fish per day, a small crew could work a number of nets and easily make a high profit in return for their investment. Unlike the large-scale haul seine operations, extensive shore facilities were not required for the Pamlico Sound pound netters. Pound net fishermen on the Pamlico Sound often set up temporary fish camps, either on the mainland shore or near shore islands, during the spring fishing season. Many of the crude encampments simply consisted of brush huts called “runches” or tents made by a canvas thrown over marsh reeds (Jones, Pate, Lewis, and Lupton 1974). Centralized fish houses were built on the Pamlico Sound in the later 1880s where individual boat crews came in to sell their catch. Before that

time, “run” boats carried the fresh fish to Washington or New Bern, North Carolina and transported to market by rail (Jones et al. 1974).

Pound nets were introduced to the Pamlico Sound in the early 1870s and were placed in the Croatan Sound to catch large runs of shad that entered from Oregon and New Inlets. Pamlico region netting operations were so effective that Albemarle Sound shad catches were drastically reduced by the early 1900s. Lobbyists ensured that laws were passed that required certain channels that led to the Albemarle Sound to remain unobstructed to the migration of spawning fishes (Pratt 1908, 1911b; Taylor 1992). In response to the growth and demands of the pound net fisheries in the rough waters of the Albemarle and Pamlico Sounds, North Carolina boat builders designed a unique work boat during the late 1870s. The specialized fishing boat came to be known as the “shad boat” or “Albemarle Sound boat.” In recent years, the shad boat was officially designated as North Carolina’s state boat, in view it’s special place in the history of the state, as well as the fact that the shad boat is the only vessel type ever used in the state that was specifically designed, built, and utilized in North Carolina waters alone (see Appendix B).

In response to the new competition, the large-scale haul seine operators fought to outlaw pound nets from being used in North Carolina waters. Power seines, such as those operated by the Capehart family at Avoca and the Wood family at Greenfield, were owned by a small number of wealthy individuals, who possessed enough capital to maintain and operate the expensive machinery. These same individuals often owned or controlled the access to the best seine beaches. As such, a virtual monopoly had existed over the commercial end of river herring and shad fisheries until the introduction of the more egalitarian, and less labor intensive, pound net (Griffith 1997; Taylor 1992; Boyce 1959 [1917]). Previously, small-scale commercial operators and subsistence level fishermen had sandwiched themselves, as best they could, in between the major fishery operations.

Boyce (1968 [1917]:102) observed that large haul seine "...owners saw the pound net as an instrument that was to take away...their long-enjoyed monopoly, and,...when threatened, they raised a howl." Legislation against the "Dutch Nets," however, did not come to pass and the pound nets multiplied at such a rate that the large seine operators "...noticed a decided falling-off in their catch. One by one they were forced to quit seining, since they did not care to operate their plants at a loss" (Boyce 1968 [1917]:102). In 1880 there were 117 pound nets in the state and in 1890 there were over 950 (State Board of Agriculture 1896:148). By 1897 there were some 1,100 licensed pound net operations in the Albemarle Sound region alone (Taylor 1992). Approximately sixty percent of these were located near the mouths of the major rivers, with the balance found in the sound proper (Boyce 1968 [1917]:103).

In comparison, there were only five haul seine operations left on the main body of the Albemarle Sound in 1895 (*Fisherman and Farmer* [anonymous] 1895b). This figure stands in contrast to the twenty-eight sound fisheries that operated in 1850 (Parramore 1967). The 1895 figure did not include "several other" haul seines that operated on the Roanoke and Chowan Rivers (Parramore 1967). Part of the decline was undoubtedly due to the competition from the pound netters (Boyce 1959 [1917]), but a number of antebellum seine fisheries were also destroyed by Union forces during the War (Thomas 1996). Hightower et al. (1996) indicated that there was only one haul seine operation on the Albemarle Sound in 1902 and that it went out of operation in 1907. Cobb's 1906 report, however, indicated that three haul seine fisheries were operational on the Albemarle Sound proper in 1906. Further, the Capehart fishery at Avoca, one of the last of great haul seine operations on the Sound, it did not go out of business until the late 1930s (*Bertie Ledger-Advance* [BLA] 1972; Smithwyck 1997; Taylor 1990).

Despite the conclusions made about the demise of the haul seine fisheries and the preponderance of pound nets by Boyce (1968 [1917]) and Taylor (1992), a moderate number of large-scale seine operations remained in operation on the Roanoke and Cashie Rivers and the head of the Albemarle Sound through the early 1940s. Numerous small-scale seine fisheries, with nets that ranged from 80 to 1,000 yards in length, continued to operate on many rivers and creeks well into the late 1970s (Davenport 1997; Goerch 1940; Harper 1997; Heath 1997; McIntyre 1978; Peele 1963, 1967; Stephenson 1995; Stevenson 1899). The last remaining commercial hand seine fishery is located on the Meherrin River at Hill's Ferry (Stephenson 1995). Boyce (1959 [1917]), while concentrating on the impact of the pound net in the region, largely neglected to emphasize the ubiquity of the small haul seine, gill net and skim or bow net in the shad and river herring fisheries of the late nineteenth and early twentieth centuries.

The Cobb (1906) report on the shad fisheries indicated that seven haul seine operations were located on the Roanoke, Middle, Cashie River complex. Twenty-one were located on the Tar-Pamlico River, fourteen on the Neuse River, four on the Contentnea Creek, three on the Chowan River and nine on the Roanoke River (Cobb 1906). In 1902, 129 shore fisheries (sound and river) in seventeen counties of the Albemarle-Pamlico watershed utilized haul seines to harvest more than 4,300,000 pounds of river herring and shad (United States Commission of Fish and Fisheries 1903). The 1,600 pound nets in eight of the same seventeen counties accounted for over 6,800,000 pounds of shad and river herring. Nine of the seventeen counties with shad and river herring haul seine fisheries did not include pound net fisheries (United States Commission of Fish and Fisheries 1903) because the operations were located on inland rivers and streams where pound nets could not be as efficiently utilized.

In 1931, 59 haul seines in eight counties were responsible for the harvest of over 2,260,000 pounds of shad and river herring combined. Gill nets accounted for 1,235,000 pounds and pound nets reaped 5,300,000 pounds combined (Bureau of Fisheries 1934). Three counties that accounted for 28 of the haul seine operations listed in the 1902 survey did not list the commercial use of any haul seines in 1931. Haul seine fisheries listed in six counties of the 1902 survey were not actually surveyed in the 1931 report (United States Commission of Fish and Fisheries 1903; Bureau of Fisheries 1934). As such, an unknown number of seine operations still existed in those counties that were unaccounted for. While pound nets were quite ubiquitous and accounted for a large portion of the harvests by the end of the nineteenth century, the seine net, gill net, and other small-scale gear types remained equally important, particularly for the subsistence level fisherman and the part-time fisher-farmer.

Although pound nets were responsible for the greatest proportion of the statewide river herring harvest after 1896, gill nets (set and drift) were responsible, by far, for the highest proportion of shad harvests from 1887 through the mid-1930s (Chestnut and Davis 1975). Pound nets did not greatly surpass the gill net in shad harvests until the late 1940s (Chestnut and Davis 1975). Well after the introduction of the pound net shad fishermen outside the Albemarle Sound region primarily took to the rivers and streams in dugout canoes or other small boats to take the fish with skim or dip nets (Taylor 1992; Earll 1887; Stevenson 1899). Skim nets, small haul seines or drag nets, bow nets, and gill nets were the primary gear types used to harvest shad and herring on the Neuse River which was considered to be the most important shad stream in the Southeast (Stevenson 1899).

In the early twentieth century technological developments further stimulated the fisheries. Gasoline engine-powered boats, which replaced sail, oar and steam-powered varieties proved to be another advantage for those who could afford them. Haul seine operations on the rivers employed

gasoline-powered boats to tow the seine flats into position and to haul the catch to shipping points (Hampton 1997; Taylor 1997). Small crews in gasoline-powered boats could easily fish twice as many pound nets or gill nets as their sail or oar-powered counterparts (Boyce 1959 [1917]; Lane 1997). The potential range of the exploitation area increased, as crews could travel further away from processing and shipping areas with greater ease and speed. Increased speed and improved all weather capabilities of for work boats reduced spoilage problems, which previously tended to damage catches while en route to a landing point (Lane 1997; Hampton 1997; Taylor 1997; Boyce 1959 [1917]).

While white farmers and timber industry laborers continued to labor in the commercial fisheries, the largest percentage of the labor force for the major commercial concerns in the postbellum period were black (Winston 1937). Many black residents in the Albemarle region, who had been hired out as slaves by their masters to work fishery operations, returned to the same trade. Some of the Pamlico region's black entrepreneurs operated fishery concerns in the local retail markets. The postwar New Bern retail market included eight African-American operated fish stalls and four or five fish peddlers (Earll 1887). By the early 1880s, a number of white business owners (anonymous [*Historical and Descriptive Review of the State of North Carolina*] 1885) operated six wholesale fishery operations in New Bern and shipped the products of "...one of the most important shad fishery in the state" by a circa 1880 observer (Earll 1887:485). River herring and shad exploitation undoubtedly contributed heavily to their product mix from March through May.

During the later nineteenth century, concern began to develop for the decline of the American shad harvests in the state. Although there were some general attempts at fisheries conservation through legislation in the eighteenth century and the antebellum period (Watson 1996), concerted conservation efforts were not develop until the 1870s (Winslow 1990). While no

statewide statistics were kept until 1880 (Chestnut and Davis 1975), fishermen had already observed a noticeable decline in the annual harvests (Boyce 1959 [1917]). Since American shad were the most valuable “export” market fish, they were of particular concern. The fisheries section of the State Board of Agriculture was established in 1877 and developed shad hatcheries that released some 26 million shad fry into the Albemarle Sound between the years 1877 and 1884 (Taylor 1992). It appeared that the program was working, as harvests increased through the year 1897. Even though the shad propagation program operated until 1943, the annual shad harvest continued to spiral downward after 1897 (Winslow 1990).

Through 1905, the Board of Agriculture limited most its operations to fish stocking and oyster culture, with little or no emphasis on actual fisheries management or conservation. In 1907 the North Carolina Fish Commission was created, but not given autonomy and statewide jurisdiction until 1915 to protect the fisheries of North Carolina (Winslow 1990). By 1908, the Commission had drafted regulations that closed the shad and river herring season early (varied from mid-April to mid-May, depending upon location), restricted gear types used in the shad and river herring fisheries (based on dates and locations that varied) and requested penalties if river herring or shad were caught for any purpose other than food (Pratt 1908:29-31). Such regulations were novel for their day, considering the free reign of the commercial fishery interests through the turn of the twentieth century.

Chapter IV

Early Modern Period River Herring and Shad Fisheries, circa 1915-1950

Historic records, oral histories and contemporary cultural traditions reveal that the dependency on river herring and shad exploitation in northeastern North Carolina from the late nineteenth through the mid-twentieth centuries manifested itself in variable ways. Many of the historic era communities in the region were intimately tied to the seasonal spawning runs of river herring and shad for both economic and subsistence purposes. Although the exploitation patterns were nearly infinite, the seasonal dependence on *Alosa* species by the peoples of northeastern North Carolina can be characterized by three general patterns: full-time commercial fisheries, part-time commercial fisher-farmers, and non-fishing consumers. The economic importance of shad and river herring to North Carolinians of the early modern era resulted from the same qualities that made anadromous fish runs attractive to prehistoric cultures: they were super-abundant in the spring, they could be easily harvested with a range of gear types and they were storable for months without the need for refrigeration or specialized storage appliances.

Full-time commercial fishing families relied on the massive spring runs of river herring and shad for the largest portion of their annual income. Part-time fisher-farmers and urban fishery workers relied on the resource for seasonal monetary income and as a long-term storable food resource. Just as the part-time and full-time fishermen, most non-fishing rural farmers and urban residents relied on the yearly catches for their annual subsistence needs. Perhaps only the most affluent, urban families in the region did not rely on river herring and shad for subsistence. Since the region generally lacked sophisticated storage technology, due to a range of factors to be discussed, until the 1950s, shad and river herring continued to be a significant subsistence, as well as an economic resource into the post World War II era. Others who depended upon the seasonal fish

resources were “hucksters” (fish peddlers) from inland counties and commercial fish buyers in the major port towns of eastern North Carolina. Many of the urban elite, however, were economically dependent upon the fish runs, because they operated the fisheries, marketed fishery products, leased land to the fisheries, or utilized capital that resulted from the fisheries (e.g., bankers, merchants, lawyers, doctors, etc.)

Large-Scale Commercial Fisheries

Large-scale commercial fishing operations existed along the shores of the Albemarle Sound and up all of the major river tributaries of the region. Large-scale concerns are loosely considered by the author as operations where fishermen gained the largest portion of their annual income from fishing activities, employed workers outside the immediate family of the fishery owner, and would have listed their primary occupation as “fisherman” in the official tax and census records. Large-scale operations included the power-haul seines (horse or mechanical) and pound net fisheries with more than ten sets of nets. Although some large-scale operations relied on gill nets after the 1920s (Lane 1997), most of the larger fishery concerns utilized haul seine or pound nets (for further elaboration on the specific details of the gear types mentioned in this chapter, the reader should refer to Appendix A; refer to Appendix C for smoke and salt curing processes).

Despite Boyce’s (1969 [1917]) observations about the demise of power-haul seines by 1915, informants have indicated that a number of large-scale seine operations continued to exist and were quite profitable well into the early 1940s. Even though pound nets were popular in the late 1880s, many pound netters switched over to gill nets in the late 1920s, due to a shift in fishery exploitation focus from river herring to a focus on higher value “shipping fish” such as striped bass (locally known as “rock”) or American shad (Lane 1997; Spruill 1997). Gill nets, by nature, allowed

the fishermen to be more discriminate about which species were harvested (Lane 1997; Spruill 1997). Shipping fish were species that were packed on ice and shipped to northern markets by rail, truck or steam ship. One sound fisherman recalled his early years back in the mid-1920s:

You see when I was a boy, I hauled most of my Daddy's shad and shipping fish...I'd carry them to Hertford and take them out of that box and put a little ice in the bottom...and nail them up, and carry them to the depot and the 2:00 train would come along and pick them up...and the train would carry them to Norfolk...Baltimore or Philadelphia...you got your check after they got to Baltimore and got sold...a retailer...he'd take his fee out and then send you a check...you didn't know until you got your check back, you wouldn't know (if you made a profit) (Lane 1997).

Although a handful of small-scale beach seines (engine-powered and hand-powered) were employed on all of eastern North Carolina's major rivers and tributaries through the early 1970s, most of the post-Civil War era commercial haul seine operations were large-scale concerns (Capehart 1988; Hampton 1997; Taylor 1997). Small-scale operations included such fisheries as Casey's Seine Beach on the Neuse River at Kinston, Davenport's Fishery on the Tar River (now known as "Seine Beach") at Grimesland, and the Revelle-Reid Herring Fishery on the Chowan at Mount Gallant Ferry). Large-scale fisheries included those such as the Capehart Fishery on the Albemarle Sound at Black Walnut Point [Avoca Farm], and the Terrapin Point Fishery at the mouth of the Cashie River, Slades and Kitty Hawk Fisheries on the Roanoke River near Plymouth.

Few of the large-scale fishery operators, with the exception of the market processing and canning operations (e.g., Perry-Belch/Perry-Wynns Fish Company [Colerain] and the Standard Products Company [Cannon's Ferry] on the Chowan River), depended solely upon fishing for their income (Hampton 1997; Layton 1997; Spruill 1997; Taylor 1997). Most owners, although primarily involved with fisheries for economic purposes, were still seasonal participants who depended upon

other livelihoods during off-seasons. Many commercial fisher-families farmed (subsistence and cash crop), raised livestock, cut timber, built work boats, worked as blacksmiths, or operated other businesses, such as general stores, saw mills or farm supply and equipment stores (Hampton 1997; Lane 1997; Smithwyck 1997; Spruill 1997; Taylor 1997).

The multiple-livelihood lifestyle of the full-time commercial fishermen during the pre-World War II era still continues among many waterman in the Albemarle Sound region (Ashley 1996; Byrum 1996; Hollowell 1996) and other areas of coastal North Carolina today (Forrest 1988). Commercial river herring fisheries fitted in with the regional barter economy. A resident of Colerain recalled that his mother sent him down to the fishery several times each week to trade a dozen eggs for one dozen river herring (BLA [anonymous] 1972:C4). Others recalled that fishermen on the Roanoke River at Jamesville would meet farmers down at the landings to trade for county hams for river herring (Beacham-Phelps 1991), while farmers on the Chowan River often traded corn for river herring (Sharpe 1958a). The fishermen transported the corn on their boats to regional markets (Sharpe 1958a). One full-time fisher-farmer recalled that he had a route during the 1930s where he delivered fresh and salted river herring from farm to farm. He stated:

Yeah. We'd back the truck over right beside the boat and fill the truck body full and I'd take off about 4:00...and most of the time I'd sell them all. Peddle them out. I'd come home with eggs, molasses, chickens. I'd come home many a night at 10:00 from selling herrings...I've called folks out of bed and sold them herrings. Really, in the night. Yes sir. I had a route and if I was late getting started, I'd just be late...And they'd come out and get a whole washtub full of herrings, they would...because they'd get them cheap (Lane 1997).

As the local demand for river herring and shad for subsistence began to dwindle in the post-World War II era, many shad and river herring fishermen diversified into shrimping and crabbing during

the late spring and summer months, and catfish harvesting in the winter to supplement the spring fishing for river herring, shad, perch and rock (Smithwyck 1887; Spruill 1997; Griffith 1996; Woodward 1956). Such a pattern continues today in many coastal regions of the state (Griffith 1996; Forrest 1988). As noted by Griffith (1996:27), “The flexibility to move among and between fisheries, both on a seasonal basis and from year to year, is a hallmark of North Carolina fishing...”

Part-time and Small-Scale Fisher-Farmers

Many families were involved in small-scale seasonal shad and river herring fisheries at different levels. Some farmers and industrial laborers owned a single boat and a hand seine, a pound net or set of gill nets and only fished commercially during the spring season to supplement their income from cash cropping, as well as to provide their families with cured river herring for the coming year (Smithwyck 1997; Spruill 1997). As observed by Pratt (1911a:6), “Many of the persons employed in the industry fished only a part of the year, and during the remainder of the time engaged in farming and other occupations.” The small-scale commercial fishing operations largely developed after the American Civil War (1861-1865), particularly after the pound net and refrigerated shipping (ship and train) were introduced to the region (Boyce 1968 [1917]). Pound nets, gill nets and other small-scale gear types were economical enough that fishermen invested a relatively modest amount of money in gear for a greater economic return in catch (Boyce 1968 [1917]). Further, pound nets and gill nets did not require access to a cleared shoreline area as in the case of haul seines that had to be landed on a cleared beach or a specially constructed landing (Boyce 1968 [1917]). Refrigerated shipping to northern urban markets in the 1870s led to an increased demand for fresh fish, particularly shad and rock that were generally sold fresh in local markets before the early 1870s (Taylor 1992).

From the 1870s through the 1950s, many farmers fished seasonally to supplement their income from cash crops. Smithwyck (1997) observed:

It was just spring time along then. There weren't many of them full time. Come the tenth of May the herring season was over and that's all they were lookin' for along then. They didn't catch em' in big quantities...perch, rock and stuff like that...to make a go of it, and in the summer time if you don't have some means of refrigeration you can't do much of it. They just had to fish when the weather was cold enough to take care of that part of it.

The small-scale fisher-farmers could fish the spring runs without interfering too much with the spring planting season. As one fisher-farmer recalled, "It worked you mighty hard during the fishin' season, but...ah... you could make a dollar...We fished for herrings...of course I was glad to get the other fish, but if it hadn't been for the herrings we couldn't have made a go of it" (Smithwyck 1997). It has been observed that "the runs would end by the middle of May but the fortunes of most of the residents of the Albemarle region could rest on the eight weeks preceding: (Parramore 1980:41). It is apparent that river herring fisheries, in particular, were central to many families' livelihoods.

On the Roanoke River during the early-to-mid-twentieth century, a number of black fishermen operated out of the "Sugar Hill" community on the west side of Plymouth. These fishermen fished drift (gill) nets from dugout canoes and sold their catch on the beach, down by the river, or hired children to deliver the fresh river herring from door-to-door (T. Gardner 1997; Smith 1997). The Sugar Hill fishermen only fished during the river herring runs and worked as laborers in local factories or on local farms during the remainder of the year (T. Gardner 1997; Smith 1997).

One informant recalled:

An old colored man down there...he'd bring them right in on his boat, the bow of the boat up on the sand, and they'd be up there in front of the boat where you took them out. And he had a wet bag on them to keep them fresh. They didn't have no ice or nothing like that...I've been around town selling herrings a many an evening...them colored folks would be selling them six for a quarter, and he would give me a nickel when I got back (T. Gardner 1997).

Other male farmers worked at the commercial fishing operations as boatmen, net handlers, fish handlers and fish packers, while their wives worked in the cutting houses to clean and prepare river herring for salting to supplement the family income (Hampton 1997; Lane 1997; Spruill 1997; Taylor 1997).

Although some whites, generally the owner's family members, were employed in the river herring and shad fishing industry, the majority of the larger fishery operation crews were comprised of members of the rural black farming communities in the vicinity of each fishery operation (Boyce 1968 [1917]; Capehart 1988; Goerch 1940; Hampton 1997; Lane 1997; Spruill 1997; Taylor 1997). Alternately, most small-scale commercial fishery operations in the twentieth century were owned and operated by small crews of white fishermen (Lane 1997; Layton 1997; Smithwyck 1997). Just as freed and enslaved blacks were hired or used in the antebellum period fisheries, black farmers and urbanites continued to make up the largest portion of the work force in the post-bellum period, large-scale river herring and shad fisheries in eastern North Carolina through the 1950s (Boyce 1968 [1917]; Capehart 1988; Hampton 1997; Lane 1997; Spruill 1997; Taylor 1997). While the shore and seine crews were largely made up of black laborers, the large-scale fishery operations were generally owned by white fishermen or entrepreneurs. A similar pattern was mirrored in both the offshore menhaden, *Brevoortia tyrannus*, (Garrity-Blake 1994) and ocean side sea mullet, *Mugil cephalus*, (Cecelski 1993) fisheries in North Carolina after the 1870s.

Despite the general racial inequalities observed in the south during the age before civil rights legislation, many fishery operations, such as the river herring and mullet fisheries, were, at a daily operation level, largely desegregated industries. One historian has observed that there was an "...easy familiarity between black and white fishermen...generally white southerners did not openly tolerate black cultural influences...fishing, however, bred an interdependence that transcended racial divisions and encouraged a measure of racial equality remarkable for the era" (Cecelski 1993:12). A white fisherman from the Albemarle Sound region recalled his early years as a farmer-fisherman in the Depression era: "And you know (how) our race relationship(s) (are) today? I'd like to add, back in those days we seemed to be more communicative to each other than we are today, I mean really. Back in those days, we had (black) people who worked...with us, and I worked with them, and we worked together, we really did" (Spruill 1997). A number of fishery owners noted that their best boatmen, net handlers and shore "captains", who directed the shooting of the seines or the pound net operations, were black workers (Hampton 1997; Spruill 1997; Taylor 1997). Despite these observations, inequalities still undoubtedly existed at the basic social level away from the immediate environment of the fishery operation.

As in the antebellum period, the large power-haul seine operations on the Albemarle Sound and its tributary rivers required large labor forces to operate. Crews were needed to operate seine flats, machine houses and horse-driven capstans, while others mended nets, hauled in the catch, cut and salted river herring, and iced down shad or other fresh packed varieties for shipping. All of the large-scale operations had salting houses where white and black women were employed to cut the heads off the river herring and remove the visceral matter and roe from the body cavity before they were pickled with salt in large wooden vats. The men and women who labored at the fisheries were part-time fisherfolk. Many of the men and women who worked at the fisheries were small land

holders, tenant farmers or sharecroppers who relied on their income from fishing as “start up money” for the coming farming season (Capehart 1988; Hampton 1997; Taylor 1997). When gross annual incomes from farming were approximately \$250 per year (less than \$5 per week) for most tenant or sharecropping farming families during the 1920s and 1930s (Dickey and Branson 1922; Raper and Reid 1941), work at the large-scale shad and river herring fisheries provided in excess of \$18 per week for many skilled fishery workers, such as the boat and seine handlers (Hampton 1997).

Capehart (1988) indicated that most of the fishery crews worked to get money “...because they were largely subsistence farmers...” who generally grew few or no cash crops. The operator of the Terrapin Point Fishery, owned a timber business with two saw mills, where many of his full-time fishery employees worked during the off season (Taylor 1997). This particular pattern was reminiscent of the antebellum era plantation fishery operations, whereby slaves were utilized in the agricultural off season to work in the fisheries in the spring and cut timber in the late fall and winter. Many of the large-scale pound net and gill net fisheries on the Albemarle Sound employed farmers and farm wives during the spring season to operate boats and to work in the fish houses processing salt river herring and iced shad (Lane 1997; Spruill 1997). In some counties, the Fisherman’s Court of the antebellum era continued to serve as a place where fishery owners hired seasonal labor. The practice continued well into the early 1950s, but evolved into a festival of sorts, rather than a serious affair as it had been in the past (Sharpe 1958a).

The river herring and shad fishing season dove-tailed nicely with the seasonal aspects of subsistence farming and cash-cropping during the late nineteenth and early twentieth centuries. Many farmers would “change hats” for a few weeks or months in the spring to take advantage of the seasonal economic boom brought on by the spawning runs. The son of one large-scale seine fishery operator stated:

You see, along then, at that time, everything was operated with a team you know...mules and horses. And a man ah, a one horse farmer, he wouldn't tend over twenty or twenty five acres of land, and it just...it just took a lot of people to run the farms then. And there was a lot of people in the area. And ah, most of your tenant farmers were black. I say over, way over, fifty percent, sixty or seventy percent were black...black farmers. And ah, that's one reason why so many were black that worked at these fisheries...there were more of 'em. They were glad to get the job...(If) a man had a family and he had ah, four or five young men, three or four or something like that. Well he could farm and still do (work at the fisheries)...Your younger men, they would, they could work (on the farm). He could still operate his farm, because ah, they were only ah, only (at the fishery for) three months (Taylor 1997).

Another former full-time fisherman remembered: "...the farmers had small farms and it was done in a slow way...you could get somebody to go help you a half a day...and all the farmers, they'd go back and work on the farm the rest of the day. It was kind of a side job, like" (Lane 1997).

In addition to receiving a cash wage to supplement the limited farming income available to small-landholders and tenants, many fishery workers were paid "in-kind" as an additional benefit. Workers were often allowed to carry as much fresh fish (river herring, shad, perch, rock, catfish, etc.) home as they wished for immediate consumption (Spruill 1997; Taylor 1997). Some fisheries supplied the workers' families with a year's supply of cured river herring (T. Gardner 1997; Spruill 1997). Capehart (1988) believed that many of the local farmers worked at the fisheries "because they loved it...because it was an exciting sort of life...and they enjoyed one another's company...it was a very fraternal thing." Although the fishery work was labor intensive, exhausting and dirty (Boyce 1968 [1917]), Capehart's (1988) more positive observations were in keeping with similar comments made by other large-scale haul seine operators during the 1920s and 1930s (Hampton 1997; Taylor 1997). As Boyce (1968 [1917]:97) further observed: "Though the work was hard, necessitating

much exposure...seining seemed to have a peculiar fascination for the men and women who followed it.”

The remotely located haul seine operations often included sleeping quarters or bunk houses for crew members that had to travel a long distance by road or boat from home to work (Hampton 1997; Taylor 1997). Others had cook houses where the workers were provided with three meals per day in addition to their regular wages (Hampton 1997; Taylor 1997). Despite Boyce's (1968 [1917]:97) observations regarding the coarseness of the food served to the fishery workers, several of the haul seine operations were noted by the informants for their locally renowned cooks and table fare (T. Gardner 1997; Hampton 1997; Taylor 1997). Hampton (1997) recalled:

They had a cook who cooked for them...and we furnished meat and cornbread and fish...and the guys from High Piney used to bring shallots, and they'd start a pot, and they'd steam catfish or eel or whatever in the hell they could get. But the old man had plenty of potatoes and fed them well...And you got three good meals a day...(one) old guy here, when he'd start off every spring, his face would be just as ashy and his skin would be just as dry, but when he left there, the damn grease was running out of him....we didn't feed them ham, we fed them fatback. And they would fry the fatback...and cut herrings, and (we would) feed them herrings and molasses, cornbread and coffee and whatever in the hell they wanted.

Although the workers were usually equipped with rubber boots and oilskin or rubberized pants and jackets (Hampton 1997), Boyce (1968 [1917]) and Winston (1937) noted that whiskey was an essential element of the daily fare, particularly at the haul seine fisheries. One source implied that cheap whiskey was an “absolute necessity” as the “fuel” of the seine fisheries (*The State* [anonymous] 1958:16). The constant exposure to the cold water and the long hours required that the fishery owners supply generous quantities to the haulers that continually entered the water, as well as to those on shore after large hauls were made and processed (*The State* [anonymous] 1958:98). In

the nineteenth century, the standard ration for net haulers, those who were most exposed to the elements, was one gill (5oz.) per haul, while shore hands received two or three gills each day and cutters received a gill after processing particularly large catches (NCDCD 1963:6). Capehart (1988) remembered that some men were turned away from work at the beginning of the fishing season if they were known to be heavy drinkers. If a man drank too much on the job and became too drunk to work, he was “put ashore” (fired) (Capehart 1988).

It was observed by most informants that the seasonal fishery crews, male and female, at both the pound net and haul seine fisheries were long-term employees who returned from local communities each fishing season to work (Hampton 1997; Lane 1997; Spruill 1997; Taylor 1997; Capehart 1988). Some part-time fishery workers would return in the early fall, after the harvest, to mend and repair nets for the following spring fishing season (Spruill 1997). Hampton (1997) observed that during the 1930s “They came back year after year, always willing to help and do what they could...(they made) three or four dollars a day, or whatever in the hell (they could).” Many of the workers were related or attended the same churches in their home communities (Capehart 1988).

At the Kitty Hawk and Slades Fisheries in Plymouth, Hampton (1997), whose father operated the fishery, recalled that most of the workers came from a community known locally as High Piney (Dardens, North Carolina). Capehart (1988) recalled that while the majority of the Capehart Fishery (Avoca Farm) workers came from Bertie or Chowan County, at least one steam-flat captain, a black menhaden fisherman, and a number of other crewmen traveled from Beaufort, North Carolina and Franklin, Virginia each season to work at the haul seine operation. Several informants indicated that the same families and their neighbors would come back year after year to work each fishing season at the large-scale fisheries on the Albemarle Sound and its tributary rivers

(Capehart 1988; Hampton 1997; Spruill 1997). Capehart (1988) noted that "...it was a tradition that stayed in those families over time." Hampton (1997) remembered:

We fed them and gave them a place to stay. And there was a bunch that lived back over at what they used to call High Piney (Dardens, North Carolina) that used to come back... and one man had a mule and he'd start, and he'd whistle, and everybody would come out and ride the cart. And when he got there (at the fishery), he'd turn the mule a loose and the mule would go right down that old path and go back home; he knew exactly where to go too! And that was the crew from High Piney...just a collard growing community, as far as I know...most of these were farmers, and they would come down and fish in the spring, and get enough money to start up with, and would buy boots and put it on credit and take out so much a week for a pair of boots and a slicker.

Many farmers who had access to, or lived along, the tributary creeks and rivers of the Albemarle Sound simply employed small gill nets (drift or set), bow nets, bridge nets or other vernacular fishing gear to harvest a large enough catch to provide their family with fresh shad in season and river herring to be salted or smoked for the coming year (Fenner 1995; T. Gardner 1997; Smith 1997; Smithwyck 1997; Spruill 1995). The author refers to homemade, often crude, non-commercial fishing gear as "vernacular" gear (see Appendix A). Lane (1997) and Spruill (1997) recalled that almost every farm family that had property with water access, along the north shore of the Albemarle Sound, had a boat and nets (pound or set gill nets). He observed that while there were only a handful of commercial fishermen in the area during the 1920s and 1930s, almost everyone who had access to the sound fished for river herring and shad to provide for their families (Lane 1997). In 1911, a former state representative of Gates County, speaking specifically of shad and river herring fisheries, informed the North Carolina Fish Commission that "the people of my county are interested in the fishing industries, not as a means of making a living, but as an article of food" (Pratt 1911b:62-63).

Smithwyck (1997) noted that many of the farmers along Salmon and Cashoke Creeks or Cashie Swamp in Bertie County fished for river herring with dip nets and set gill nets. Those who owned property along the creek would generally allow landlocked families to cross over their property to fish the creeks and creek fed lakes or swamps where the river herring often spawn (Smithwyck 1997). On the Roanoke River and Contentnea Creek, some small-scale fishery operators and subsistence level fishermen operated unique vernacular contraptions called “fish wheels” and “fish reels” for shad and river herring (Ormond 1997; Jones 1994). In the late nineteenth century, state fisheries regulations related to conservation efforts mandated that hauls could not be made after dark at the haul seine fisheries (Hampton 1997). Accordingly, some fishery owners allowed farmers to come in at night to catch river herring off the fishery landing area (Hampton 1997; Holmes 1885). An informant, whose father had owned two river fisheries, stated:

We let them (farmers) come up there at night in front of them (the fisheries), and you could take a dip net and bail them (river herring) right out and put them in gunny sacks and throw them over your shoulder and put them on your mule cart and come home with them... Had a nice place (the fishery landings) there that you could scoop them up and it weren't any trouble.

In one oral history account, a former resident of Washington County recalled that a small river herring fishery operation was built on the main Somerset Plantation canal at its juncture with Lake Phelps during the mid-1880s. She observed:

When the canal was full of them (river herring), the water gates were closed and a hedge put in the canal. As the water became lower the herrings would turn back toward the river and millions of them were dipped out with skim nets... poor people were allowed to fish behind the hedge and get their herrings for the year (Holmes 1954).

In Washington County, Tom Gardner (1997) recalled farmers utilizing bow nets to catch river herring on all of the small tributary creeks around the Plymouth area during the 1920s and 1930s.

He observed:

(I went herring fishing when) I wasn't nothing but a snotty-nosed little young'un, going with Papa. I've seen fifteen or twenty mule carts with herring in them. Filled up with herrings! Dip them right up and throw them right in the cart...Black folks and white folks just getting them for nothing. Some of them put them in the garden for fertilizer...Used to everybody put up a molasses barrel full of corned herring...You used to could go up the creek and have you a good landing net (bow net) and you could catch, I mean, you could catch all the damn herring you wanted...get you two or three cypress trees together on the bank and stand there and the herrings would come in there! (T. Gardner 1997).

On the fast moving Roanoke River, drift gill nets were the most popular gear for subsistence level and small-scale commercial fishermen (L. Gardner 1997; T. Gardner 1997).

While almost every family in the Albemarle region salted river herring, few people, apparently, salt-cured shad in the twentieth century. Some non-commercial fishermen salted shad if they caught more than they could sell or keep fresh to consume in a relatively short period of time (Smithwyck 1997). Spruill (1997) observed that "A few people smoked shad...and I have known them to salt shad...but that was because shad at the end of the season would get so cheap and it was a source you could get for much of nothing...maybe catch them yourself." Even though shad were commonly salted for the commercial markets during the nineteenth and early twentieth centuries (Beacham-Phelps 1991; Smith 1893), shad did not cure as well with salt as did the river herring (Smithwyck 1997; Spruill 1997).

Spruill (1997) indicated that "...they didn't cure out and I don't think they would last all the year like the herrings. I think that salt would bring the water out of the herrings more so than they

would the shad.” Another informant indicated that shad are best prepared by slow baking to dissolve a portion of the bones (Smithwyck 1997). If a shad was salt-cured, it had to be fried, which did not dissolve or soften the bones. It was concluded by one elderly fisherman that “If you salted a shad it wasn’t too good for baking” (Smithwyck 1997). As such, few people preferred salted shad over river herring, as the fried river herring could be consumed bones and all. The roe from the female river herring and shad was typically eaten fresh, but less often salt-cured or canned at the household level.

As in the early historic period shad and river herring parts continued to serve as fertilizer for crops or feed for pigs (L. Gardner 1997; Lane 1997; Smithwyck 1997; Spruill 1997). At the family farm level, fish heads, offal and roe from the cleaning process were often composted with leaves and organic soil from the forest floor. After a period of decomposition, the mixture was taken up and spread over the fields during the summer (Lane 1997). During the peak shad and river herring runs, the large-scale fishery operations often caught more fish than could be processed or sold. In such cases, the excess shad, particularly the less preferred hickory shad (McDonald 1884), and river herring were chopped up and used as fertilizer (Smithwyck 1997; Spruill 1997). It was noted by one informant that the fields near the Capehart Fishery, on the Avoca Farm, were “burnt up” after too many loads of excess fish and offal were applied to the soil season after season (Smithwyck 1997). One Roanoke River fisherman observed that shad were not as popular as river herring as a food resource; as such shad were often fed to hogs (L. Gardner 1997).

Non-fishing River Herring and Shad Consumers

Many farmers and urban residents in the region were not directly involved with commercial or subsistence level river herring and shad fisheries. Even so, most families in eastern North Carolina procured river herring to cure as an important element of their annual subsistence mix (T. Gardner

1997; Smith 1997; Smithwyck 1997; Spruill 1997; Taylor 1997). One resident of Bertie County, born in 1911, recalled that “we had to hook up the old mule to the cart and go down there with guano (fertilizer) bags...we’d wash them guano bags out good...and we’d go down there and get em’ (the fishermen) to put our herrings in the bags and we’d put em’ in the cart and go home and clean em’ and salt em’ up” (Smithwyck 1997). It was a common practice in the 1930s for farmers who had tenant families on their property, to purchase enough river herring for their tenants to live on until the following spring (L. Gardner 1997; Sharpe 1958a). One resident of Gates County recalled:

people up there would go fishing in the spring of the year and they would always hook a mule to the cart and there’d be a line of them behind each other, you know. Everybody had a lantern and a seat board and they’d go to Cannon’s Ferry and get fish. But they’d go to Cannon’s Ferry and spend the night, you know...Some time twelve-to-fifteen carts would come along. You know that’s when they’re catching a lot of fish. Get ‘em fifty cents a thousand, sometime a dollar a thousand. They didn’t cost much (Rountree 1978).

Not everyone had to travel down to the fisheries to purchase herring for the year. Townspeople, perhaps the more affluent, often purchased barrels of pickled river herring already packed from the fisheries and had them delivered to their homes where they stored the barrels in pantries or smokehouses (David Phelps, East Carolina University, personal communication 1997).

All of the Coastal Plain region’s rural families did not rely on river herring to the same degree as the people of the northeastern, Albemarle Sound, section of the state. Many rural inhabitants of the southeastern and interior Coastal Plain areas made a journey down to coastal towns such as Swansboro or Morehead City and purchased mullet (e.g., jumping mullet and white mullet [*Mugil* spp.]), which were salt-cured or smoked and packed in barrels, much like river herring (Gregg 1968; Harper 1997; Smith 1907). Fishermen on the coast, like their inland counterparts, salted down mullet and other salt water species for the market trade. Barrels of salt-cured mullet were

commonly shipped in from the coastal areas to New Bern and Washington, North Carolina to be sold in the local markets or shipped throughout the state along with shad and river herring (Robinson 1970; Smith 1907).

In addition to the consumption of river herring by farm families and urban working families, salt-cured river herring provided sustenance for many other people in eastern North Carolina. A letter published in one Edenton newspaper asked that the fishermen not forget their annual contribution of salted river herring to the Oxford Orphanage (Oxford, North Carolina). River herring were considered an important source of nutrition for the two hundred and twenty-five children that lived there (*Fisherman and Farmer* [anonymous] 1888:4). At Holley's Fishery in Bertie County during the late nineteenth century, one day, each fishing season, was dedicated to supplying the widows of Confederate veterans and their children for the year to come (Mack Bell, Windsor, North Carolina, personal communication 1997).

While American shad had largely developed into an export market commodity, river herring and hickory shad were especially utilized in the local subsistence oriented market because they were economical to purchase from the fisheries. As one contemporary fishery owner observed, "the (American) shad and rock furnish a rare and valuable food supply to those who are able to pay high prices...and the herring supplies a good and wholesome food to our own people and our neighbors at prices lower than any other food of equal (nutritional) value can be bought for" (Frank Wood 1909; quoted in Pratt 1911b:56-57). In 1895, river herring could be purchased for as little as one dollar per thousand during the peak season runs (*Fisherman and Farmer* [anonymous] 1895b:4).

Hucksters and Commercial Fish Buyers. Both large-scale and small-scale commercial fish buyers depended upon the seasonal shad and river herring fisheries in eastern North Carolina for a significant portion of their annual income. The large-scale fish buying operations were primarily located in either the larger port towns such as New Bern, Edenton, Elizabeth City, Plymouth and Washington, or in smaller shipping ports such as Belhaven or Colerain. From these shipping points, both fresh market fish, primarily shad and rock, and salt-cured river herring were shipped by train, steam ship or truck to urban markets in Norfolk, Richmond, Baltimore, Boston, Philadelphia, New York, cities of the Midwest and the westerly regions (“up state”) of North Carolina (Capehart 1988; *Fisherman and Farmer* [anonymous] 1888a, 1888b, 1893; Taylor 1997). At an economic level, many market buyers and fish handlers at the wholesale operations in eastern North Carolina depended upon the seasonal abundance of shad and river herring for jobs during the spring of the year.

Fish peddlers or “hucksters” were a common phenomena in rural North Carolina through the early 1950s (Capehart 1988; Heath 1995; Taylor 1997). Capehart (1988) recalled that many salt river herring and fresh shad were sold “up state”, in small towns such as Oxford, Halifax and Rocky Mount by “fish mongers” or hucksters who purchased their stock from the sound fisheries for other local retail markets. One source noted: “Hucksters who came to buy fish, drank, sang and fought to provide their own entertainment” when they visited the fisheries (BLA [anonymous] 1972:C7). One Albemarle Sound fisherman noted that a number of farming families from the community of Belvidere (Perquimans County) would come down to the fishery to purchase fresh river herring off the boats (Lane 1997). He observed:

They’d take them home...and put them up and dry them or smoke them. They’d carry them off and sell them. And that was a big thing for a lot of people up there.

They'd take them to Norfolk and sell them, you know. As a sideline for them, yeah they made a lot of money at it. They called them hucksters...and their family would help them...and the neighbors would come in and take the gills out and the entrails out...and put them in the smoke house...any way to make a dollar you know (Lane 1997).

A Plymouth resident recalled that his father would purchase several hauls of river herring each year from one of the two Hampton family fisheries on the Roanoke River (T. Gardner 1997). His father had several smoke houses and would smoke the river herring on reeds until they were a "golden brown color". T. Gardner (1997) noted that as a young boy, he and his older sister delivered boxes of smoked river herring to local residents around the town of Plymouth. He further recalled that he sold river herring from house-to-house or down at the riverside for several of the black drift net fisherman who fished the Roanoke River during the 1920s and 1930s (T. Gardner 1997).

River Herring and Shad as a Subsistence Resource

Although the consumption of cured river herring in northeastern North Carolina was undoubtedly high, the actual significance of the resource, as an element of the annual subsistence mix, is a difficult phenomena to measure. Boyce (1968 [1917]:105-106) estimated, based on interviews with fishermen and consumers in Chowan County, that the county's population of 7,900 persons consumed approximately 6,500,000 river herring each year during the 1880s. These figures calculate out to roughly sixteen river herring per week, or two-and-a-half river herring per day, per person. He estimated that the 1880s consumption rate had dropped in half by 1915. Boyce (1968 [1917]) attributed the reduction in consumption to the general availability of more diverse sources of nutrition that had not been previously available, presumably canned goods that were more readily acquired by the end of the nineteenth century.

Despite the increased diversity of storable food resources in the early twentieth century, living informants from the Albemarle Sound area, born between the years 1909 and 1930, observed that almost everyone in northeastern North Carolina kept a “herring barrel” in a smokehouse or other storage building near the kitchen; a practice that lasted well into the early 1950s in most rural areas (T. Gardner 1997; Lane 1997; Smithwyck 1997; Spruill 1997). Wooden stave barrels were the most commonly used storage containers, but some people used large stoneware crocks to store salt-cured fish (L. Gardner 1997). One informant recalled, during the late 1930s and early 1940s, that his father “...had a wooden barrel in the smoke house which was known as the herring barrel...and it would hold a thousand herrings, and a thousand herrings is what he would pack each year. And that would last the whole year...we always had fish to eat for the whole year” (Spruill 1997). Some urban families, particularly in the Depression era, were simply too poor to purchase many meat products, other than river herring. An informant from Elizabeth City stated:

I never raised my children to eat meat. When my husband died leaving me with six young children, I had to scratch my head to take care of ‘em. None of the children were large enough for work.... We never had any money to spend for meat. I gave my children rice, grits, oatmeal, greens and beans...never could do much with chickens - too many colored folks like chicken; try to raise chickens and as soon as they get big enough to fry they just natchally begin to disappear. Herrings have always been cheap and we eat corned herrings ‘bout once a week, sometimes oftener than that...we all like fish (SHC: Works Progress Administration Interviews, W. O. Saunders [#NC-458, Georgia Rice).

At all of the fisheries along the sound shore and up the tributary rivers, rural farmers and urban residents came to the fisheries on Easter Monday or take a break from plowing on a rainy day in March, April or May to get their river herring for the year (Lane 1997; Smithwyck 1997). As one fisher-farmer observed: “...come a rainy day - and they’d keep you busy dipping out herrings (from

the salt brine vats) and selling them (Lane 1997). Depending upon the size of the family, most consumers purchased or traded for between 1,000 and 3,500 or more river herring. One Chowan County fisherman recalled that his family kept three barrels (approximately 3,500 fish) of river herring in their smoke house (Burgess 1990). Some people took fresh river herring away from the fishery landings in guano (fertilizer) sacks and cut and cured them at home (L. Gardner 1997; Smithwyck 1997). Others purchased cut and brined river herring from the fishery and took them home to be packed in barrels with salt (Lane 1997). Some people simply procured their river herring already salted and packed in the barrel (Taylor 1997). The more industrious farmers and urbanites, or those who lacked sufficient money to buy commercially available river herring, ventured to nearby rivers, creeks and canals and caught enough to feed their families for the year (Fenner, 1995; T. Gardner 1997; Hampton 1997; Smithwyck 1997; Spruill 1995).

During the late nineteenth century Boyce (1968 [1917]:104) observed that many Chowan County residents ate salt-cured "...herring three times a day for days in succession, and little else besides, except bread and tea - his herring was either boiled in clear water or broiled on coals; his bread was made of cornmeal and water only; his tea was 'black yeopon' tea with neither milk or sugar." One full-time fisher-farmer recalled that his family often consumed river herring three times a day during certain periods of the year (Lane 1997). Most modern informants indicated, however, that salt river herring consumption "three times a day" on a year-round basis was somewhat of an over-statement in their experiences (Spruill 1997; Smithwyck 1997). Comments from several informants were illustrative of the continued importance of salted river herring in the annual subsistence mix through the early 1950s.

One Hertford resident, born in 1909, stated: "They didn't think about going to the store and buying them. That's right. You went to that smoke house and you got them herrings...and that's

what you ate...(People ate them) the whole year. Once in a while they'd have bad luck and lose some (spoilage), but they aimed to have enough to last the whole year" (Lane 1997). A Plymouth resident observed that "Used to everybody put up a molasses barrel full of corned herring. All the farmers, that's all they had way back yonder. A stand-by was the old herring. And they turn their nose up at them now...they've got a good job and buy stuff from Winn-Dixie and Food Lion" (T. Gardner 1997). Spruill (1997) noted that "It was nothing strange to have those herrings maybe in February and March from the previous year...and at times, you'd take the old herrings out and pack them in something else...if you had some left over."

Spruill (1997) observed that salt river herring were eaten at least four times each week during the fall and winter; "... (during) certain periods of the year when vegetables may be a little short" or "maybe in the spring before vegetables would come out of the garden. Now after the gardens got good and all, we might eat them twice a week then." Another fisher-farmer recalled that pork and river herring were the main diet staples for his family. He stated:

Hog killins'...that was a must...Hog killins' and the herrings that was all together, well, two different times...those herrings just about always come at supper time. That would be our supper...and the garden end of it, and the meat like that (pork), that would come at dinner time we called it (lunch). Herrings for supper. 'Boiled dinner' for dinner. We had to eat herrings real often, because we didn't have no alternative...we had to live and do a good portion of our eatin' (on) herrings. We'd eat em' three, four times a week (Smithwyck 1997).

Spruill (1997) echoed Smithwyck's (1997) observation and stated that "...we used to have herrings (for) what we called supper, the evening meal...we usually had those at night." Another informant recalled that his mother carried two or three salted river herring to school for lunch and that his father carried a few salted river herring for lunch when he worked as a logger (L. Gardner 1997).

Smithwyck (1997) indicated that the cured river herring occasionally spoiled in the barrel if they were subjected to an unusually hot period of weather in the late summer. If the temperatures exceeded one hundred degrees for a period of a week or more, the salted river herring would spoil unless measures were taken to keep them cool (e.g., cover the container with wet burlap sacks or move the barrel or crock to a root cellar). In such an instance, Smithwyck (1997) stated: "We had to jump on another hog and kill him...and we would sow some rutabagas and turnips kind of early so we could get some of them." Although not as nutrient or protein rich, such vegetables served the same purpose, a long-term storable food product, as salted river herring. A number of informants (L. Gardner 1997; Lane 1997; Spruill 1997; Smithwyck 1997) indicated that while pork was popular, river herring and shad served as a change of taste from the ubiquitous cured pork products most commonly associated with the historic southern diet. As one informant observed, "there ain't nothing better than a damn corned herring" (T. Gardner 1997). In the Albemarle region, few, if any, rural families suffered the same plight of many of the South's farm families during the Great Depression era when "...a can of sardines or salmon..." was considered to have been a "delicacy" (Raper and Reid 1941:21).

The general lack of refrigeration at the household level, as indicated by most informants, was one of the most significant factors in the dependence on curable meats. Spruill (1997) concluded that "...if you were putting up your own herring, it kind of dwindled after electricity and freezers became available. The salt fish fell out with that." A survey of North Carolina counties in 1926 indicated that only fifteen of Bertie County's 3,442 farms had electricity, while 29 of Chowan County's 1,261 farms boasted the resource (Deutsch 1945:Table I). At that time, North Carolina ranked fortieth among all states of the Union in terms of farms with electricity (Hobbs 1930:28). In 1935, less than five percent of North Carolina's rural residents had electric service (Deutsch 1945:Chart A). Despite

the efforts of the North Carolina Rural Electrification Authority, created in 1935, less than thirty-five percent of eastern North Carolina farms had electricity by 1943 (Deutsch 1945:Chart A). As late as 1950, many rural households, except for those situated along main highways, in eastern North Carolina had no electricity (Heath 1995).

While many families had tin-lined ice boxes or small capacity kerosene-powered refrigerators for butter and milk (Heath 1995), rural households simply did not have large-capacity refrigerators, much less freezers for long-term food storage until the widespread development of rural electric service well after World War II (Constantinos and Ward 1985; Hobbs 1963; Lane 1997; Smithwyck 1997). A 1940 survey (Deutsch 1945:Map II) indicated that less than eight percent of the homes in rural Chowan county had mechanical refrigeration (electric, gas, kerosene) while less than fifteen percent of the homes in the remainder of rural northeastern North Carolina were without the similar appliances (e.g., Dare Bertie, Gates, Pamlico, Pasquotank, Perquimans Counties). As such, in most rural areas of eastern North Carolina, meats had to be eaten immediately or otherwise cured with salt to retard spoilage.

Since colonial days, rural North Carolina farmers, as in most regions of the southeastern United States, raised pigs for subsistence and as an economic resource. As compared to other types of domesticated livestock, hogs were much simpler to raise and pork meat cured the best with salt for long-term storage (Bryant 1995; Heath 1995; Spruill 1995). While urban markets provided freshly butchered beef and fresh fish for immediate consumption (Hampton 1997; Lane 1997), few rural residents had access to such markets. Many rural communities were only accessible by water transport or by long, circuitous, overland routes over muddy, poorly maintained roads (Lane 1997; Smithwyck 1997; Taylor 1997). In most rural areas of eastern North Carolina, beef was rarely eaten since there was no way to store the meat once the animal was slaughtered (Fenner 1995; Lane 1997;

Smithwyck 1997; Heath 1995; Spruill 1995). Cows were primarily kept for milk, cream and butter production (Bryant 1995; Fenner 1995; Spruill 1995). One informant observed that many farmers raised cattle to sell in the urban markets, but that his family only ate beef about once a year (Lane 1997).

Lane (1997) said that during the 1930s his father would buy beef from "...the stores, maybe once a year..." or sell a calf in the fall to "...a butcher or huckster (that) would come along and buy one and kill it right out in the woods and clean him. Sometimes my daddy would get the tail, and my mother took that and made soup out of that. Oh Boy! That was good stuff. It won't much of that then." He further noted that people could not simply run to a grocery store to buy food for a meal like we do today. Lane (1997) reflected on the years before the advent of electricity and grocery stores in rural areas and stated:

You had to go to the smokehouse and take it out and cut yourself off a slice of meat or (take out) a pickled herring or whatever you were going to have (to eat for a meal). Every family tried to put up enough pork to last, and when it comes to herrings, they tried to put up enough herrings to last them. But like I said, once in a while you might run short one way or another. But they tried to. In the summertime, if you didn't have any cured, you just didn't have it. You couldn't kill a hog and put him on ice, (because) you didn't have nothing to put it in.

Spruill (1997) observed that salt herring were "...something to have on hand...back in those days you didn't go to the store every day."

One fisher-farmer, born in 1911, noted that his family lived in rural Bertie County had to travel to the town of Plymouth, the closest major town, in an oar-rowed skiff (Smithwyck 1997). He recalled that the boat trip took about one day's time to make, and if they were lucky, a crewman from a passing tug boat throw out a line to tow them up river. As late as the 1940s there were no bridges across the rivers leading from his community to Plymouth which is today a simple fifteen minute

automobile trip (Smithwyck 1997). A historian of North Carolina's highway system observed that the Albemarle region was the "Alsace-Lorraine of North Carolina" in that the region was politically part of North Carolina, but socially and economically tied to Virginia (Brown 1931:247). Until the development of state funded highways after 1921, the Norfolk-Southern Railroad and steamers operating out of Norfolk, Virginia were the only transportation outlets for people in the Albemarle Sound region and the surrounding territory (Brown 1931:248). Such limited access to urban markets and the general lack of electricity for refrigeration required rural populations to rely on long-term storable food resources. In northeastern North Carolina, the major storable meat resources were pork and river herring or shad, with both elements playing a key role in the annual subsistence mix.

Cultural Traditions Related to River Herring and Shad Fishing

A number of cultural traditions evolved out of the *Alosa* fisheries in eastern North Carolina. These traditions reflected the significance of the resource in the daily lives of the people in the region and included festivals, courts, poems, songs and legends related to shad and river herring fisheries. It is not surprising that such fishery related traditions developed, particularly in light of a statement by one prominent shad and river herring fishery operator in the early 1900s. He stated: "Our county is largely fringing on Chowan and Roanoke rivers and Albemarle Sound. Everybody, nearly, is directly or indirectly connected with fishing" (Frank Wood 1909; quoted in Pratt 1911b:58). Work songs or chanteys were popular among the fishery workers at the sound and river haul seine operations (Capehart 1988; T. Gardner 1997; Smithwyck 1997; Taylor 1997). One informant recalled, "...they sang all the time when they were dumping those fish, they were singing all the time" (T. Gardner 1997). Although most of the songs have been forgotten in recent years, one chantey was recorded by Ms. Connie Mason, History Museum Specialist, North Carolina Maritime Museum, in 1988. The

song she recorded was sung by Colonel William R. Capehart in a 1988 interview (taped). Colonel Capehart's father, Mr. Cullen Capehart, owned a fishery at Black Walnut Point (Avoca Farm) on the Albemarle Sound during the early 1900s. Capehart (1988) remembered the following tune (punctuation and arrangement is purely arbitrary, but based on the natural rhythm of the song):

Oh, it seems to me that the time ain't long,
 So haul and be lively,
 Haul, boys, haul.

Oh, she must come, and she will come,
 Haul, boys, haul.

Oh, she must come, and she will come,
 Haul, boys, haul.

My ma told me, when I was young,
 So haul and be lively,
 Haul, boys, haul.

Oh, she must come, and she will come,
 Haul, boys, haul.

Oh she must come, and she will come,
 Haul, boys, haul.

The chorus line of "Haul, boys, haul" is synonymous with an old English sea herring fishery chantey that included the repetitive rhythm of "Haul, you joskins, haul" (Samuel 1918). The similarities between the old English chanteys and those from North Carolina were likely not coincidental, as the early river herring fisheries were established by English settlers who had familiarity with the English sea herring fisheries. The English term "joskins" reflects an interesting parallel between the North Carolina river herring fisheries and the English sea herring fisheries. In England, the term "joskin" referred to a farmer who tended crops during the spring and summer

months and went to sea as a part-time fisherman during the autumn and winter fishing season (Samuel 1918).

Capehart (1988) recalled that the fishery crews at the Avoca Farm haul seine operation during the 1920s and 1930s often sang "...especially on warm, moonlit nights," while the "...bonfires burned continuously from the beginning of the season until the end." The sea-end engine house crew would strike up a chorus that could be heard back down to the land-end engine house, or vice-versa, and the other crew would pick up and respond. Each engine house crew had a chanter that would start the song and the crew would pick up the chorus. The chanter would often make up verses as he went along and the crew would repeat the chorus.

One work song that survived in printed form was recorded from the Greenfield Fishery in Chowan County. The "Greenfield Blues" likely dates back to the antebellum era, as its lyrics reflect the days of slavery in North Carolina. The song's verses, reprinted in Matheson (1984:56), are as follows:

I want to go to town but it ain't no use.
Mr. Wood won't turn me loose.
Lawd, Lawd, Lawd, I got dem Greenfield blues.

Pick, pick, pickin' and de dust a flyin',
Old folks fussin' and de young uns cryin'.
Lawd, Lawd, Lawd, I got dem Greenfield blues.

Two old maids sittin' on de sand,
Each one wishin' de other was a man.
Lawd, Lawd, Lawd, I got dem Greenfield blues.

When you plant yo' corn, put a herrin' to de hill.
If dat don't do it, de good Lawd will.
Lawd, Lawd, Lawd, I got dem Greenfield blues.

In de jail house on my knees,
All dey give me was a pan of peas.

Lawd, Lawd, Lawd, I got dem Greenfield blues.
 Where you goin', Brother? Where you goin', Joe?
 Goin' down to new ground to git a grubbin hoe.
 Lawd, Lawd, Lawd, I got dem Greenfield blues.

Where you goin', sister? Where you goin' Jane?
 Goin' down to Greenfield to help haul de seine.
 Lawd, Lawd, Lawd, I got dem Greenfield blues.

Another chantey, purported to have been sung at an antebellum period Chowan County fishery, further reflected the intimate relationship between slavery and the haul seine operations before the Civil War. The words are reminiscent to the chantey that was sung at the Capehart fishery in the 1930s. Its verses, taken from Parramore (1980), are as follows:

My old mistis promised me
 haul and be lively
 When she die she set me free
 haul, boys, haul.

Lived so long her head got bald
 haul and be lively
 Done got out o' notion o' dyin' atall
 haul and be lively
 haul, boys, haul.

While several of the modern informants remembered work songs being sung at the early twentieth century haul seine fisheries, none of the interviewees could, unfortunately, recall the lyrics (Hampton 1997; Taylor 1997; Smithwyck 1997). One observer recalled the repeating rhythm or chorus line of "Haul, boys, haul...Haul, boys, haul...Haul, boys, haul" being sung at one of the Albemarle Sound fisheries during the 1930s (Taylor 1997). Capehart (1988) stated that many traditional black Christian spirituals were also popular as work songs.

Capehart (1988) further indicated that the rhythmic nature of the chants served a functional purpose by establishing a cadence by which to haul in the seine nets. He believed, however, that because the fishery workers only labored together seasonally, the singing of the chanteys led to a bonding experience for the crew members through the creation of a fraternal spirit. He further noted that some of the crewmen were related and had worked together at the fisheries for years. The men went to church together and often sang with one another in the church choir in their respective communities. Capehart (1988) observed: "It was soul stirring to hear them sometimes."

In a study of the North Carolina menhaden fishery, Garrity-Blake (1994) analyzed work songs or chanteys songs that were sung by North Carolina menhaden fishermen from a symbolic perspective. She concluded from the information provided by living informants that such songs served the needs of the fishermen in several ways. The chanteys often gave the fishermen power over the heavy nets and allowed them to gain a level of strength that was over and above their aggregate physical strength to haul in the loaded nets. The songs also served to bond fishermen who came to the fishery from disparate backgrounds and geographic locations. The river herring chanties undoubtedly evolved out of similar circumstances for similar reasons.

A number of regional folk beliefs evolved out of the shad and river herring fisheries; some were related to fishing activities and some were related to the fish themselves. Several signals from nature were thought to herald the arrival of both shad and river herring. The most common observation was that river herring and shad started to run up the rivers when the dogwood or yellow jasmine blossomed (T. Gardner 1997; Johnson 1982a; Smithwyck 1997). The "shad frog" was thought to signal the arrival of the shad when it came out of hibernation and first began to chirp in the spring each year (Hand 1964:475). River herring fishermen along the Albemarle Sound's tributary rivers made a similar observation and quoted the saying "Frogs holloing, fish running"

(Hand 1964:475). Others observed that the “herring frog” sounded the call of the spring run; “Frogs get to hollering, herrings get to moving...” (Johnson 1982a:9).

Another legend related to the occasional absence of river herring in a particular tributary stream or other body of water. An old-timer stated: “...if herrings don’t come on Easter they ain’t coming at all” (Johnson 1982a:10). Some fishermen believed that river herring would continue to run and spawn until it thundered (Mays 1961; Smithwyck 1997). One fisherman observed that “It can come up a little thunder cloud you know, and thunder one time good and sharp, and its just a rush of them things getting out of there...in an hour’s time they can be gone. They really do get out of there if there comes a hard clap of thunder” (Smithwyck 1997).

River herring were supposedly utilized by some people for medicinal and utilitarian purposes. One tale suggested: “Tie salty herrings to your wrists, feet, and head to cure fever” (Hand 1961:187). Others were purported to have used the river herring back bone both as a candle and a comb in hard times (Johnson 1965, 1982a, 1982b). The candle was supposedly made by drying the river herring in the sun or over a low fire. After drying, the fish was hung by its head so that the body oils would run down to the tail. When a candle was needed, the fish could be inverted and the tail lit just as a candle wick (Johnson 1965, 1982a, 1982b).

A tale of the shad, in observance of its inherent boniness, stated: “the porcupine was near the last of animals created and didn’t like his appearance. So the Maker ran His hand down his (porcupine’s) throat, turned him inside out, then tossed him into a stream of water, saying, ‘Now Your a Shad’ ” (*The State* [anonymous] 1984:17). Another set of superstitions revolved around meat spoilage and the preservation of meat during the salt-curing process. It was thought by some people that if a pregnant woman simply walked by a fish house or “hog killing”, or actually participated in any of the processes, that the cured meat would soon spoil (Mizzell 1995). One fisherman recalled

having an uncle who stated that a shad would spoil if it was exposed to the moonlight, after being pulled from the water, when fishing at night (Smithwyck 1997).

Baked shad was once the traditional Easter Sunday dinner for many eastern North Carolina families (Beacham-Phelps 1991; Spruill 1997). Spruill (1997) recalled that his mother always baked a shad with the roe on Easter during the 1930s and 1940s; "...that was her Easter Sunday dinner...that was a tradition, and I think her family, right on back, had done that." Although consumers acquired river herring all during the spring fishing season, Easter Monday has long been the traditional day that people ventured down to the fisheries and boat landings to buy their river herring. In years past, families purchased or traded for enough to last them the entire year, but today people come, out of tradition, to buy enough fresh river herring for a family fish fry. Many churches in the region traditionally held river herring fries each spring to raise money (Stephenson 1995). The Easter river herring tradition dates at least as far back as 1840 and is probably much older. Perhaps Ralph Lane's raid on Algonkian Indian fish weirs on Easter Sunday in 1586 (Quinn 1985, 1991) was the beginning of the tradition.

William Valentine, a lawyer from Bertie County, noted in his journal that on Easter Monday in 1840, he rode down to the "Lazy Hill Fishery" on the Chowan River (Colerain, North Carolina) to watch the haul seine operation and to eat a meal of fresh fish (SHC: William D. Valentine Diary 1840). One modern fisher-farmer observed that Easter Monday was the "big fish day" in Bertie County when he fished for river herring during the 1950s and 1960s. He stated: "Man we'd be up early Easter morning, goin' down there and fishin' them Dutch nets, and have some fish in there to the landing (Shipyard Landing on Cashoke Creek) by the time the people got there...used to be a pile of folks coming down there to buy...(herring)...as far away as Snow Hill (North Carolina)" (Smithwyck 1997). At the Hampton family fishery in Plymouth, one observer remembered the

Easter Monday tradition. She stated: "Easter Monday was 'The Day' -- not so much for the fishing except for the regular workers. On that day every fellow got his gal and her picnic basket and off to the fishery 'a-courtin' they would go" (B. G. Campbell; quoted in Booker 1974:79).

Smithwyck (1997) recalled visiting the Capehart Fishery at Avoca during the 1920s and 1930s with his family on Easter Monday's. He observed that "It was a lively time down there..." when people traveled to the fishery with kitchen utensils, collected driftwood and built cooking fires on the beach (Smithwyck 1997). "They cooked some of the best fish down there to be sure...herring, rock, perch, shad..." (Smithwyck 1997). The last owner of the Capehart fishery recalled: "You saw everybody you knew in a week" (BLA [anonymous] 1972:C7). During the spring fishing season, there were always "...picnics, fish fries and rock muddles. Even before paved roads and bridges there were many out of state cars seen at the fishery, some from as far away as Canada" (BLA [anonymous] 1972:C7). Another Albemarle region resident stated: "Sometimes the men held bachelor parties at the fishery. They would camp and cook out, then bring out the jug of apple brandy. Then they would drink, tell yarns, sing and have a hilarious time" (Johnson 1982:120).

Before the start of the fishing season, the Fisherman's Court continued to be held in many of the counties around the Albemarle region until the late 1950s. Workers from fifty miles or more "upriver" commonly signed on to work at the sound fisheries (Parramore 1980). In the early twentieth century, the court largely ceased to serve its original function, but remained a viable social tradition for many years. By 1958, however, "...there was absolutely no vestige of the custom remaining..." (Sharpe 1958a:53). In the early 1940s, one observer recalled the festive atmosphere:

We attended the court...and on that occasion the quite little village was thronged with farmers. Tow mule stables were doing a thriving business selling and trading animals. Medicine men and other pitchmen were on hand, and there was some

drinking and a couple of lively fistfights. But already interest was waning...there was less and less excuse to quit work and go to town. A few old timers would sit around...and talk about how it used to be (Sharpe 1958a:53).

The modern period anadromous fisheries stimulated a distinctive seasonal social aggregation. As in the prehistoric past, regional anadromous fishery operations brought diverse groups together on a seasonal basis. In an age when intrastate and interstate travel was much more limited than today, these seasonal aggregations in the historic period led to the broadening of social networks, as local fishery workers and consumers mingled with other people from more distant inland counties. Community bonds were strengthened as the workers, normally dispersed on small, rural family farms labored together and socialized during their off hours at the fishery operations. As observed by Griffith (1997:npn), "During these big seasonal assemblages they arranged marriages, exchanged folk tales, danced, sang, traded, formed alliances, cemented loyalties." Local cultural rituals or traditions, such as the Easter Monday fishery activities and the Fishermen's Court, are indicative of how the *Alosa* fisheries impacted the local cultures beyond merely supplying an easily exploitable subsistence or economic resource.

Chapter V

Post-World War II Era River Herring and Shad Fisheries, circa 1950-1997

While the economic role of shad and river herring fisheries continues to dwindle in the post-World War II period, the fisheries have remained a prominent, but somewhat modified cultural feature of the region. While still contributing to the economic livelihood of many local commercial fishermen, shad and river herring fishing in the area has become more of a folk tradition and a popular sport. In his 1956 publication, *Commercial Fisheries of North Carolina: an Economic Analysis*, Woodward surveyed the general status of North Carolina's commercial fisheries as of 1955. He noted that there had been a continual, slow downward trend in the annual harvest of river herring since the year 1900. The decline, along with periodic radical fluctuations, he believed was primarily due to environmental factors that affected the relative abundance of the two species of river herring.

River Herring

Woodward noted that by 1955, the demand for river herring, as a food fish, was greatly reduced. The bulk of the annual harvest (73%) went instead to scrap processing (e.g., fertilizer, oil, meal, pet food, etc.) (Woodward 1956:40). At that time, river herring were selling for approximately one cent per pound, the lowest price of any food fish of the day (Woodward 1956:40). As such, Woodward (1956) speculated that the continued exploitation of river herring in the Albemarle-Pamlico region was due to lack of alternative occupations during the spring season or the mere result of long-term habit. Although North Carolina was still harvesting over twenty percent of the national river herring production, he concluded: the river herring fishery "...does not have any very bright prospects for the future and will do well to hold its own" (Woodward 1956:40). As for shad,

Woodward (1956) observed that shad was the most valuable food fish species harvested in North Carolina through 1935, but that its significance dwindled rapidly in the post-World War II period. He noted that while the annual catch had decreased dramatically, even more so than river herring, due to environmental and biological reasons (e.g., pollution, overfishing, dams, etc.), shifts in consumer demand had decreased in a parallel fashion (Woodward 1956). Massive fishing operations undertaken during the late nineteenth and early twentieth centuries combined with declines in consumer demand and habitat destruction to reduce the annual catch levels of shad and river herring after World War II.

Unlike the shad harvests, annual river herring catches show a more gradual decline with wild fluctuations from year to year (Stanley 1992). The highest landings on record since 1887 occurred in 1969 with a catch just under twenty million pounds (Mlb), but have declined to an average of seven million pounds per year since 1975 (Chestnut and Davis 1975:79; North Carolina Division of Marine Fisheries [NCDMF] 1993:138). It has been recently observed that the decline from the most recent peak in 1969 (19.9 Mlb) to the extremely low 1981 level (4.8 Mlb) was unprecedented" (NCDMF 1993:138). Although there were some apparent rebounds in the 1980s, by 1990, the landings were the lowest on record (1.2 Mlb) since statistics on the river herring harvest were first estimated back in 1880 (NCDMF 1993:138).

River herring were the "...single most important component of the Albemarle-Pamlico finfish harvest" through the 1970s (North Carolina Division of Community Planning [NCDCP] 1967; Stanley 1992:105). Even today river herring are still canned or poly-bagged for the national retail grocery market. Perry-Wynns Fish Company pickles river herring for retail shipment and packs fillets in vinegar or wine sauce. River herring roe is canned at Perry-Wynns and their products command a respectable market price in the United States and abroad (Godwin et al. 1971). At local

fish markets, river herring are still purchased fresh in season (Layton 1997). Until recent years, the bulk of the river herring catch went through industrial processing to extract oils or to make fish meal or sold as bait fish (Burgess 1990; BLA [anonymous] 1972; NCDCCD 1963).

River herring oils have been used in paints, soaps and cosmetics. During World War II, river herring scales were ground up to make faux pearls and other jewelry. River herring are generally processed into fish meal, fertilizer products and pet foods (BLA [anonymous] 1972; NCDCCD 1963). Today, however, stocks are so depleted in North Carolina waters, that Perry-Wynns Fish Company, the state's only river herring and river herring roe packer, must look to harvests from Canadian waters to stay in business (Carter 1993; Hart 1990). Now only the by-products of the food processing operation, the offal, go for fish oil and meal production, nothing is wasted (Carter 1993; Hart 1990).

During the post-World War II era, fishermen continued to harvest river herring using old gear technology. Pound nets were the most common gear, followed by gill nets (Lane 1997; Layton 1997; Spruill 1997) and a handful of small-scale haul seine operations through the 1980s (Peele 1967; Sharpe 1958a; Stephenson 1995, 1986). In 1993, 85% of the river herring harvest was taken with pound nets (NCDMF 1993). Non-commercial and recreational fishermen continue to fish for river herring with dip nets, gill nets, fish wheels and bridge nets, just as their ancestors once did for subsistence purposes in the previous century (Mays 1961; NCDMF 1993; Peele 1963; Smithwyck 1997).

American and Hickory Shad

Shad production has declined at an even more extensive rate than that of river herring. The price on the markets, however, remained relatively stable since the 1930s and rose in proportion to

inflation (Stanley 1992; Woodward 1956). Shad are generally sold on the fresh markets and rarely processed or frozen. Shad harvests during the mid-nineteenth century were so abundant that much of the catch was sold for fertilizer; this is not the case today. The annual shad production has continued to drop radically since the peak haul of nine million pounds in 1897 (Chestnut and Davis 1975:112). Catch statistics for the 1980s and early 1990s varied from 200,000 to 500,000 pounds, annually (NCDMF 1993; Stanley 1992:106-107). Sport fishing for shad has greatly increased in popularity since the 1950s and continues to grow, further emphasizing the importance of shad to North Carolina today (Barden 1955; Godwin et al. 1971; Sink 1949).

As with the post-World War II era river herring fisheries, American and hickory shad continue to be exploited for the fresh fish market and for recreational purposes. Although pound nets are still used to harvest shad, gill nets have gradually superseded pound nets as the gear of choice for commercial shad fishermen since the late 1950s (NCDMF 1993; Spruill 1997). Seventy-seven percent of the American shad harvest from 1972 to 1991 was taken with gill nets, while pound nets accounted for eighteen percent, and haul seines accounted for four percent of the harvest (NCDMF 1993:127). As in the river herring fisheries, old gear technology continues to be used in the shad fisheries. Recreational fishermen fish for shad with drift and anchor gill nets, bow nets, fish reels, skim nets and hook-and-line (Barden 1955; NCDMF 1993; Ormond 1997; Sink 1949). The hook-and-line (fly rod / spinning rod) sport fishing aspect has largely developed in the region since the 1950s (Barden 1955; Sink 1949). The limited commercial harvest of river herring and shad today, along with the growing recreational fisheries, are the last vestiges of the great shad and river herring fishing traditions in the region.

Decline of River Herring and Shad Fisheries

In response to both reduced harvests and reduced consumer demand for shad and river herring (NCDCP 1967; NCDMF 1993; Woodward 1956), Albemarle Sound fishermen and others, once dependent upon the *Alosa* species, began to greatly diversify their fishing strategies (Byrum 1996; Layton 1997; Spruill 1997). In the 1950s and 1960s, the market demand for sea trout, flounder, crabs, shrimp and other species found in North Carolina waters jumped dramatically and continued to increase through time (Stanley 1992; Woodward 1956). Although some full-time fishermen clung to the river herring fisheries as their major source of income, many full-time fishermen in the Albemarle region looked to other species to generate the highest proportion of their income, such as the fall and winter catfish and flounder fisheries, or late spring and summer shrimping and crabbing (Byrum 1996; Layton 1997; Spruill 1997).

Even with the resource diversification, reduced stocks, and more recently, fishery regulations, shad and river herring fisheries in the spring season continued to provide a key resource to fishery dependent families during the spring season (Byrum 1996; Layton 1997; Spruill 1997). These fish varieties remain a comparatively small, but important seasonal component of North Carolina's finfish harvest in the Albemarle region. As recently noted by Griffith (1996:13), "In and around the upper reaches of the Albemarle Sound, at the mouths of the Roanoke and Chowan Rivers, one can still find people who string together seasonal work in the herring fishery, hunting, logging, and occasional farming." One Chowan River fisherman recalled, "...we used to fish for herring in the spring, and in the summertime and fall, we'd fish gill nets for rock, white perch and catfish...when the (nineteen) nineties started, the herring *really* got bad, the fishing *really* started getting bad for the herring. And we found out we were gonna have to do something, so we moved into crabbing" (Byrum 1996).

The basic patterns of seasonal river herring and shad exploitation by full-time fishermen and part-time fisher-farmers that evolved during the nineteenth and early twentieth centuries are still present in the Albemarle Sound region today. As a modern river herring fisherman recalled:

My father was a commercial fisherman. My grandfather was a commercial fisherman. But my father, now, he ran a little store that sold fishing tackle and stuff a while...Now my grandfather...he was a herring fisherman and they didn't move from this area...He was a farmer-fisherman, like most everybody along this neighborhood on the (Chowan) river were that way. And my great-grandfather, he was a commercial fisherman too (Byrum 1996).

In 1994, the state instituted fishery regulations designed to protect and rebuild depleted river herring stocks. Since that time, shad and river herring fishery operations have either been halted on the fifteenth of April, or before that date if more than 300,000 pounds each of river herring or shad have been harvested (Griffith 1996; Layton 1997; Richissin 1994).

In 1996, the hickory shad was declared a gamefish in North Carolina, but no catch limits were put on them on inland rivers. A significant sport fishery has developed for the hickory shad, particularly on the Roanoke River, since the early 1990s (Batsavage 1997). A traditional hickory shad sport fishery has existed on the Neuse River and the Contentnea Creek since the nineteenth century. The Grifton Shad Festival evolved out of the early tradition and continues today (Beacham-Phelps 1991; *The State* [anonymous] 1975). During the peak runs, sport fishermen commonly harvest between 50 and 100 hickory shad a day (Batsavage 1997).

The latest fishery regulations have unfortunately forced the majority of the full-time and part-time shad and river herring fishermen out of business, particularly in the Chowan River region, where the majority of the river herring are presently harvested (Layton 1997). A few commercial fishermen continue to set pound nets in hopes of harvesting enough to make a living before the

season is cut short by regulations. During the 1995 season, one fisherman recalled: "Well, Bobby and I and Junior Tents and David Junior all were the only ones that really had to depend on river herring fishing to keep going. So we all set. The rest of the guys set, like if they set fifteen nets (before), they set one, just to get some (herring) to eat and put up some corned" (Byrum 1996). Another river fisherman observed that "...my main income now is crabbing. And we still got the pound nets. We're still trying to hold onto that right now" (Hollowell 1996). Current Marine Fisheries regulations have hurt the few remaining commercial river herring fishermen, because the major spawning runs in the upper reaches of the Chowan River tend to come from mid-April through mid-May, after the season is closed (Layton 1997; Hollowell 1996; Byrum 1996).

A Chowan River fisherman indicated that "up the river there, right now the river is running real hard up there, and we have to wait till the middle of March to start setting them...the regulations are closing the season at April the fifteenth, and that's mainly when your herring runs start to get up here good" (Hollowell 1996). The remaining river herring fishermen believe that they are unfairly targeted by Marine Fishery regulations and feel that the State government should seek to attack the primary causes of the anadromous fishery depletion, such as industrial pollution, habitat destruction and inlet stabilization programs. Recently, one fisherman observed "...they (Marine Fisheries) had looked at their data and they told us, they said, 'We're gonna cut your catch by about 95%. If you cut your catch by 95%, he'll (Marine Fisheries) put you out of business'" (Byrum 1996). Another river herring fisherman stated that "...I just feel like they're trying to discourage us to get out of business" (Hollowell 1996). Such stiff management polices in conjunction with pollution reduction may, however, be necessary if we can hope to rebuild the current stocks to some semblance of their past proliferation.

Arguments, as to what caused the massive declines of such a rich resource as river herring and shad over the last century, include three major factors: destruction of habitat (loss of spawning/nursery areas, dam construction and channelization of creeks and swamps), pollution (industrial, agricultural and urban sewage), and overfishing (inshore and offshore) (Godwin et al. 1971; Hart 1990; NCDMF 1993; Rulifson 1994; Rulifson et al. 1982b; Stanley 1992). Rulifson (1994) has further pointed out other factors, such as dredge and fill activities and road or residential construction, which have lead to excessive sedimentation, turbidity and non-source pollution in spawning areas.

Dams have restricted the natural range of spawning anadromous fish and have further reduced the potential nursery area, particularly for shad (NCDMF 1993; Stanley 1992). A 1993 report indicated that while many dams had fish ladders to allow for upstream spawning migrations, “existing fish ladders do not work and should be replaced with functional fish passage ladders” (NCDMF 1993:131). Some fishermen believe that the damming of the Roanoke River has led to a decline of shad and river herring runs in that river, because the damming process has slowed down the natural flow of the river. As such, the river can no longer flush itself of pollution build up and naturally restabilize spawning grounds up river (L. Gardner 1997). One researcher believes that the dams have led to the alteration of key environmental signals that spawning river herring rely upon in order to home in on the natal streams (Hart 1990). A 1989 survey of the Albemarle and Pamlico Sounds found a number of other obstructions that blocked the way to known spawning grounds, in the form of dams, storm gates on canals, highway culverts, and vegetation blockages (Rulifson 1994). In other areas, drainage ditches and canals that empty into nursery areas for anadromous fish larvae and juvenile fish have created unstable or unsuitable habitat conditions (Godwin et al. 1971; Pate and Jones 1981).

The introduction of pollutants that lower the dissolved oxygen level of the water, especially from various pulp wood and paper mills along the Chowan, Roanoke and Neuse rivers since the late 1930s, have had an immeasurable impact on spawning adults, as well as juvenile shad and river herring that mature in the riverine environment (Byrum 1996; L. Gardner 1997; Godwin et al. 1971; Hampton 1997; Layton 1997; Stanley 1992; Taylor 1997). Paper mill by-products that are dumped into the rivers are “high oxygen-demanding organic waste products which “...have contributed significantly to the problem” of lowered dissolved oxygen levels in the Albemarle-Pamlico region (Stanley 1992:107). Other pollutants from industrial and agricultural operations, as well as sewage from cities that border the rivers, have destroyed much of the plankton that the hatchling fish feed on and have also negatively impacted the egg hatching process by stimulating reduced oxygen levels (Hart 1990; Stanley 1992).

When a large pulp mill operation opened on the Roanoke River, near Plymouth, North Carolina, during the late 1930s, two major seine fishery operations were forced to close due to the introduction of industrial pollutants in the river. A contemporary observer noted, “what happened the pulp mill came here and started dumping all that crap in the river, and you couldn’t catch *nothing*. At that time, they didn’t have any Environmental Protection Agency or nothing and if something went wrong at the pulp mill, they just opened the gates and dumped it in the river” (Hampton 1997). It is apparent that little has changed since the 1930s. Recently a Chowan River fisherman observed:

Union Camp Corporation which is in Franklin, doubled the size of its plant in the late seventies. And in 1980 they started dumping, discharging twice the fluid that they were discharging before...It would take about three weeks to get here (Chowan River), and when it got here, the water would be - coffee ain’t as black, it would be as black as that. I mean it would be black and sudsy...and the fish started dropping

...and kept right on dropping...and that's when we really lost the herring deal... We'll never get the amount of herrings we used to have back up here because of Union Camp. There won't that many hatch out and survive that! (Byrum 1996).

Contemporary shad and river herring fishermen have observed that shifts in the nature of agricultural production over the last fifty years have coincided with the continual decline of fish harvests in the rivers and sounds. It has been suggested that potent farm chemicals (e.g., pesticides, herbicides, fungicides, etc.), not generally used before the 1950s, but widely dispersed since that time, have entered *Alosa* spawning and nursery areas as agricultural runoff (L. Gardner 1997; Hart 1990; Layton 1997; Smith 1997; Spruill 1997). While the transient adult shad and river herring may not necessarily be harmed by such chemicals, the more delicate eggs, larvae and juvenile varieties may easily succumb to the introduction of the chemicals into the water column or bottom sediments (Godwin et al. 1971; Ross 1997). Farming practices also lead to sediment loading of streams from cropland erosion. Sediment loading from chemical enhanced soils leads to cultural eutrophication or the rapid build up of excessive nutrient levels, which stimulate algal and plant growth. As the algae and plants die off and decompose, along with other organic nutrients, anoxia, or the depletion of dissolved oxygen occurs (Godwin et al 1971; Ross 1997)

Inshore and offshore fishing pressure has further contributed to the destruction of the shad and river herring population, as no specific regulations existed in the post World War II era until 1971 to manage the shad fisheries and no regulations were directed toward the river herring fisheries until 1994. Inshore fisheries naturally concentrate on the harvest of sexually mature adults. As such, American shad that spawn once and die or river herring and hickory shad that spawn two or more times are harvested before they have the opportunity to reproduce; "...overfishing decreases the abundance of older individuals, thus decreasing annual spawning potential" (Bozeman and Van Den

Avyle 1989). While inshore overfishing was not a problem in the prehistoric or early historic periods, the transition to high-energy commercial fisheries after 1880 and on through the 1940s gradually contributed to a dramatic reduction of the *Alosa* stocks in the later twentieth century.

Offshore landings of adult river herring by foreign vessels, particularly during the 1960s and 1970s greatly reduced the potential number of spawning adults in North Carolina waters (Hart 1990; March 1971; NCDMF 1993; Stanley 1992). During the 1960s and 1970s, Russian fleets harvested river herring shoals while they lingered, before entering the sounds, in the waters off the North Carolina and Virginia coasts. The ocean trawlers regularly exceeded the eight million pound limit placed upon their factory ships by the government of the United States (March 1971:7). The passage of the Magnuson Fisheries Conservation Management Act of 1976 reduced the amount of river herring that could be harvested in offshore waters by foreign trawlers (NCDMF 1993). Even though direct exploitation of river herring is prohibited by foreign vessels, the problem still persists today: offshore foreign and domestic trawlers are allowed to harvest river herring as a bycatch of the Atlantic mackerel (*Scombrus* spp.) fisheries (NCDMF 1993). Presently, trawling gear is being developed to reduce the juvenile finfish bycatch, which may enhance the recovery of stocks. Stocks, battered from offshore trawling during the 1970s, have likely had a difficult time recovering due to rampant pollution and habitat destruction that continues to escalate in North Carolina waters from a variety of sources.

While there is no one variable totally responsible for the destruction of *Alosa* stocks in North Carolina, water pollution and spawning habitat destruction seems to be the key. The greatly reduced commercial demand for river herring and shad for subsistence has negated the need for high-energy fisheries of the past. The present demand is much less than what the supply should be if stocks were as healthy as they were in 1900. As such, stocks should be recovering, but they clearly

are not. Culturally introduced pollution and habitat destruction processes, therefore, are the primary culprits. The range of factors, discussed above, have all combined to greatly deplete what was a historically and culturally significant resource of the North Carolina Coastal Plain.

The rich nutritional value, seasonal predictability and ease of harvest of *Alosa* species contributed immeasurably to the growth and development of the prehistoric cultures that flourished on the Coastal Plain drainage of the vast Albemarle-Pamlico estuarine system. European settlers later depended on these anadromous fish species for the same subsistence driven needs, but soon realized the trade potential of commercial fisheries, which could be successfully exploited in the complex colonial trade network. Even with the gradual development of commercial fishery operations in the Albemarle region, subsistence production for local consumption continued as the major focus of the sound and river fisheries throughout the colonial period.

Large-scale commercial fisheries, in their infancy during the colonial era, developed into major concerns during the antebellum period, but did not accelerate to massive, capital intensive, high-energy operations until after the Civil War. Subsistence fishing at the local level for river herring and shad contributed to the local subsistence cycle mix just as immeasurably to North Carolina's early modern societies as it did to those prehistoric periods. Exploitation of anadromous species has continued to be an extremely important element of the eastern North Carolina economy well into the twentieth century, but pollution and overfishing have largely decimated what seemed to be an infinite natural resource; current Marine Fishery regulations have done the rest. As one of the few remaining river herring fisherman on the Chowan observed:

This will be the last of the pound net fishermen up here anyway. Nobody else'll go in it. And so, really, like Danny, he's got a boy and he's going to college...if he's smart he'll get a job where when he's sixty years old he can retire. And when I get

sixty years old, I'm gonna keep working. I'll be like daddy. Daddy...still worked when he was 75...he part-time fished till he was 75, and if I live that long, I'll be doing the same thing. But, like I say, all the part-time guys down the river are already pulling (up) their (pound net) places; they're quitting. And so when B(uddy) and I, and D(anny) go, that's gonna be it, and herring fishing will be gone (Byrum 1996).

Chapter VI

Theoretical Discussion and Summary

The present research has addressed the exploitation of shad and river herring, as a component of the annual subsistence and economic strategies, by both prehistoric and historic period populations in northeastern North Carolina. The presentation in the preceding chapters described continuity and change in fishing practices and fishing technologies in the region as a range of cultures, through time, adapted to seasonal anadromous fisheries. Other fish species were certainly exploited, but the seasonal predictability, exceptional biomass and relative ease of capture of shad and river herring in the region provided both prehistoric and historic populations with a subsistence option that produced an extremely high yield with low costs. The influences of the availability of the species have been addressed for their cultural impact in conjunction with the consequences of human exploitation of the environment and their impact on shad and river herring populations in the region.

The massive shad and river herring runs were easy to exploit and were simple to preserve, either by smoking or salting, for long-term storage. The late winter / early spring timing of the spawning runs resulted in the availability of a productive food source at a critical time of the year: before planting season and well before significant agricultural or wild floral resources could be harvested or gathered. Consequently, the dependence on shad and river herring by fisher-farmers was a similar phenomena with local cultures in both the historic and prehistoric periods. The continual cultural exploitation of shad and river herring through time reflects the aggregation of conscious choices of individuals in adaptive response to the range of natural resources available to prehistoric and historic populations. Although river herring and shad were a relatively low value species, economically speaking, in the late nineteenth and early twentieth centuries (Singer 1987),

their continued exploitation in the historic period was in response to the tremendous volume of the seasonal spawning runs and the ease of extraction. This phenomena supports the conclusions drawn by Jochim (1976) and Reitz (1979), whereby populations seek to develop subsistence strategies that result in low risk, high yield food sources.

The exploitation of anadromous fish runs may have contributed to long-term changes in prehistoric cultures in the region. The impact of the large-scale communal efforts to harvest and process fish likely contributed to the specific prehistoric settlement patterns observed in the region, as well as the general prehistoric evolution to increased sedentism and stratified social structure, as observed in the proto-historic period. The impact on historic period cultures may not have been as dramatic, due to the presence of a developed market economy and the presence of an already stratified society with the advent of European settlement. The impact on the fishery stocks by historic era cultural exploitation was, however, dramatic within the relatively short period of two centuries.

The shift from low-energy exploitation in the prehistoric and early historic period, to one of high-energy exploitation in the later historic period (Bennett 1993) is also important for several reasons. The dramatic shift in technology initially led to conflicts with, and the eventual displacement of, local fisher-farmers that depended on the seasonal resource, as well as to the ultimate degradation of the resource base being exploited. Before separate discussions are presented on the prehistoric and later historic periods of the study, a general restatement of the basic tenets of Bennett's (1971:14-16) concept of adaptive strategies is useful:

- 1) individuals respond to their environment by making short-term choices to meet short-term needs.

- 2) adaptive strategies are generally at the conscious level of human behavior.
- 3) individual choices, through time, develop into cultural choices as a result of aggregate conscious and unconscious individual choices.
- 4) cultural choices become patterned and repetitive patterns of behavior become cultural traditions.

Prehistoric and Proto-historic Periods, circa 3,000 B.C.-A.D. 1650

Given the tenability of the assumption that anadromous fisheries were a significant aspect of prehistoric lifeways in eastern North Carolina, the development of anadromous fishery practices was a reflection of short-range choices made by individuals. Such individuals sought to provide for themselves and their family units in an attempt to compensate for the lack of more easily obtainable resources in the spring season due to local environmental constraints. Spawning shad and river herring runs came during a seasonal period when edible wild plants, fruits and game were at an annual low point in the hunting and foraging cycle for pre-agricultural societies in the Archaic and Early Woodland periods. Agriculturally adapted cultures of the later prehistoric era experienced a similar spring season food shortage of readily available subsistence resources, as agricultural products were generally not harvestable until the early to late summer season.

As compared to other alternative subsistence strategies, the choice to exploit anadromous fish runs was a low-risk, low-cost, low-energy option. Seasonal dependency on anadromous fisheries would have easily evolved after the stabilization of the rivers and estuaries, when anadromous fish stocks became more prolific in the Middle to Late Archaic period. In technological terms, both shad and river herring could be simply harvested with a variety of low-energy gear types. Fishing gear could range from smaller scale dip nets, scoops, gill nets and basket traps, utilized at the family unit level, to larger scale brush or reed weirs and seine nets, utilized at the community level. By

aggregating labor resources, community level fisheries would have been an even lower cost strategy. Compared to single family unit fisheries, bands or tribes could construct and maintain a range of complex gear, as well as aggregate labor forces to harvest and process fish for storage on an exponential scale (e.g. economies of scale principle).

Anadromous fisheries were a low-energy option, as compared to normal hunting and foraging activities. A relatively low expenditure of energy quickly resulted in the ample recovery of a high energy food resource due to the inherent ease of capture, without having to range over a large territory while seeking out scarce floral and faunal resources. As compared to most other wild floral and faunal resources, available in the early spring season, shad and river herring had the additional value as a long-term storable resource that could be utilized through the summer months, until time to harvest wild or domesticated floral resources. In contrast with hunting mammalian species, in forests lacking the necessary foliage cover that is present in late spring, summer and early fall seasons, anadromous fish harvesting was a more logical alternative. During the early-to-mid spring hunting and foraging season, given prehistoric subsistence technologies, hunters and foragers in eastern North Carolina would have taken a risk of “coming up short” without opting for the addition of a spring fishing strategy in the annual subsistence cycle.

As with other seasonal resources, shad and river herring runs were extremely dependable in their timing and spatial distributions. *Alosa* species return to their natal rivers and streams at approximately the same time each year. The very predictability of the resource may have influenced the settlement patterns observed in eastern North Carolina throughout the later Archaic and Woodland periods. By incorporating anadromous fisheries into the annual subsistence cycle, prehistoric peoples could easily harvest the resource on a daily basis from early March through the end of May without ever straying from either permanent settlement or temporary camp sites on

virtually any Coastal Plain sound, river, tributary stream or tributary communicable swamp or lake. Early European colonists in New England observed: “When the fish were spawning, many Indian families might gather...to create a dense temporary settlement...” (Cronon 1983:38). Similar phenomena undoubtedly occurred in eastern North Carolina during the prehistoric period. The addition of communal labor effort in both the harvest and processing of the fish for long-term storage, the quantity recovered for future consumption would exponentially increase in a given season. As observed by Schalk (1977), the evolution to communal fisheries, as short-term adaptations among cultural groups through time (e.g. adaptive strategies), may have resulted in long-term cultural changes (e.g. adaptive processes).

The author argues that the evolution of anadromous fisheries in eastern North Carolina was likely the result of many individual innovators, acting through time, within the opportunities and constraints of the Coastal Plain environment. The individual innovators at some remote point in time took advantage of the seasonal resource in an effort to supply first their biological needs for sustenance, and later material needs for valuable trade commodities. The creation of smoked or dried fish stocks for trade purposes represented a fundamental shift in exploitation patterns from a subsistence strategy to an economic strategy, related to the development of rudimentary market economies even before the arrival of European colonists in the historic period. Through time, the actions and conscious subsistence or economic choices of the individual innovators were seen by others within their respective societies. As a result, the individual behaviors were adopted by the greater communities in which they lived. The aggregate responses at given points along the cultural continuum, in turn, led to culture wide adaptive strategies related to anadromous fish exploitation.

The author has suggested that widespread cultural foci on anadromous fisheries resulted in the development of larger scale fishery operations that included the communal construction and

maintenance of weirs and seine nets, communal spring fishery harvests and communal fish processing. The author further suggests that the results of larger scale anadromous fishing strategies, in turn, contributed to adaptive processes, such as increased sedentism, development of agriculture, social complexity and gender oriented labor specialization. Sedentism in the region was made possible by the combined development of anadromous fisheries and agriculture in the later prehistoric period. Minimally, social interaction, and potentially social complexity, were stimulated as a result of both sedentary agricultural practices and the continual adaptation of large-scale sound and riverine fisheries.

Based on early historic observations from other regions on the Atlantic seaboard, the seasonal fisheries resulted in annual social aggregations by multiple family groups, normally dispersed on farmsteads scattered about a particular region. The dispersed families came together at temporary fish camps where "...feasting and celebration were the order of the day" (Cronon 1983:38). The author suggests that prehistoric anadromous fisheries in North Carolina resulted in similar social aggregations both during the Archaic and Woodland periods. The author further proposes that gender oriented labor specialization may well have been further enhanced by the development of fisheries, whereby females, who traditionally made cordage and twine, most likely made fishing nets and processed the fish harvests. Males on the other hand, constructed and maintained fish weirs and traps and handled the actual fishing operations.

Early Modern Period, circa 1880-1950

Like the aboriginal cultures of the late prehistoric period and the colonial settlers of the early historic era, rural North Carolinians in the northeastern region of the state, through 1950, were heavily dependent upon subsistence agriculture. Most rural communities typically lacked the

relatively recent convenience of electricity for the refrigeration needed for adequate long-term food storage. The lack of quality roads in the region, and an economy suppressed by the Great Depression, ensured that intrastate transportation was limited at the family level on a day- to-day basis (Powell 1989). In 1930, it was observed: “Highways have always been poor, due to the sparse population and the physical nature of the region” (Hobbs 1930:75). Further, rural populations in the pre-World War II era did not have the modern convenience of well-stocked supermarket shelves and meat counters within easy daily or weekly access. In such an environment and economic situation, the availability of seasonal, high protein yield, storable food resources were of paramount significance.

Excluding the comparatively small urban population, the majority of the people that inhabited the Albemarle region of North Carolina during the early twentieth century were engaged in cash cropping and subsistence level farming (Dickey and Branson 1922; Nathans 1983). With the exception of cotton, corn and peanuts, the region’s primary cash crops through the 1920s (tobacco as the main cash crop began to develop in the late 1920s and early 1930s) (Cecil-Fronsman 1992; Hobbs 1930; *Fisherman and Farmer* 1895a; Smithwyck 1997), approximately 98% of the region’s balance of agricultural output was consumed within the counties in which they were produced (Boyce 1968 [1917]:63, 271). The vast majority of the population during the early twentieth century, as in the pre-Civil War era, might well be classified as yeoman farmers (Nathans 1983).

Chowan County is particularly illustrative of the region. In 1880, 17.7% of the population in the county lived in urban areas, primarily in Edenton, while 82.3% lived on rural farms (Boyce 1968 [1917]:41). In 1940, 33.1% lived in urban areas and 64.9% lived on rural farms (2.0% of the population made up the rural non-farm population) (Carolina Population Center 1969:26). As late as 1940, many farmers in eastern North Carolina still utilized mules or horses to till the land (Heath

1995; Smithwyck 1997). The average farmer in the region, with one mule or horse, could only tend a maximum of 35 acres per year (Boyce 1968 [1917]:45). If a farmer had a family to assist with the plowing, planting and harvest, a family might have tended as many as twenty-five acres (Smithwyck 1997; Taylor 1997). In 1880, there were a total of 716 farms in the county, of which 68.3% had less than 31.5 acres of improved (tillable) land (Boyce 1968 [1917]:45). By 1910, the number of farms in Chowan county had increased to 983. Of that number, 79.7% had less than 33.7 acres of improved land (Boyce 1968 [1917]:273). Living informants suggested that most farms in the region were equally small in the 1930s and 1940s (Lane 1997; Smithwyck 1997; Spruill 1997). Many of the small landowners rented out portions of their improved lands to tenant farmers, thus reducing the actual number of tillable acres available to each family (Smithwyck 1997; Spruill 1997; Nathan 1983). Such general statistics and observations are particularly illustrative of the nature of agriculture in the northeastern region of North Carolina in the period before World War II.

Other than subsistence level agricultural products from kitchen gardens, domesticated animals, particularly pigs and chickens, supplemented the farm family's larder. Pork was especially valued, because the meat could be cured with salt and stored in smokehouses for long periods of time. Hogs killed and processed in the winter, provided meat through the spring, summer and fall (Bryant 1995; Heath 1995; Lane 1997; Smithwyck 1997; Spruill 1997). Although most families killed pigs each winter, a large majority of the rural population could not produce a enough cured pork to last their families for an entire year. Beef cattle were raised primarily for urban market sale, since the general lack of electricity precluded any long-term storage of beef when cows were slaughtered (Bryant 1995; Fenner 1995; Lane 1997; Spruill 1997). In the majority of the rural households, chickens were only killed and cooked for Sunday lunch, while Geese were primarily raised for feathers and only cooked on special occasions (Bryant 1995). As in the colonial era, many

rural families supplemented their larder with wild game, such as turtle, duck, rabbit, squirrel and other small game (Bryant 1995; Fenner 1995; Mizzell 1995), but like hog killings in the fall, the spring *Alosa* runs were a “turning point on the dietary calendar” (Sharpe 1960:26).

While many farmers raised vegetables and livestock to feed their families, most families had little money on a day-to-day basis to purchase the basic necessities of life. Most farmers were forced to borrow money in the spring for planting and supplies; in the fall, cash from the harvest was used to repay debts. Due to the ubiquity of the tenant and share cropper system in rural North Carolina (Nathans 1983; Powell 1989), many farmers had to go into debt each year to purchase fertilizer, seed, farming supplies or equipment and subsistence provisions, such as sugar, flour, salt and other provisions (Dickey and Branson 1922; Heath 1995; Nathans 1983). Much of the labor on the farm was dedicated to the cash crop. As such, many poorer farmers, tenant (renters) and share croppers, could not produce as much food crops or livestock as they needed to feed their families (Dickey and Branson 1922; Nathans 1983). It has been observed by one historian that “Under the crop lien system, when the farmer did not pay out his debt to the landlord or furnishing merchant, he was legally bound to give the creditor a mortgage on his next year’s crop. So he labored to produce still more tobacco and more cotton” (Nathans 1983:13). Although living in a modern market economy, many rural inhabitants in the region found themselves experiencing a “starving time” by the inevitable focus on cash crops in an era of global depression cycles.

The tenant and sharecropping system developed out of the ashes of the Civil War, in a state with a shattered economy and little available credit for working class citizens (Powell 1989). By the turn of the twentieth century, one in three white farm families and three out of four black farm families were either tenant farmers or share croppers (Nathans 1983:13). During the period between 1860 and 1940, eastern North Carolina farmers experienced a frequent periods of “agricultural

depressions” that generated a steady rise in the economic dependency of both white and black farmers on the crop lien system (Powell 1989). Due to globally depressed agricultural prices from 1880 to 1915 and from 1920 to 1940, “Even landowning farmers who were self-sufficient found themselves in jeopardy” (Nathans 1983:12). With such an agriculturally oriented, yet depressed economy, the early twentieth century inhabitants of the Albemarle Sound region continued to turn to the area’s aquatic resources for sustenance and economic relief, just as their predecessors in the prehistoric and early historic periods.

Based on the information provided by living informants, it is readily apparent that shad and river herring runs continued to provide a dependable seasonal source of meat, as well as money to rural and urban populations in the region, as late as the 1940s (Fenner 1995; T. Gardner 1997; Lane 1997; Smith 1997; Smithwyck 1997; M. Spruill 1995; R. Spruill 1997). While tenant farmers and sharecroppers in the Piedmont and Blue Ridge Mountain regions often suffered from the lack of a diverse and nutritious diet (Dickey and Branson 1922; Raper and Reid 1941), Albemarle region fisher-farmers were readily able to supplement their annual subsistence needs with a nutritional food resource. For subsistence purposes, river herring were particularly valued since they could be salt-cured and preserved for long-term storage. While shad could be salt-cured, only poorer inhabitants of the region relied on cured shad, as it was not as palatable as river herring when salted (Smithwyck 1997; Spruill 1997). As a fresh market fish, for export shipping purposes, river herring were cheaper than American shad, but the people who relied on shad for annual subsistence needs most often netted their own (Smithwyck 1997; Spruill 1997). Some farm families purchased their yearly supply of river herring from local fishery operations, while others utilized small-scale fishing gear to harvest what they needed for the year (Smithwyck 1997; Spruill 1997.). One writer observed that farmers who “...fished regularly were usually poor farmers, for the reason that time devoted to fishing could

have been more profitably employed in cultivating the crop” (Taylor 1966:60). For families of the Albemarle region, spring fishing was a necessary activity for sustenance and not a recreational activity for the indolent farmer.

Economically, shad and river herring runs contributed to the local market economy. The cultural reliance patterns observed in the present study, reflect a range of adaptive strategies related to the continued exploitation of anadromous fish that evolved in the eighteenth and nineteenth centuries. Full-time fishermen and part-time fisher-farmers were common to the Albemarle Sound region through the pre-World War II era. Only with the influx of industry in the late 1930s and early 1940s was the pattern radically altered, as higher paying manufacturing jobs drew many farmers and fishery workers away from commercial fishing adaptations (T. Gardner 1997; Hampton 1997; Smith 1997; Spruill 1997). Until the late 1930s, and the gradual industrialization of the Albemarle region’s major towns, few other occupations were open to the rural population other than growing cash crops or working in the lumbering business. As Hobbs (1930:74) observed of the Albemarle-Pamlico region in 1930, “There is practically no manufacture carried on in this area.”

Some individuals involved in the fisheries operated part-time carpentry or blacksmith shops or participated in other local businesses on a part-time basis (Boyce 1968 [1917]; Spruill 1997). As such, fishing was an attractive option among a number of other available options to people in the market driven economy of eastern North Carolina. Given the continued demand for North Carolina shad and river herring in northern, inland and local markets, many individuals, however, chose fishery related work as a viable economic alternative. Anadromous fisheries not only provided a low-cost, dependable subsistence option to most families, they also provided an additional source of income to those who chose to work in the seasonal fisheries or actually operate fisheries for profit.

For these reasons, anadromous fisheries in the later historic period were reflections of multiple adaptive strategies selected by individuals for their personal goals; survival, either economic or subsistence. In the early modern period, shad and river herring fisheries were the result of long-term adaptive strategies that had evolved during colonial and antebellum days in eastern North Carolina. As such, the continued exploitation of anadromous fish for subsistence and economic purposes was the result of patterned strategies through time; the repetitive patterns became a tradition in the Albemarle-Pamlico Sound region.

Most farming families utilized the resource in order to survive, as river herring and shad provided a dependable source of nutrition during the spring, early summer and winter, when few vegetables were available (Smithwyck 1997; Spruill 1997). River herring and shad, as well, provided a break from the monotony of salt pork on a day-to-day basis and largely served as a substitute for other meats, such as beef which was rarely consumed outside the urban centers until the 1950s (Smithwyck 1997; Spruill 1997). For these people, both shad and river herring fishing or market purchase of the same, represented a subsistence driven adaptive strategy in response to scarce resources. Informants have indicated that salted river herring were a necessity for life sustenance in the rural farming region of northeastern North Carolina (Smithwyck 1997; Spruill 1997). Accordingly, the continual need to harvest fishery resources in the early modern period contrasts with some researchers' theoretical assumption that societies utilizing agricultural and livestock domesticates have no need to extensively utilize wild resources for subsistence needs (see review in Reitz 1979).

For part-time fisher-farmers and full-time fishermen, the fisheries represented an adaptive strategy related to environmental opportunities, rather than environmental constraints. These individuals and their supporting families responded to a perceived resource in the local environment

that could be exploited for profit, either to provide an annual salary or to supplement farming income, during a period when crops were not available for sale on the market (Hampton 1997; Lane 1997; Spruill 1997; Taylor 1997). The seasonal nature of farming, tilling and planting in the spring, and harvesting in the late summer or fall, allowed part-time fisher-farmers or subsistence level fisher-farmers to participate in the fisheries (Hampton 1997; Taylor 1997; Spruill 1997). Some farmers operated seasonal small-scale fishery operations during the spring fishing season and sold fish to local consumers or to the larger fishery operations in the region (Smithwyck 1997).

Many tenant farmers and small landowners, as well as their wives, would have their children plow and plant the fields, while they went to work at the sound and river fisheries for wages each spring. Other farmers would work at a fishery from the early morning until mid-afternoon and return to the farm to work the land until evening (Hampton 1997; Spruill 1997; Taylor 1997). The variations on the general theme were broad and individualistic in nature. Each variation related to the economic exploitation of shad and river herring was an individual adaptive response to the opportunities presented by the unique aquatic environment of the Coastal Plain region. The scheduling of anadromous fisheries, for both subsistence and economic purposes, during the early twentieth century, was dependent upon a natural biological cycle.

The conscious choice to exploit the spawning runs was, however, purposefully incorporated in the seasonal livelihoods of a broad range of people in the Albemarle region: urban workers, farmers, rural laborers and the fishery owners. The subsistence and economic survival strategies employed by these individuals reflect the tendency of cultural groups to respond to the environment by developing schedules that emphasize reliable, predictable resources, specifically those that provide a high yield with minimum energy or labor cost investment (Jochim 1976, 1981; Reitz 1979). As in the case of prehistoric anadromous fisheries, historic period peoples exploited the

resource because it was still a low-cost, low-risk option in the local subsistence and market economies.

By the mid-to-late 1950s, anadromous fisheries for subsistence purposes had greatly dwindled in scale. Fewer families, save those who continued out of tradition or personal taste, continued to pack or salt cure river herring and shad for their annual subsistence needs. In 1958, one observer stated: "Most of the catch goes into commercial plants...(but) among old time Gates (County) farmers, the river herring is as much a food staple as is pork in most rural counties..." (Sharpe 1958a:54). Some of the commercial catch continued to be distributed through local fresh fish markets in season, but larger portions of the catch went to commercial processors who canned and packaged both the fish and the roe for shipment all over the United States and abroad. River herring in particular evolved to a semi-gourmet status (e.g. packed in wine sauce) in the early 1960s (NCDCD 1963), an ironic evolution, since it was considered to be the poor man's food (Hart 1990) a few decades before. The bulk of the river herring harvest, however, went to fertilizer, fish oil and fish meal plants in the region (NCDCD 1963; Smithwyck 1997). Their steward service as a necessary subsistence resource in the region greatly dwindled in the post-World War II era.

The reasons for the decline as a subsistence resource relate back to the concept of adaptive strategies. Within a relatively short period of time, the rapid modernization of northeastern North Carolina near the end of the Great Depression led to significant changes in the cultural and natural environment of the region. The wide-scale availability of electricity after the 1940s meant that refrigeration was common in most rural households and local stores (Heath 1995; Spruill 1997). The general development of improved roads and the widespread introduction of automobiles enhanced the intrastate and local transportation systems. The economic boom, experienced after the World War, resulted in a greater range of food products in stores, as well as jobs in factories and other

businesses that provided income for people to make such purchases. As living informants noted, before World War II, there was little money available for most rural families to spend on food; they had to raise, hunt or fish for what they consumed (Heath 1995; Smithwyck 1997; Spruill 1997; Taylor 1997). As one fisherman stated in a recent interview, “Anybody 50 years old and down ain’t going to eat too many river herring...everybody now has got too much money to eat herring (quoted in Burgess 1990:3).

Substantial changes in the regional infrastructure and economy between the years 1930 and 1950, resulted in a cultural environment where river herring and shad, as necessities for life, were no longer needed. Accordingly, fishing for and processing (e.g. salting, smoking, etc.) shad and river herring at the family level became a higher cost subsistence choice or option. There was no longer any rational, other than tradition to continue the adaptive strategies of the past for most people outside the realm of the commercial fisheries, which had already begun to decline by 1950. As observed by Woodward (1956:40), “...the sustained production (of river herring) is difficult to understand unless from mere habit...the fishermen continue to catch the fish even though the demand (as a food fish) is so slack that a large portion of them go for scrap.” The eventual adaptive response of the full-time and part-time fishermen, in the face of changing consumer demand, was to diversify and select other alternative strategies to provide income (e.g. shrimping, crabbing, fishing for alternative higher market value species) after the 1950s (Lane 1997; Spruill 1997).

Unlike the prehistoric and early historic periods, early modern period (circa 1880-1950) shad and river herring fisheries, with the exception of small-scale subsistence fisheries, were high-energy extractive processes, rather than low energy processes (Bennett 1993). The application of steam power (circa 1880), and later gasoline and electrical power (circa 1915-1930), to the large haul seine operations, as well as the addition of the gasoline engine to pound net and gill net fishery

boats, accelerated the process of the overfishing of stocks in the period between 1900 and 1950.

With the addition of the mechanical engine to work boats pound net and gill net fishermen could fish more nets during a work day and, as a result, harvest more fish than ever before.

With the addition of mechanical engines, seine-flat tow boats could also operate more efficiently, which, combined with the use of mechanical winches (steam, gasoline, diesel, electric), allowed the seine nets to be fished more frequently on a daily basis. The implementation of machine-driven or supplemented fisheries reflect the greater demands placed upon the shad and river herring fisheries as part of the greater national market economy. The fisheries responded to the general availability of technology to enhance their production, which was being utilized to support larger and larger urban population centers, well beyond the needs of the people directly involved with the fisheries.

As Bennett (1993:258) observed, the evolution from low-energy to high-energy production leads to both resource degradation and the displacement of segments of the population that rely on a specific resource. While other factors, related to environmental degradation and habitat destruction, contributed to the tremendous decline in shad and river herring stocks in the later twentieth century, the shift to high-energy fishery production undoubtedly contributed to the demise of the stocks. Along similar lines, the shift in agricultural production, from low-energy production before 1945, to high-energy production in the post-World War II era has also contributed to the destruction of the shad and river herring fishery.

Low-energy agricultural production relied on human or animal power for tilling and harvesting. During the same period of low-energy production, toxic chemicals were rarely used on crops and large-scale fertilization, other than the application of manures and fish offal was minimal. As such, the impact on the regions waterways from agricultural run off was minimal. With large-

scale farm mechanization and the development of sophisticated fertilizers and pesticides during the post-World War II period, agriculture in the region became much more extensive in nature. Larger farms and liberal application of chemicals to boost production resulted in greatly increased agricultural runoff in swamps, tributary streams and rivers of the Albemarle-Pamlico drainage.

During the same period of agricultural intensification, industrial development along major waterways increased. Beginning in the late 1930s, a variety of processing and manufacturing plants, elements of a high-energy culture, were put into operation. The by-products of many operations, such as paper mills, are dumped into the rivers. In the late 1930s, two major fishery operations on the Roanoke River were forced to cease operations within two years after a paper mill went into operation (Hampton 1997). Pollution emanating from the same plant led to the closing of another major fishery downstream within three years of the plant opening (Taylor 1997). The wholesale dumping of chemicals by the mill reduced the fisheries catches by more than 90% (Hampton 1997; Taylor 1997). By-product chemicals, combined with agricultural runoff, degrade the waterways and destroy breeding grounds where shad and river herring spawn. Most of the chemicals do not directly attack the adult fish, but rather kill the eggs that are deposited in the water or destroy the larvae after they hatch. Pollution from high-energy processes and the general employment of high-energy fishing technology have ultimately combined to destroy what once appeared to be an infinite resource.

The Last Vestiges of the River Herring and Shad Fishing Tradition

Prehistoric cultures, as well as early modern cultures of northeastern North Carolina would have likely suffered from the magnitude of such a natural disaster; prehistoric populations perhaps to a greater extent. At best, their range of options or adaptive strategies would have been significantly reduced. Although there are a few remaining commercial fishery operations that depend on shad and

river herring today, the scale of the operations are greatly reduced from those of fifty years ago. The fisheries are highly regulated and limited by the state government in an effort to protect and enhance the future viability of the present stocks. One commercial processing plant on the Chowan River, and a handful of scattered fish houses are all that remain of a once thriving shad and river herring industry.

Few people today, except for the poorest members of the Albemarle region population (David Griffith, East Carolina University, personal communication 1997), rely extensively on river herring or shad for subsistence purposes. Non-commercial fishermen fish primarily for sport and out of tradition. Older inhabitants of the region continue to keep a hundred or so home cured or commercially prepared salt river herring on hand out of tradition and often travel down to the local fish houses to purchase a fresh shad for baking or a “mess” of river herring to fry up on occasion during the spring runs (Layton 1997; Smithwyck 1997). Local supermarkets and grocery stores continue to carry quantities of canned river herring roe and commercially processed plastic bags of pickled river herring which are still purchased in small quantities by older individuals who remember growing up on river herring and make small purchases each year out of tradition (Burgess 1990; Smithwyck 1997; Spruill 1997).

The Easter Monday tradition continues on today, as the day that many people in the Albemarle region go down to the fishery landings to buy a few dozen river herring for a family fish fry or a shad to bake (L. Gardner 1997; Layton 1997). In the northeastern Coastal Plain region the river herring is celebrated on Easter Monday at a festival in Jamesville and the hickory shad is celebrated in May at a festival in Grifton. The Jamesville Herring Festival began in the mid-1950s, while the Grifton Shad Festival began in the early 1970s (Beacham-Phelps 1991; *The State* [anonymous] 1975). Both festivals largely evolved, in response to the perceived decline of the long-

time cultural tradition of the seasonal anadromous fisheries, as a means of keeping time-honored traditions alive in the region (Beacham-Phelps 1991; *The State* [anonymous] 1975). In response to the dwindling number of shad in eastern North Carolina waters, more river herring than shad are consumed at the Shad Festival (*The State* [anonymous] 1975).

On Easter Monday, part-time commercial fishermen still ply the waters of the Roanoke River and gill net for river herring to sell to the public at the landing in Jamesville. The river herring stocks have dwindled so badly in the Roanoke River that local restaurants, in order to meet the seasonal demand, have to purchase most of their river herring from South Carolina, where the fish is not as popular as a food resource (L. Gardner 1997). A handful of seasonal restaurants such as the Cypress Grill, on the Roanoke River in Jamesville, follow the schedule of the river herring runs and still open their doors every March and close up at the end of April. The Cypress Grill is a locally famous cafe that draws a daily crowd when it is open during the fishing season. When asked why the restaurant was so popular, its present owner indicated that people came out of a sense of nostalgia for the old days when the river herring was still the focal point of spring activities in the region (L. Gardner 1997). These contemporary cultural adaptations and traditions are the remnants and reflections of the patterned adaptive strategies that evolved in our present day European and African descent cultures over the last four centuries.

The present study is incomplete, as much more information is needed to complete the story and to support or refute the general conclusions offered by the author. The present study is simply a starting point for future research endeavors in the areas of archaeology (prehistoric and historic) and history (documentary and oral). Many questions remain about the prehistoric past that can only be resolved with the addition of in-depth archaeological and zooarchaeological data: (1) exactly what was the extent of prehistoric exploitation of *Alosa*, as compared to other available species? (2) what

exploitation sites manifest themselves in the archaeological record? In the early historic period, numerous commercial fishery sites exist, particularly in the plantation setting that have never been investigated: (1) how were these operations spatially organized? (2) how did labor efforts in the fishery operations affect the lives of the enslaved, as well as the free populations of whites and blacks? In the modern period, the riverine fisheries were poorly recorded in the historical record. Documentary evidence of the hundreds of small-scale operations up all of North Carolina's major rivers is limited. Oral history data needs to be collected before the generations associated with those fishery operations are gone. (1) how were the inland fisheries organized? (2) what types of gear were utilized? (3) who was employed in the fisheries? (4) were there distinct regional variations, in terms of ownership, labor, gear, marketing, subsistence, and so on? More research is certainly needed before the broader anthropological questions and theoretical perspectives on labor issues, economics, adaptation, and such can be pursued.

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Appendices

Appendix A:

Material Culture and Methods of the Historic Period River Herring and Shad Fisheries

The fishing technologies developed to harvest the anadromous fish runs were variable in terms of materials, form and complexity. Even though there have been cultural, technological and exploitive foci changes through time, there has also been continuity in the fishing gear technologies applied through time. This appendix presents a comprehensive, in-depth review, and description of both the formal types of gear used in the commercial fisheries and the vernacular types of gear used in subsistence fisheries during the twentieth century. Continuity and tradition are hallmarks of the fishing technologies employed in both household level and commercial anadromous fisheries. Variability in commercial gear technology through time largely related to changes in sources of energy or power and the development of new raw materials for the production of nets and other gear. The review and description of the commercial fishing gear will cover what is known of the eighteenth and nineteenth century gear, as well as the twentieth century period through the post-World War II era.

Local, household level fishery exploitation led to a range of vernacular fishing technologies that included weirs, drift and set nets and several types of dip nets. As with any folk material culture, the range of variation in form and material has been nearly infinite. As with commercial fishing gear, however, the vernacular equipment changed in relation to available materials, yet also exhibited a certain level of continuity in form and function over time. The review and description of vernacular fishing gear will be primarily restricted to the post-1920 era, due to the lack of earlier historical descriptions or the inclusion of such fishing equipment in North Carolina museum collections.

Primary and secondary sources, as well as oral traditions, where applicable, were utilized for the period surveyed.

Commercial Gear

The line between commercial and non-commercial fishing gear is often gray. Small-scale commercial operations often used the same type gear as the household level fisheries, such as fish wheels, gill nets (set and drift), hand-seines, etc. Although, any number of gear technologies have been employed in the commercial fisheries, the hand and power haul seine, anchor gill net and pound net were the most common gear technologies utilized to harvest spawning shad and river herring in North Carolina waters. Fish wheels, similar to devices once used in the salmon fisheries on the Columbia River, were used on certain rivers in the region, particularly on the Roanoke River in the vicinity of Williamston. Weirs were common in the colonial period commercial fisheries and drift gill nets were also utilized, particularly on the Roanoke River. The haul seine, pound net, anchor gill net and fish wheel, however, will be covered as commercial gear and described in detail in the following section.

Hand and Power Haul Seine Nets

Haul seine nets were purported to have been introduced into North Carolina waters sometime around 1762 by an Irish immigrant, Alexander Brownrigg (Taylor 1990). They remained the primary commercial river herring and shad harvesting technology until the 1880s when the pound net began to dominate the fishery (Boyce 1968 [1917]). Although a handful of small-scale haul seine operations remained on all of the major rivers of the Albemarle-Pamlico drainage system through the 1970s, the major commercial operations faded out by the early 1940s (Hampton 1997;

Taylor 1997). Small-scale operations, primarily geared to local trade, remained on the Tar, Neuse, Meherrin and Roanoke rivers through the 1970s (Davenport 1997; L. Gardner 1997; Heath 1997; Stephenson 1995).

The seine is an ancient fishing technology that was known by the Egyptians as early as the 2,575 B.C. (Brandt 1984; Cushing 1988). Brandt (1984:283) noted that the Romans introduced a similar net technology to Europe and the French term “seine” was derived from the Latin word “sagena.” Since the haul seine net was a relatively well known technology in seventeenth and eighteenth century Europe, the author suspects that small hand-powered seines were used in North Carolina, well before Richard Brownrigg established his fishery in the early 1760s. In its general form, the seine is basically a mesh wall with two ends (wings) and a slightly taller center section (bunt or bag). At the outer end of each wing, a hauling line (warp) is attached. There are two lines from which the actual mesh is hung. The top line (cork line) holds corks that float the net. The bottom line (lead line) may carry weights and serves to keep the bottom of the net vertical in the water. Although several sources indicate that the lead line is generally weighted with lead weights, the larger haul seine nets formerly utilized in North Carolina shad and river herring fisheries were not all weighted. The bottom line was generally heavy enough to keep the bottom of the net down on the river or sound bottom (Hampton 1997; Taylor 1997).

Although there are any number of variations in the actual fishing technique, in general, North Carolina haul seines were all operated in a similar fashion. The net was set by two boats, called “flats,” in a half circle or “U” around the fishing ground off shore. The fishing area where the seine was operated was known in as the “seine ground” (Taylor 1997; Capehart 1988). Fish in the seine ground area were captured when the warp lines were simultaneously pulled inshore at two predetermined points. In North Carolina, the operation of setting and hauling the net ashore was

referred to as “shooting the seine” (Capehart 1988). The wings of the seine served to herd the fish into the bunt area of the net. As the two wings of the seine were landed on the shore, the fish became concentrated in a smaller and smaller area. When the ends of the bunt reached the shore the fish were removed by various methods depending upon the size of the haul.

The variations in the construction of the seines were as variable as the procedures used to operate the nets. Although any number of historical sources before the 1850s mention the use of seines in North Carolina rivers and sounds, few details of their actual construction and operation are available from the period. What is known of the post-1850 seine configurations and fishing operations can be utilized to infer what may have been used in the past. Boyce (1968 [1917]:94) described the use of late nineteenth century hand seines, which were hauled in by hand-powered windlasses. The use of such nets in the 1880s likely reflected the continuity of a tradition that dated back to the mid-eighteenth century, if not before. Between four and six men could shoot the hand seine by operating one or two oar-powered flats. Boyce (p. 94) further observed that the hand seines ranged from 75 to 200 yards in length and were known to have been used to capture as many as 150,000 river herring in two days of operation.

Larger eighteenth century operations, such as the Brownrigg fishery, used seines that were between 1,000 and 1,300 feet in length (Taylor 1990:9). Such large seines were set with two oar-rowed flats and were hauled in by hand-windlasses or with mule or horse-powered capstans. In the nineteenth century, teams of as many as six horses were required to handle each end of the a fully loaded net that may have measured up to 2,500 yards in length. The net depth would vary according to the water depth in which the nets were used (Taylor 1997). Seine depths for the river fisheries were between six and eighteen feet, while the sound fisheries used deeper nets, again according to the depth of the water. In the later part of the nineteenth century, the Capehart Fishery on the

Albemarle Sound at Avoca utilized a steam-powered seine 2,500 yards long and 36 feet deep (*The Orient* [anonymous] 1896). In general, seine nets had to be set in such a manner that they remained vertical while the bottom of the net touched the bottom of the sound or river and the top of the net remained at the surface. The goal was to ensure that fish could neither swim over or under the net during the capture process.

In the late nineteenth century, steam-powered seines were generally between 2,300 and 2,500 yards long from wing to wing, while the river fisheries used steam-powered seines that measured from 600 to 1,800 yards in length (Boyce 1968 [1917]:95). Hauling lines, or “warps”, were added to the outer ends of the wings. Each warp was generally the same length as the net itself. Both warps together made up approximately two thirds of the total length of the seine. Depending upon the configuration of the shoreline and the direction of the water current at the landing site, the land end (upstream) rope may have been one half the length of the net, while the sea end (downstream) end would still be the same length as the net (Boyce 1968 [1917]:95). Such a configuration was often used in the rivers, where the nets were often shot upstream, parallel to the shore (Hampton 1997; Taylor 1997).

In the twentieth century, the lines and ropes used on the seine were often made from imported Manila or Russian hemp (Taylor 1997). The large sound side seines utilized up to 4.50 inch diameter rope for the hauling lines (*Fisherman and Farmer* [anonymous] 1895b) made up into sections referred to as “shifts” (Capehart 1988). Diameters of the lines varied depending upon the size of the seine and where it was operated; top and lead lines were generally about one-half the diameter of the hauling lines (Taylor 1997). Top lines were used to carry enough cork floats to keep the top of the seine at the surface of the water and to keep the net from sagging along its length.

Cork floats were imported if the net owner could afford them, some operations used cypress or cedar wood floats. The wooden floats were cut in a circular form and had holes drilled or burned through the center for mounting the cork on the top line. In the nineteenth century most operations utilized cork floats that ranged from 4.00 to 6.00 inches in diameter and ranged from 2.00 to 3.00 inches in thickness (Taylor 1997; Capehart 1988). In some instances, the corks were strung on a second line which was attached to the top line by short sections of heavy twine. This method was employed at the Terrapin Point Fishery in the 1920s and 1930s to facilitate tarring the seine by allowing the cork line to be removed without untying the mesh from the top line (Taylor 1997). Given that cotton or linen mesh seines had to be tarred each season, it is likely many other operations used a similar cork attachment system. The 2,500 yard long seine at the Capehart Fishery required 8,000 corks (*The Orient* [anonymous] 1896). To keep from importing so many corks, the Capehart's attempted to grow their own cork trees, but they never produced cork thick enough for the giant seine (Capehart 1988).

Long wooden poles called "staffs" were attached to the outer ends of the wings. Any sort of durable wood could be used. At the Terrapin Point Fishery in Bertie County, heart pine was used to make the staffs (Taylor 1997). The staffs served to keep the ends of the net from collapsing when it was hauled ashore and served as an attachment point for the hauling lines. The staffs had iron rings on each end through which the top and bottom line of the seine were attached. The staffs were stripped of bark to prevent unnecessary wear on the ends of the net (Hampton 1997; Taylor 1997). The hauling lines were attached to the top and bottom ends of the staff by means of a "Y" spliced into the net end of the hauling rope.

At the Capehart fishery, the hauling line or "warp" shifts had iron rings or "beckets" spliced on each end, the shifts were connected with hinged steel coupling devices or shackles referred to as

“sister hooks.” The sister hooks folded in and latched together, but a string was tied around the hook to ensure that it did not break loose while the line was being hauled in. The warp was divided into four shifts of approximately 600 yards each. The Capeharts replaced their horse-powered hauling capstans or “horse winches” with steam-powered winches after the Civil War. The steam winches incorporated a two winding drum system. After the two steam-powered flats shot the seine and returned to shore, the hauling lines would be coupled to the drums of their respective engine houses.

One drum would take up the first shift of the warp. When the second shift was reached, it would be placed on the second drum and the first drum at each engine house would be unloaded and the lines would be placed back on their respective flats. As the wings came in, each wing would be loaded on its respective flat so that the flats were ready to shoot the net again as soon as the catch was landed (Capehart 1988). In the twentieth century, the Kitty Hawk and Slades fisheries in Plymouth (Hampton 1997) and the Terrapin Point Fishery at the mouth of the Cashie River (Taylor 1997), operated in a similar, although not exact fashion.

To keep tension off the net when it was being pulled ashore, many seines incorporated a second, much heavier, hauling line was attached to the bottom line by a series of evenly spaced toggle lines. The toggle lines were spliced permanently into the heavy hauling line. Iron rings were spliced into the bottom line of the seine and spaced at the same interval distance as the toggle lines. The toggle lines were tied with slip knots to the iron rings so as to attach the hauling line to the bottom line of the seine. Toggle lines attached the hauling line to the bottom line on the net down the length of the wings. When the staff reached the shore the first toggle line was released from the seine and coupled to the winch. The toggle lines were knotted in a fashion so that they could simply be released by snatching the loose end of the toggle. From that point on, the seine was hauled in using the toggle lines until the bunt was reached (Hampton 1997; Taylor 1997; Capehart 1988).

The initial toggle lines were hauled in using the powered winches or capstans, but as the net drew nearer to the shore it had to be closed up or “pursed.” Accordingly, snatch blocks were positioned down the length of the shoreline. The toggle lines at each end of the seine were simultaneously positioned around a snatch block pulley and passed down to the engine house or horse winch which continued to pull in the net. The toggles were passed down a series of snatch blocks until the bunt reached the shore. At each end of the bunt, an iron swivel was spliced into the bottom line where a final toggle line was attached to the swivel. The swivel kept the seine from twisting if the toggle line got twisted on the winch. This point was known as the “wet foot” (Capehart 1988). When the wet foot reached the beach power pulling by engine or horse was no longer used. The wet foot was the point where the shore crew had to get their “feet wet” by going out into the water to haul in the net by hand. By the end of the nineteenth century, the crew wore rubber boots to keep from getting soaked with water, but the term “wet foot” continued to be used well into the 1930s (Capehart 1988).

Unlike the Capehart Fishery which relied on steam-powered winches, the Slades and Kitty Hawk fisheries at Plymouth used electric motors to haul in the sea end of the seine while the land end was hauled in by a horse-powered capstan referred to as the “horse windlass”. The “horse windlasses” were actually capstans, but the term seems to have also been used to describe the land end winch, even after the advent of gasoline, diesel and electric-powered winches in the twentieth century (Hampton 1997; Taylor 1997; Capehart 1988). When the wings landed on shore, the toggle lines were passed down a series of hand-powered capstans that ran the width the landing area (Hampton 1997). The Terrapin Point operation used diesel engine-powered winches on both the sea and land end hauling ropes. At Terrapin Point, the seine had to be shot up the comparatively narrow mouth of the Cashie River. Accordingly the seine was set in an elongated fashion running parallel to

the shore. To keep the net in such a configuration, a large snatch block was positioned out in the water, approximately one hundred yards from the engine house. The sea end rope was passed around the snatch block in an “L” fashion to keep the net parallel to the shore until the end of the wing was reached. At that point a large knot was pre-tied on the hauling line. When the knot reached the pulley on the snatch block it would cause the line to be thrown off. From then on, toggle lines would be used to haul in the seine (Taylor 1997).

When the bunt was reached, two men would step out into the water and stand on the lead line at each end of the bunt. This action kept the net down on the sound or river bottom so the fish could not escape. At the same time, the rest of the crew would begin “rolling the net” in to “run out” the fish. The hand seine operations generally landed their catches on open sandy beaches. The large fishery operations, however, landed their catches on a wooden planked landing called the “battery.” The battery was a low wharf that had a ramp, or “apron” protruding down into the water. The ramp was buried into the sound or river bottom to keep the net from working up under the wharf and to keep the fish completely trapped within the net (Hampton 1997; Taylor 1997; Capehart 1988).

At some operations, overhead beams were placed at each end of the battery. The beams projected out over the water and mounted a pulley with ropes. The ropes would be tied to the top line of the bunt so that the upper portion of the net could be raised up to facilitate the landing of the haul (Hampton 1997). Generally, the haul was landed by “rolling” the net and dumping the fish on the battery. If the catch was particularly large, dip nets would be used to scoop out a portion of the catch, until the net could be handled by hand (Hampton 1997; Taylor 1997). The hauls were sometimes knee-deep on the battery and a hinged ramp, or “apron”, on the side of the battery would be flipped up to keep the catch on the landing. “Pioneers,” not boatmen, cleaned up the hauls on the

landing. Generally women and cut the river herring for salting, while the pioneers salted and packed shad and river herring (Taylor 1997; Capehart 1988).

By the time the seine was emptied of its haul, the boat crews had the warp shifts, wings, and toggle lines for each end of the seine reassembled and loaded back on their respective flats. Once the bunt was completely empty, it was pulled back from the landing and loaded back on the flats; half on one flat and half on the other. During the loading operation, the flats were tied together, stern to stern, or “sistered” with about thirty feet of the bunt suspended between them. The boats went out sistered until they reached the center of the seine ground called the “seine bush.” The term was coined in the early nineteenth century when a bush was lashed to a marker post out in the sound so that it could be seen from the beach. In the late 1800s the bush was replaced by a lantern so that it could be seen at night. In the twentieth century, a lighted buoy was used, but the terms “seine bush” or “center bush” continued to be used into the 1930s (Capehart 1988).

When the flats reached the seine bush, the boats would move up or down the sound, depending upon the wind, tide and current. The boats were positioned to ensure that the seine could drift with the wind or tide and still be centered on the beach after the seine was set. At the center bush the flats were untied and they pulled away from each other, parallel to the beach, in opposite directions. When the staff was dropped in the water, the flats turned and headed directly for their respective engine houses. At the engine house, each flat would anchor in a position so that the warp and seine could be reloaded as it was hauled back in (Capehart 1988). Skilled seine menders were stationed on the boats to rapidly mend tears in the mesh as the net was slowly pulled ashore (Taylor 1997).

The Capehart fishery used steam-powered side-wheeler flats after 1879. As such, the two flats could steam away, in opposite directions and pay out the seine as they went (*The Orient*

[anonymous] 1896). The Slades and Kitty Hawk fisheries at Plymouth used six man oar-rowed flats that were towed into position by a gasoline-powered vessel; a converted and modified launch from a World War I submarine chaser. The sterns of the flats were tied together to keep the flats from separating, and accidentally paying out the net, until they reached the appropriate position in the center of the river (Hampton 1997).

Although eighteenth and early nineteenth century records are lacking on the specific mesh sizes used in the North Carolina haul seine nets, a small mesh size would likely have been used to keep captured fish from passing through the net. The bunt or center section of late nineteenth and early twentieth century haul seine nets ranged in mesh size from 1.50 to 2.75 inches. The mesh size used for the wings or ends of the net was slightly larger, to save weight, and ranged in mesh size from 2.50 to 3.50 inches (Taylor 1997; Gray Family Papers 1874). The twine for the wings was smaller than that used in the bunt. As more strain was placed on the bunt due to the massive weight of the haul, its mesh was tied from a much heavier twine (Capehart 1988).

In the eighteenth and early nineteenth centuries, the mesh would have most likely been made from hemp or cotton thread and hand-tied by skilled net makers. Brownrigg purchased his nets from England, but it is likely that many of the seines used in North Carolina were tied by local net makers. Taylor (1990:16) noted that net making machinery was not developed until the 1820s and did not reach general use until the 1840s. An early Federal government fisheries report states, however, that the first net making machine was perfected in 1809 and were in widespread use by 1830 (Sabine 1853:195). The first machine made nets were produced in Scotland and England. American net making machines were introduced in 1851 (Taylor 1990). A search through the Capehart Fishery records indicated that seine mesh was ordered from a number of sources in the post-Civil War era. Several entries in yearly fishery record books note orders for netting to be tied by local net makers.

At other times, orders were placed for machine made netting from the American Net and Twine Company of Boston (Capehart Papers; Gray Family Papers).

The nets had to be tarred at the beginning of each fishing season for two purposes. Tarring primarily served to preserve the twine from rotting away due to its near continuous submersion in water for three or more months of operation. Since the tar hardened, it also served to strengthen the slender twine of the net and reduced the probability of a tear or rip during the fishing operation (Layton 1997; Spruill 1997; Taylor 1997). Before the net was tarred it had to be dismantled and repaired by seine menders from the wear and tear of the previous season. The corks and all of the ropes and lines had to be removed from the mesh. Tarring was accomplished by dipping the netting in hot tar that was heated in vats or kettles, fired over underground kilns or fire pits that were fired with wood, kerosene doused tires, or any available combustible materials. The fire pits incorporated a chimney, either made from mortared brick or metal stove-pipe (Layton 19967; Spruill 1997; Taylor 1997).

The tarring process varied as did the form of the kilns, vats and kettles. In some instances large cast iron kettles were used to heat the tar. Due to the length of the wings and bunts, only small sections of the net could be fed into the kettle at one time. Wooden paddles had to be used to stir the net to keep it from sticking to the bottom of the kettle and burning. Long rectangular vats with wooden sides and iron bottoms were used, as were sheet steel rectangular vats. The larger rectangular vats often included a wooden grate, or "false bottom", that was placed on the interior bottom of the vat. The grate protected the net from scorching and reduced the need for stirring the mesh while it was passed through the tar. Long, wooden handled-iron hooks were sometimes used to retrieve the mesh from the hot tar.

To remove excess tar from the net, a number of methods were used. In some instances, a “tar cart” was backed up to the edge of the vat. The tar cart had a large wooden grate attached to the floor of the cart body. Excess tar would drain down into the bottom of the cart where it would spill out the back of the cart and back into the kettle. Other carts incorporated a drain hole in the bottom with a plug. In such cases, the tar would drain down to the bottom of the cart and it would be released back into the vat before the cart was towed away with the loaded net. In later years, “tar boxes”, attached to the rear of a pickup truck chassis, replaced the mule and tar cart (Spruill 1997). Some tarring operations incorporated various types of wooden wringer systems to squeeze off the excess tar (Taylor 1997). At the Capehart fishery, a team of mules was used to pull quarter mile long sections of the net through the tar vats, while a man used a round-edged board to squeeze off the excess tar (Taylor 1990). Once the net sections were tarred, they were hauled away in the tar cart to a large grassy area where they were spread out to dry or “cure”. The length of the curing process depended upon the weather and usually took from four-to-seven days. After the net was cured it had to be reassembled on the lines or “hung” (Taylor 1990).

Pound Nets

The giant haul seines and related deployment and recovery accouterments, while extremely efficient, became prohibitively expensive, when compared to other available fishing gear. Pound nets were first introduced to the Albemarle area in 1869 by two men from Pennsylvania (Leary 1915). Pound nets continue to be used today and are the primary fishing gear used to capture river herring (Layton 1997). With the exception of the twine used to make the mesh, pound nets have undergone few changes over the last 125 years. Although large quantities of shad are caught in pound nets today, the bulk of the shad are taken with set gill nets (Spruill 1997). The pound net is basically a

fish trap or weir made with nets. Thus the pound net, although “introduced” to North Carolina in 1869, represented another facet of technological continuity through time, as the basic configuration of the modern pound net resembles the form fish weirs illustrated by John White in 1584.

The pound net is a trapping device that consists of a main trap or “pound” which is enhanced by the addition of a “lead” and one or more wings or bays, referred to locally as “hearts” (Spruill 1997; Smithwyck 1997). Some fishermen refer to the pound area as the “kettle” (Smithwyck 1997). The nets are attached to posts that are driven or washed into the sound or river bottom before the component nets are set. Depending upon the depth of the water, the pound net will extend from the shoreline from 150 to 1,200 feet into main channel or deep water areas (Tyler and McKenzie 1973). Although the two heart arrangement seems to be the most common arrangement, pound nets may have one, two or three hearts. Pound nets may also be set in a series projecting out from the shore, with each successive net being staggered off from the previous net. The nets were often set in a series of five-to-eight in a row (Goerch 1940; *Fisherman and Farmer* [anonymous] 1895b). Spawning shad and river herring, as well as other varieties of fish encounter the lead and follow it into the hearts which serve to further channel the fish through a round or square tunnel that leads into the trap or pound area.

The tunnel is inserted through the mesh wall of the pound area and projects into the pound area approximately one third the width of the pound. The tunnel is generally centered on the heart side of the pound and tied-in with the mesh that forms the heart side wall of the pound. The tunnel generally projects inward approximately one fourth-to-one third the distance across the pound area. At the outlet end of the tunnel, a round or square iron ring, depending upon the shape of the tunnel, is attached to the opening. The twenty-two-to-twenty-four inch ring supports the opening and keeps it from collapsing. a line is tied to the top of the ring so that it remains vertical and keeps the tunnel

open. Once the fish enter the pound area, through the tunnel, they become trapped. The pound has a mesh bottom to keep fish from swimming out from under the bottom. Some fish may swim about until they manage to get back out through the tunnel, but most of the fish do not find their way back out (Layton; Spruill 1997). Fish are taken from the pound by using dip nets or by “rolling the net” and dumping the catch into the boat. Generally speaking, most fishermen push down on one side of the pound and position their boat inside the pound and “trip” or drop the tunnel, so the fish cannot escape, and recover the fish.

The pound net hearts contain a number of precise corners and angles that take a practiced eye and experience to properly position the post or “net stakes” to which the pound net is attached. Most fishermen assemble their own pound nets and make the pound section large enough for their particular boat to fit inside (Spruill 1997). For example, if a fisherman operates an eighteen foot skiff, he would make his pound at least twenty-seven feet square. Since the fishermen know the dimensions of the pound and the lengths of the hearts and leads, they often use precut sections of twine to measure when positioning the stakes. Once the stakes are positioned, it has always been a common practice to fish the same area year after year. As such, the nets are removed at the end of the season, but the stakes are left in position. Current Marine Fisheries regulations allow pound net stakes to be left in position, if the nets are reattached and fished at least once each year (Spruill 1997; Layton 1997). Spruill (1997) observed that he had fished several pound net locations that had been used for three generations.

The pound net stakes are cut from any available wood of suitable strength. Pine and hickory are often used, but cypress is preferred for longevity and ash is preferred because of its relatively smooth bark (Layton 1997; Smithwyck 1997). Pine stakes last about two years before they rot off at the top. In earlier years, stakes would be recycled. The stake was pulled up and reused in a shallower

location. Today, PVC pipe is cut and driven down over the top of the stake when the top rots away. The waterlogged portion of the stakes last indefinitely (Layton 1997; Spruill 1997). During the winter months, the stakes may have to be scraped to remove barnacles that can keep metal rings used to attach the hearts from slipping down over the stake. Additionally, the barnacles can cause excessive wear on the nets (Spruill 1997). Some pound netters made long-handled scraping tools, with an L-shaped scissor-like device at the base, that was used to scrape the sides of the stakes (Spruill 1997).

Most of the stakes are stripped of rough bark so that they will not abrade the net. Ash is used, if available, since it does not have to be stripped. If the stakes will be used in a mud bottom, the base of the stakes will be sharpened into a point, so they can be driven into the bottom. If the stakes will be used in a sandy bottom area, the base may be left flat if the fisherman has a pump with a long hose to “wash in” the stakes using water pressure to blow out the sand. Before the development of engine-powered pumps, hand pumps were used to wash in stakes (Spruill 1997). Pointed stakes can be initially set by hand and driven down with a sledge hammer, hand held “stake driver” or boat-mounted pile driver rig.

A stake driver is a heavy steel pipe with a cap on one end. The inside diameter of the pipe (6-8") is large enough to slip over the top of the stake. The drive is used by raising it up above the stake and dropping it down repeatedly to drive the stake. Steel handles are welded on two sides of the drive to facilitate the driving of the stake (Smithwyck 1997). Many of the large-scale pound net operations have special barges or pontoon boats with a well or slot cut into the bow. A set of vertical posts are attached to each side of the slot. The upright posts are supported by posts that angle back toward the stern of the vessel. A heavy wooden weight is suspended from a cross post by means of a rope and pulley mechanism. A stake is dropped into the slot and driven in by the hand operated pile

driver. The weight is raised and dropped repeatedly until the stake is driven down to the desired depth. When the stake is emplaced, the barge can be pulled away without disturbing the stake (Layton 1997; Smithwyck 1997; Spruill 1997).

The “corner” or “kettle” stakes for the pound are generally set first, then the “heart” stakes are set. The heart stakes consist of “breast”, “peak” or “point”, and “gap” stakes. “Lead” stakes are positioned in a line leading out of the heart to the shore. “Help” stakes are positioned at the center of the pond area on two sides to support the side wall of the pound. On the side of the pound opposite the tunnel, a “set” stake is positioned. The set stake is used to attach lines that are used to open and close the tunnel, by raising or lowering the iron tunnel ring (Layton 1997; Spruill 1997; Smithwyck 1997).

Once the stakes are positioned, the net is attached. The pound is attached to the pound or kettle stakes by short lanyards so that the net does not actually abrade against the stake. The top lines on the hearts are attached by lanyards to the heart stakes (breast, gap and peak stakes). The lead lines (bottom) on the hearts often have metal rings spliced in at the stake position. The rings are slipped over the post and will sink to the bottom. The lead is tied directly to the lead stakes without the use of lanyards. The lead net is often allowed to sag between the stakes so that tree limbs, logs and other debris floating down river will float over the lead without destroying the net. The net is designed so that at least one foot of the hearts and the pound are above the surface to keep fish from jumping or swimming over the top, once they become trapped (Sпруилл 1997).

Weights made from old ships ballast, rocks, bricks, or sections of terra cotta drain tile are used to weight the bottom line of the lead and the hearts to keep down on the bottom. The weights are tied to short pieces of rope and lashed to the bottom line between each stake. The pound is not weighted except at the entrance of the tunnel to keep fish from swimming under the pound. a series

of small weights are tied to the lead line or a length of chain is dropped down along the inside entrance edge of the pound (Smithwyck 1997; Spruill 1997).

The lead line is generally heavy enough to keep the other three sides of the pound on the bottom (Sпруill 1997), unless the pound is set in a river with a strong current flow. In those areas, tie downs lines are attached to the lead line of the pound on the upstream side of the pound. The tie down lines, or “down hauls” are passed through pulleys at the base of the stake. The lines are pulled up and tied to the upper end of the stake to keep the net from being pushed in on itself by the current (Layton 1997).

Originally, pound nets were made from cotton or linen twine that had to be tarred, in a fashion similar to the haul seine nets, each year. Although the leads and hearts were often placed in large grassy areas to cure, the traps or pounds and the tunnels were often suspended from trees or posts at the four corners while the tar dried and cured. This prevented the square sides and bottom from sticking together (Sпруill 1997). In the early 1950s, nylon mesh pound nets were introduced. As the nylon would melt if dipped in hot tar, a cold, asphalt-based chemical was developed to coat the nylon mesh nets. The asphalt based solution served the same purpose as the tar on cotton nets (Layton 1997; Spruill 1997). The nylon mesh was immediately preferred by the fishermen, because it was much lighter in weight and did not rot as quickly as cotton or linen nets. The trap or pound of the net is handled most often, while the hearts and leads are not generally disturbed once the net is set. As such, many fishermen sought first to replace their old cotton pounds with nylon pounds, while still retaining and using the old cotton hearts and leads until they eventually rotted away (Sпруill 1997).

As with the haul seine nets, many local fishermen once tied their nets in their spare time during off seasons as late as the 1960s. Spools of twine were much cheaper to purchase than the

completed mesh. Further, almost all fishermen were thoroughly knowledgeable about tying nets, as they often had to repair nets on a daily basis (Spruill 1997). Many commercial fisheries utilized fifty or more pound net sets in their operations. As such, large-scale operations most likely relied upon machine-made webbing which was readily available when the pound net was first introduced to North Carolina waters.

Today, most fishermen purchase machine made webbing (Layton 1997). When the mesh is purchased, it is generally purchased separate from the lines and the various components of the pound net have to be “hung” or assembled by cutting the webbing to the size and depth most suitable for the area where the pound will be set. Two inch mesh is the most common webbing size. Some fishermen, concentrating on shad capture, use “shad pockets” or pounds made with a four inch mesh, through which all but the largest river herring will pass through (Spruill 1997).

Anchor and Set Gill Nets

Anchor and set gill nets have probably been used for centuries in North Carolina waters. Gill nets are used today by both commercial and recreational fishermen. During the nineteenth and twentieth centuries, gill nets were used to harvest river herring, but were most popular in the shad fisheries. As the name implies, the nets are designed to “gill” fish as they swim through the net. The mesh of the net is large enough to allow the fish to get its head through the opening, but not to pass completely through. When the fish attempts to back away from the mesh, its gills hang in the webbing of the net (Tyler and McKenzie 1973). Anchor gill nets are arranged to hang in the water like a curtain and are positioned in the likely direction of travel schooling fish. In the case of river herring and shad, gill nets will be positioned in the mouth of a river or stream or in the sloughs and channel areas of the sound where the spawning fish pass.

The fishermen periodically check the net and remove captured fish when the net becomes loaded. When the net is full it is pulled into the boat and the fish, hung by their gills, are pulled out of the webbing. A top line for the net is used to mount corks and a bottom line or lead line is used to attach weights to keep the net suspended vertically in the water. Normally, large floats and buoy markers are attached to each end of the net and heavy weights are attached to fix the net in position. A long rope is attached to the end weight with a buoy marker that allows the weight recovery rope to float at the surface (Baird 1873; Spruill 1997; Tyler and McKenzie 1973). A variation of the regular anchor configuration of the stake net, whereby the net is fixed on each end to a stake or pole driven in the bottom of the river or sound. Depending upon the length of the net, several additional stakes may be added to support the net. Stake nets are popular in sound shallows, rivers and creeks (Jones et al. 1974; Stevenson 1899) while anchor gill nets work well in the deeper waters of the sound (Spruill 1997).

The nets can range from 50 to 1200 feet in length (Sink 1949; Tyler and McKenzie 1973), but the average shad net used in the sound fisheries ranged between 200 and 300 feet in length (Lane 1997). The depth of the net is tailored to the depth of the water where it will be used. The nets vary in length and mesh size, depending upon the water conditions, size of fish and species that is being captured. River herring gill nets are usually 2.50 to 3.00 inch mesh, while shad nets range from 4.00 to 5.25 inches (Spruill 1997; Sink 1949). As with seine and pound nets, early gill net webbing was made from cotton. Later, cotton was replaced by linen in the early twentieth century. Unlike the seine and pound nets, however, cotton and linen gill nets were not tarred to extend their working life (Spruill 1997). Cotton and linen nets, if not tarred, must be removed from the water at least once each week to be cleaned and dried when used in fresh water. Salt water environment nets, made with cotton or linen twine, can be left in position for several months (Stevenson 1899). Lower

maintenance nylon twine nets were developed in the 1950s, followed by monofilament nets in the mid-1960s (Layton 1997; Spruill 1997). Corks and plastic floats and plastic bottles are used today to float the nets. In earlier years, fishermen often used floats made from cedar or cypress wood (Baird 1873; T. Gardner 1997; Smith 1997). The bottom line, or lead line, is normally weighted with a series of small lead weights or iron rings that are spaced according to the number of floats on the top line (Coker 1949). Anchors include: old grooved ballast stones, cement blocks, bricks, and manufactured steel weights (Baird 1873; Spruill 1997).

The gill net became particularly popular in the late nineteenth century with shad fishermen. Due to the weight, pound nets normally require two fishermen to tend each net. Alternately, one fisherman can handle a gill net with relative ease (Lane 1997; Spruill 1997). With anchor gill nets, the fisherman can anchor the boat and fish off of the bow. The boat is positioned according to the prevailing wind and tide so that it will drift along the length of the net. Then the net is pulled up on the boat and passed over the deck while the fish are being removed (Sпруill 1997).

Fish Wheels

A noteworthy device, known as the "fishing machine" or "wheel" was introduced to the Roanoke River region in the late 1800s. The precise date of the introduction is not known. a 1906 report on North Carolina shad fisheries, however, revealed that some 500 "wheels" were operational in 1896. This figure fell dramatically to just over 100 by 1904 (Cobb 1906:35).

The strange contraption basically consisted of a water-flow actuated, revolving skim net, that was designed to dip running shad and river herring from the water as the basket turned. The device was mounted on pontoons or flats. Paddle wheels actuated by swift moving river currents propelled the basket around in a continuous cycle. As the basket made its revolution out of the water, the fish were

automatically dumped onto "slide boards," which guided the fish into open flats on each side of the scoop basket. The technology spread to various other rivers in North Carolina and continued to be widely used well into the 1970s. One example survives today and is maintained on the Roanoke River near Williamston (Jones 1994).

The basic design incorporated two cypress flats or jon boats that were placed side by side and spaced approximately eight feet apart. The two flats were connected together by a long axle that rotated in cradles cut into the each of the flats. In early years, the pole or beam was hewn from cypress, but metal pipe was used in later years. On the surviving example, two paddles are mounted on the water side of the machine (Jones 1994). Other variants had paddles mounted on both sides of the machine (Peele 1963). The paddles operated on the natural water flow of the river and actuate the scoop net. The scoop was typically made of bowed birch saplings attached to a frame of ash or elm. In early years the nets were made form cotton or linen twine, but more recent variants used chicken wire nets. The scoop revolves on the beam between the two flats (Jones 1994).

One or two logs or telephone poles were positioned on shore to jut out over the river and the fishing machine was tethered to them with rope(s). Such an arrangement allowed the machine to move up and down with the natural rise and fall of the river. The paddles were mounted on arms so that they could be raised and lowered out of the water to stop or start the machine. When the paddles were set in the water the machine operated untended. The paddles spun the net down into the water and fish were scooped up in the net. As the scoop would spin back up and around, the fish would fall out onto "slide boards" attached to the axle end of the scoop. The slide boards directed the fish down into the flats on either side of the wheel (Jones 1994).

The machines were usually operated at night, so that the spawning fish would not see the contraption as a barrier and avoid the trap by schooling around the machine (Jones 1994). In the

1940s the machines were observed harvesting between three and five thousand river herring in one night. As late as 1976, the only surviving machine on the Roanoke harvested 15,000 fish in one night's operation (Jones 1994). If the machine was left unattended for too long and the fish were not consistently off loaded, the flats would literally sink under the weight of the catch (Peele 1963).

Vernacular and Non-commercial fishing gear

Vernacular fishing gears used to harvest spawning river herring and shad were quite varied and diverse. Most of the vernacular gears were used for household level fisheries either for seasonal or annual subsistence needs. The most common of the vernacular gears was probably the bow net. Other technologies included wire baskets or bridge nets, weirs, drift gill nets, fish reels and traps. These specific forms can only be generalized due to the folk nature of their construction. Some gears are recent technologies, based on the material they are made from, such as the bridge net, while other technologies, such as weirs, were very ancient in terms of design and origin.

Weirs

Wooden weirs continued to be used in North Carolina waters as late as the 1940s (T. Gardner 1997). In their basic function, the modern wooden fish weirs operated in the same fashion as their prehistoric counterparts. The form of the weirs was somewhat different than the aboriginal weirs depicted by John White and Theodore De Bry (Hulton 1984). A 1930s Roanoke River weir, described by T. Gardner (1997), had a rectangular pound area with three trap openings and a single lead that projected from the shore of the river into the main pound entrance. The rectangular pound area was constructed of 2x4 inch or 4x4 inch cypress frames to which thin, vertical cypress slats were nailed. The slats ranged from .50 to .75 inches in thickness and usually measured from 1.00 to

2.00 inches in width. The vertical slats were nailed to the horizontal frame boards and spaced approximately one inch apart to facilitate water flow in the trap, while still retaining large fish. Other observers recorded the construction of slated weirs built out of white oak splits in the Gates County area (Johnson 1982).

T. Gardner (1997) noted that the leads were constructed by attaching upper and lower 2x4 or 4x4 inch stringer boards to a series of post that were driven down into the river bottom, perpendicular to the shore line. The post were spaced according to the length of the stringers. Cypress slats of similar dimensions as those used in the construction of the pound area were spaced out and nailed vertically to the lead stringers. Some builders opted to use a much cheaper, and simpler to install, heavy fence wire, in place of the more cumbersome slats. The pound section was also attached to four corner posts driven into the river bottom.

Openings were made on the lead side of the pound and at each end. Angled planks were attached to each side of the opening on the interior of the trap area and served to funnel the fish into the pound area and restrict their exit. T. Gardner (1997) observed that some of the fish would naturally escape the system, but enough remained trapped to make the weir effective. As observed by Spruill (1997), most fish will “bump along” the interior walls of a pound net. If the tunnel projects well into the interior of the pound, then most fish will pass over or under the tunnel which is normally positioned halfway up the side of the pound (Spruill 1997). The weir, thus described, was certainly only one variant of any number of similar styled devices that were employed in the region. Any number of other variations, in terms of exact form and material used, undoubtedly existed. Thompson (1997) noted that the remnants of a reed and brush weir still exists in a slough off the Middle River, just upstream from Plymouth.

Bow (Dip) Nets and Skim Nets

Bow nets are basically a form of dip or scoop net and have been used in the capture of shad and river herring in North Carolina for well over a hundred years (Goode 1887). Dr. Brickell (1969 [1737]) observed that dip nets were used in Edenton to harvest river herring in the 1730s. Although he did not describe their specific design, the nets may have been much like the bow nets made in this century. Although the author has found no specific evidence of their origin, it is suspected that the bow net may have been adapted by Europeans in the colonial era from traditional Native-American or possibly African inspired designs. Nets of a similar design were used on Lake Tanganyika in Africa (Brandt 1984).

One informant, the 94 year old grandson of a Bonarva Plantation (Tyrell County) slave, said that his grandfather taught him to make bow nets before World War I (Fenner 1995). Spruill (1995), the granddaughter of a Somerset Plantation (Washington County) slave, described a 1930s bow net that her father had learned to make from his father. She said that her father constructed his bow nets out of juniper wood and hand-tied the netting from cotton twine. She noted that her father used other types of wood to make the bow, but preferred juniper, because it was more flexible and light in weight.

Smithwyck (1997) described the bow net construction process. He noted, although it was possible to make a one-piece bow frame, most people made two-piece bow frames. It was more difficult to shape a one piece bow, without a significant degree of additional carving, so that it remained well-balanced. The final product needed to be light on the front end and heavy at the handle end for balance and strength. First, a suitable cedar (juniper) tree was selected; the tree had to be tall and straight with a diameter under six inches at the base. The tree was then cut, trimmed of branches, stems and bark, and split down the middle. The two bow halves were laid on flat ground

and shaped by bending the split sections into half-ovoid forms. Wooden stakes were driven into the ground around the sections so that they would retain their shape while they dried. If the weather was good (relatively dry), the bow sections would dry in about thirty days. Once the sections were dry, the bow was assembled by lashing and nailing the pieces together (Smithwyck 1997).

The front of the bow (the oval) was formed by overlapping the narrow ends of the two sections and lashing them together with string, leather or wire. One informant observed that the two ends that formed the central curve of the bow were sometimes notched in an “L” fashion so that they could be joined and retain the smooth appearance of a one piece bow (T. Gardner 1997). The lashed ends were occasionally reinforced with the addition of nails or wood screws. The rear of the bow, or the handle end, was formed by overlapping the wide (trunk base) ends of the two sections in the form of an “X”. The crux of the bow was fastened with a nail or bolt. It was occasionally reinforced with a lashing of string, wire or leather. The handle ends of the bow protruded back from the crux far enough to allow a cross-piece handle to be attached. The handle was attached with nails, screws or bolts. A second cross-piece was attached to the bow just forward of the crux point. This cross-piece served as an attachment point for the net and as a second lifting handle. Both handle attachment points were occasionally lashed to the bow frame with leather, string or wire (Smithwyck 1997).

A net of .50 to 1.00 inch mesh for river herring (Smithwyck 1997) or 2.00 inch for shad (Barden 1955) was attached to the bow. Some people purchased machine-made webbing, while others hand-tied their own webbing from bulk twine (Smithwyck 1997). The net was generally tied directly to the frame of the bow and the inner handle. Some makers reinforced the net lashing with the addition of twine or light gauge wire. Some bows, such as one in the collection of the Port O’ Plymouth Museum (Plymouth, NC), utilized “chicken wire” baskets instead of cotton or nylon

netting. In some cases, a lifting rope was tied to the front of the bow at the center point (Spruill 1995). The hand rope was used by a second person to assist in lifting a filled net.

If the water was deep enough inshore, the bow nets could be used for fishing from the bank of a creek or river. The nets could also be used from boats anchored or drifting in creeks, rivers and swamps. If the net was to be used from a high bank shore position or if the inshore water was too shallow, a long wooden handle could be attached to the back of the bow. The long-handled versions were used to fish from both boats or from high creek and river banks (Smithwyck 1997). A larger variant of the bow net, called a skim net, was a popular gear for drift netting shad on the Neuse and Roanoke Rivers in both the nineteenth and twentieth centuries (Peele 1963; Goode 1887). The skim nets were often twenty feet in length from the tip of the handle to the tip of the bow (Peele 1963).

Spruill (1995) claimed that her father had caught as many as one hundred river herring in a single dip of the net in either the Scuppernong River or the old Somerset Plantation canals that connect the Scuppernong to Lake Phelps. Fenner (1995) said that he had, as recent as the 1950s, caught at least one hundred and fifty river herring in a single dip of the bow net. The weight of the catch required two men to haul the net up out of the water. He claimed that two men fishing with one large dip net could fill up the back of a pick up truck or a mule cart in less than an hour-and-a-half back when the river herring still ran in the Somerset canals. Drift fishermen on the Neuse and Roanoke rivers used larger bow nets, often referred to as skim nets (Goode 1887), to catch shad as late as the 1950s (T. Gardner 1997; Harper 1997)

Bridge Nets or Pot Nets

Spruill (1995) described bridge nets that her family used in the 1950s and 1960s. These were simple contraptions made from “chicken wire”. Heavy gage chicken wire was wrapped in a cylindrical

shape, approximately the diameter and depth of a “bushel basket”. Chicken wire was used to close up one end of the cylinder. a heavy solid wire, such as “baling” wire, was used to reinforce the opening of the net. Sometimes heavier gage wire was formed into rings and slipped down over the cylinder. The rings were spaced evenly down the sides and attached to the chicken wire with a light gage wire. The rings acted as support frames for the relatively flimsy chicken wire and kept the cylinder from collapsing when dropped.

Two ropes were rigged on the net in such a fashion that the trap could be suspended from the bridge and hung in a horizontal fashion. When the river herring “hit” the basket, vibrations could be felt in the suspension ropes. At that point in time, the pot net would be pulled up out of the water to a vertical position, thereby trapping the river herring inside. The net was then hauled to the top of the bridge, emptied out and cast back out (Spruill 1995).

Drift Gill Nets

Drift gill nets have probably been used for centuries in North Carolina waters. Drift nets are used today by recreational fishermen and small-scale commercial ventures, just as they were used in the past. As the name implies, the nets are designed to hang freely, much like a curtain in the water, and drift with the current or tide, while the fisherman drifts along with the net and periodically checks the net for catch. When the net is full it is pulled into the boat and the fish, hung by their gills, are pulled out of the webbing (Peel 1963). The nets are relatively simple affairs that range in length and mesh size, depending upon the size of fish and species that is being captured. River herring gill nets are usually 2.50 to 3.00 inch mesh, while shad nets range from 4.00 to 5.00 inches (Spruill 1997; Sink 1949). A top line for the net is used to mount corks and a bottom line or lead line is used

to attach a small amount of weight to keep the net suspended vertically in the water (Tyler and McKenzie 1973). The nets usually ranged in length from 50 to 100 feet (Sink 1949).

Corks and plastic bottles are used today to float the nets. In earlier years, poorer fishermen, as well as recreational fishermen used floats made from cedar or cypress wood (T. Gardner 1997; Smith 1997; Sink 1949). Drift net fishermen were prominent on the Roanoke River in the Jamesville and Plymouth area during the last century. a large number of fishermen in Plymouth harvested river herring to be traded or sold from door to door or in the local markets. They would paddle their dug out canoes upriver, several miles past the town and set their nets. They would then float downstream with the current and pull in their nets several miles past the town, near Conaby Creek. They would then have to fight the current and paddle back upstream to off load their catch. The process was often repeated from sun up to sun down during the spring spawning runs (T. Gardner 1997; Smith 1997). Today fishermen still ply the waters of the Roanoke in gasoline-powered, fiberglass skiffs in an effort to capture the ever dwindling river herring stocks. They now use monofilament gill net material and cork or synthetic floats. Much like their counterparts over fifty years ago, they land at the local boat ramps and sell their catch to customers on the spot or to local seasonal restaurants (L. Gardner 1997).

Conclusion

In conclusion, it is apparent that a broad range of fishing gear technologies have been employed through time to capture *Alosa* species in North Carolina. The various technologies employed show marked patterns in there similarities over time in relation to their form, function, and purpose. For thousands of years, the net in all of its various manifestations has continued to be the most efficient method of capturing spawning shad and river herring. Diversity, yet continuity are the hallmarks of the shad and river herring fisheries. Today fishermen still set nets for shad and river

herring, but many wistfully observe that the river herring no longer run in any significant quantity up the Scuppernong, Roanoke, Alligator, Middle, Cashie, Neuse, or Tar-Pamlico Rivers and their tributary streams (Davenport 1997; Layton 1997; Smith 1997). The Chowan and Meherrin Rivers and the Albemarle Sound appears to be the last stand of the river herring and the shad for the immediate future, unless things change. It is unfortunate, however, that our modern society, through pollution, over harvesting and habitat destruction has largely destroyed what was once a seeming infinite resource that played such a critical role in the history and development of North Carolina.

Appendix B:

The Shad Boat

Because of its geographic setting, the maritime environment has always been an integral part of both the cultural and natural histories of Eastern North Carolina. To exploit marine resources, many of North Carolina's historic period coastal communities focused their economic endeavors on fishing or fishing-related activities. In such an environment, watercraft have been an important element of the region's material culture. The information presented in this chapter will address the specific historical context, development, design, and construction of a particular vessel that was unique to the North Carolina coast, the round bottom "shad boat" of the late nineteenth and early twentieth centuries. While a range of work boats, from dug out canoes to flat bottomed skiffs, were utilized in the shad and river herring fisheries, the shad boat is the only variant that was specifically designed for the sound pound net fishery.

After the American Civil War (1861-1865), technological advancements and market changes greatly stimulated North Carolina's commercial fisheries. In the northern markets, North Carolina shad commanded respectably high prices, which resulted in a greater effort to increase local production in the region's fishing communities (Taylor 1990, 1992). By 1907, more shad were being netted by North Carolina fishermen than in any other state on the Atlantic seaboard or Gulf Coast (Smith 1907). It was in this general context that the North Carolina "shad boat" developed.

By their very nature, shad and river herring fisheries required the use of an array of fishing gear, processing equipment, shore-based facilities and work boats. A variety of work boats were used to "set" or "shoot" haul seine nets, to set pound and gill nets, to harvest the catch and to transport the catch to "buy boats" or local markets. Before the Civil War, North Carolina fishermen most often used small, flat-bottomed, dugout log canoes, skiffs, perriaugers, and shallops in their

fishing operations. The increased demand for shad after the War, however, required larger boats that could operate in shallow sound waters and still carry a heavy catch and gear load. In the early 1870s, George Washington Creef, a Roanoke Island boat builder, responded to the needs of the shad fishermen (Alford 1990, 1993; Barfield 1995).

Creef designed and built a graceful, round bottom, but functional work boat at Creef Boat works in Wanchese that has since come to be known as the “shad boat” (Alford 1990, 1993; Barfield 1995). It has been suggested that George Creef’s father, Joseph Creef, actually designed the original shad boat (Gray 1981). One source indicated that Creef’s first shad boat may have actually been built at East Lake, North Carolina, a small fishing community on the Alligator River (Dunbar 1958). Local informants from Manteo, North Carolina, have noted that the Creef shad boats were also known as “Dare County Shad Boats” or “Sprintsail Shad Boats” (Dunbar 1958:157). Others have called the vessel the “Albemarle Sound Boat,” the “Croatan Fishing Boat” or the “Pamlico Sound Boat” (Chapelle 1951, 1960). The hull design, however, had a limited geographic range of use, from the Elizabeth City area on the Albemarle Sound, down the Pamlico Sound to Ocracoke Island (Couch 1982).

Due to the careful shaping and fitting requirements of the construction process, round bottom boat builders had to possess a greater degree of skill than other boat builders. The inherent nature of the design required that the best available materials be incorporated into the fabric of the vessel, because of the curved shapes of the various parts of the craft. As such, round bottom boats were generally more complicated to build and more expensive than flat bottom varieties (Alford 1990). Due to the complexity of construction, the majority of the shad boats were built by the most experienced boat builders, rather than being “knocked together” in a fisherman’s backyard (Barfield 1995).

Creef's shad boat designs are known to have ranged from eighteen-to-thirty-two feet in length (Alford 1993; Chapelle 1951) and incorporated: a round bottom, wide beam, full body, tapered (upright) and raked stem, and a raking heart-shaped stern (Alford 1990, 1993; Barfield 1995; Chapelle 1951, 1960). The stem had a strong sheer that promoted the boat's seakeeping ability (Chapelle 1960). The beamy midsection was "...formed with a rising straight floor, easy bilge, and flaring topside" (Chapelle 1960:281). Most versions were undecked except for narrow "washboards" or "side-decks" that ran from the transom to the bow (Chapelle 1951). The side boards acted as a deck for the fishermen to stand on to set the pound nets used in the shad fishery (Paul Fontenoy, North Carolina Maritime Museum [NCMM], personal communication 1997). A coaming strip was used to finish the inboard side of the hull (Chapelle 1951). Early sail-powered models included a retractable centerboard (Alford 1993; Gray 1981) that was slightly forward of the midlength (Chapelle 1960). An outboard rudder was hung on an outside sternpost for steering the boat (Chapelle 1951). Fifteen-to-thirty canvas sandbags were carried for ballast. Sandbags, weighing from 50 to 100 pounds each, were used so that they could be shifted to windward in stormy weather (Chapelle 1951). One old-time shad boat fisherman recalled:

To go against the wind to get where you wanted to go, it usually took three men to sail 'em. Two men would stand right a-straddle of the center board, and when the man would tack they'd shift that ballast from one side to the other, mighty quick. Two men can shift five hundred to a thousand pound of ballast right now. It was hard work but we didn't mind it. Damn it, I've shifted 'em. Shifted 'em for twenty miles (Forrest 1988:107).

The boat was designed with a large roomy interior, specifically to carry heavy loads (e.g., nets, stakes and catch) and to handle well in the adverse conditions often encountered in North Carolina coastal waters.

Although Creef's basic construction scheme was the conventional plank-on-frame method (Alford 1990), it has been noted that the shad boat assembly technique was "...an interesting hybrid of carvel and inserted-frame construction" (Alford 1995:31). While all other work boats built in North Carolina were adaptations of designs from other geographic regions, George Creef's shad boats were quite unique. The Creef shad boat "...is the only identified new vernacular boat type ever built in the state" (Barfield 1995:182). The Carolina shad boat should not be confused with the v-bottom working shad boats and "racing shad boats" found in Florida, Georgia, and South Carolina (Fleetwood 1995) during the last quarter of the nineteenth century .

The keel of the North Carolina shad boat was often hewn from the trunk of great white cedars and the curved frames were cut from "...the spreading buttress roots of the white cedar tree" (Alford 1990:19; Chapelle 1951; Gray 1981). The incorporation of the hand-shaped keel into the fabric of the shad boat, reflects its heritage as a descendant of the split-bottom dugout canoes of the colonial period in North Carolina. Early split-bottom dugouts, or perriaugers, utilized a similarly fashioned hand-hewn center-piece or keel (Paul Fontenoy, NCMM, personal communication 1997). Atlantic White Cedars, also known locally as junipers or southern cedars (Chapelle 1951), grow in the "cedar swamps" of the Atlantic states and the lumber cut from the trees has long been prized by southern small boat builders, because it is soft and easy to work, as well as resistant to insect attack and rot (Alford 1990; Harris 1909). Since most other locally available woods split apart when bent, the soft, pliable, cedar wood was required to form the curved hull planks (Alford 1990). Other builders and early twentieth century variants undoubtedly incorporated other wood species in the fabric of their boats. Cypress was often used for pieces that did not need to be bent and formed, such as the floor planks. Gasoline engine-powered variants often incorporated a flat cypress plank transom (Paul Fontenoy, NCMM, personal communication 1997).

When originally conceived and constructed, the shad boat of the 1870s was powered by sail and oar. The standard rig consisted of a stepped mast with sprit mainsail and a jib. A topsail and flying jib were added when appropriate for the wind conditions (Barfield 1995; Alford 1990; Chapelle 1960, 1951). Chapelle (1951:257) observed that while there were many "...American working-boats fitted with the sprit mainsail and jib..." the North Carolina shad boat was the "...only one that is known to have carried a topsail." In most known cases, "... the topsail was rigged with its own sprit, independent from and above, the mainsail where it could reach less disturbed air (Alford 1990; Chapelle 1951). It could be set or taken down without disturbing the mainsail and could even be set when the mainsail was furled" (Alford 1990:19). The topmast was raised by means of a halyard and was usually lowered and stowed while the boat was moored. Oral history accounts indicate that the topmast was occasionally tossed overboard, while still connected to the halyard, and used as a sea anchor if the vessel was caught in a storm (Alford 1995). Alford (1990, 1995) further observed that the "North Carolina style of the spritsail rig," like the shad boat itself, was a unique rig configuration that is not known to have been used in any other region of the world.

Although, the topsides of the shad boats were most often painted white (Chapelle 1951), two surviving boats in the collection of the North Carolina Maritime Museum (Beaufort, North Carolina) have grey topsides with dark red bottoms (Paul Fontenoy, NCMM, personal communication 1997). Many of the shad boats were painted white with "...black and red bands in three narrow stripes along the gunwales, which set off the strong sheer very well indeed" (Chapelle 1951:258). One shad bot at the Museum has been repainted in its original paint colors which incorporated a grey topside with green, yellow, and red stripes along the gunwales. Certainly other color combinations were selected and used by the individual boat builders and owners. Contemporary boat builders refer to the topside stripe as the "croaker stripe" (Couch 1982). Shad

boats can be loaded down to the croaker stripe and still retain their seakeeping abilities and speed (Couch 1982).

The original Creef design was extremely successful and highly demanded by Carolina coastal fishermen. Although Creef Boat works produced the shad boat from the early 1870s through the early 1930s (Barfield 1995), other boat builders imitated the design to meet the demand. The Dough Boat works, located on the north end of Roanoke Island built shad boats in the nineteenth century, as did a number of other shipwrights from Currituck, Nags Head, Englehard, and Ocracoke (Alford 1990; Barfield 1995; Chapelle 1951). As one would expect with most vernacular vessel constructions, different builders "...imparted their own peculiar nuances to the basic design" (Barfield 1995:171).

Other shad boat variants exhibited a range of both significant and minor architectural changes such as v-bottom or deadrise hulls, and decorative-round or fan-tailed sterns (Barfield 1995; Chapelle 1951). Deadrise adaptations of the original Creef shad boat were known locally as "round-chine" (Alford 1990) or "morphodited" (Couch 1982) shad boats. These design changes resulted from the introduction of the gasoline engine in the first decades of the twentieth century. The marine gasoline engine was introduced to North Carolina in 1908 and had achieved broad popularity among fishermen by 1915 (Paul Fontenoy, NCMM, personal communication 1997). Many fishermen converted from sail power and added engines to their shad boats and removed the sailing rig and centerboard (Alford 1990, 1993). Although there were some exceptions, most of the shad boats built after 1915 were built for gasoline engine power (Paul Fontenoy, NCMM, personal communication 1997). With the general introduction of the gasoline engine, few of the complex, round hull shad boats were built after 1920s. Engine-powered boats did not require sophisticated hull designs that worked most efficiently with the wind (Couch 1982).

One sailing shad boat in the collection of the North Carolina Maritime Museum was converted to gasoline power in the early part of the twentieth century. For propeller clearance, the stern post and keel were simply notched out and an engine compartment was added to the interior area of the boat. Another example in the collection was specifically built for gasoline engine power (e.g., original flat transom), but the keel and stern post was shaped like that of the earlier sail-powered variant. As in the case of the original sail-powered boat, the builder crudely notched out the keel piece and added a wedge to the stempost to create sufficient propeller clearance (Paul Fontenoy, NCMM, personal communication 1997). During the Prohibition era, “bootleggers” and “rum runners” purchased longer, sleeker, faster versions of the original round bottom type shad boat. These vessels were known as “mail boats” and were typically equipped with more powerful engines than the average work boat so that the bootleggers could outrun the government “revenueurs” (Alford 1990).

Considering its functional purpose as a work boat, the shad boat was a handsome craft with graceful lines and lean ends. The boat was a swift sailer and it both handled well and sailed smoothly in the roughest of waters (Alford 1990; Barfield 1995; Chappelle 1951). It has been estimated that a sail-powered shad boat could make a top speed of nine knots and maintain an average working speed of six-to-seven knots (Couch 1982). Nine-to-ten knots was the terminal hull speed of the shad boat. Even with more powerful gasoline engines, the hull design would not allow for a speed significantly higher than ten knots (Couch 1982). The craft was not only useful because it could carry heavy loads of fish, it was “widely respected for its safety and comfort in rough water...” (Alford 1990:19). Even though there are faster (engine-powered) work boat designs today, they all have to slow down to the speed of the shad boat in rough weather. Comparatively, the shad boat handles better than any other work boat design in a rough sea (Couch 1982).

Due to its shallow draft, the Creef boat was “...ideally suited to the pound-net fishery...” (Alford 1990:19) in the shallow waters of the Albemarle and Pamlico sounds. The pound net fishery required the use of large nets, with sets of nets placed in a series over one thousand yards long (Leary 1915), and bundles of stakes or post with which to set the nets to the sound bottom. Pound net stakes generally ranged from twelve-to-fifteen feet in length and each net set required a minimum of twenty, four-to-six inch diameter, stakes (Layton 1997). The beamy construction of the shad boat allowed fishermen to load large quantities of stakes, for multiple net sets, on each side of the centerboard or engine box (Couch 1982).

Some watermen even used the shad boats for oystering in the lower sounds until the “sharpie” was in general use in North Carolina in the mid-1880s (Chapelle 1951; Dunbar 1958). A number of shad boats were still being used as work boats in the Roanoke Island area as late as the early 1980s (Gray 1981). Surviving Creef built shad boats, well over one hundred years old, attest to the material quality and fine craftsmanship of his creations (Alford 1993, 1990). For its unique role in the cultural heritage and economy of Eastern North Carolina, the shad boat was officially recognized by the North Carolina General Assembly as the “State Boat of North Carolina” in 1987 (Alford 1990, 1993; Barfield 1995). There are presently five shad boats in the collection of the North Carolina Maritime Museum in Beaufort, including one original Creef boat.

Appendix C:

Commercial and Domestic Preservation of River Herring and Shad, circa 1880-1950

Salt-curing (pickling or coming) was the preferred method of preservation of shad and river herring from the early colonial period through the mid-twentieth century. The pickling of shad and river herring is a process that did not undergo discernable change in its basic procedure from the colonial era through the end of World War II in the Albemarle Sound region. Except for the fact that sea herring were often cured ungutted and unsplit, the preservation technology for shad and river herring generally mirrored the techniques used in the early English sea herring fisheries (Samuel 1918). The early English techniques were no doubt observed, modified and adopted by the original European settlers of North Carolina. Contemporary ethnographic accounts (Lane 1997; Hampton 1997; Taylor 1997) of the procedures used in eastern North Carolina are largely synonymous to those first recorded in the nineteenth century (e.g., Crayon 1861, 1959). In the pickling process, the fish were headed, split down the belly, gutted, rinsed with fresh water, and coated with salt in large, rectangular wooden troughs. River herring were often sprayed down with high pressure hoses (hand-pump or mechanical) to remove the scales before salting and to remove excess blood and visceral matter after they were cut (Taylor 1997).

An expert cutter could prepare forty or fifty river herring for salting per minute (McDonald 1884). Unlike cod fish processing in the North Atlantic region (Balcom 1984), shad and river herring were not butterflied and the backbone was not removed before salting. The offal (e.g., heads, visceral matter) and roe (female eggs) from the cleaning process were often carted off with other “trash” fish from the haul to fertilize surrounding agricultural fields or fed to pigs with other “trash fish” from the hauls. In some instances, the roe was left in the body cavity and salted along with the

fish. Traditionally, women and children “cut,” while the men used either large wooden paddles or poles to work the fish back and forth in the trough to introduce salt into the body cavity of the fish.

The men then dumped the salted fish in wheel-barrows or baskets for transport to open hogsheads (large barrels) or wooden vats where the fish were packed in with dry salt. The salted fish were left in the vats for several days, which allowed the salt time to leach the moisture from the fish and to form a brine. When the backbone of the fish “struck” or popped, the salt had completely penetrated the flesh and bone of the fish, they were ready to be packed for shipping or storage (Lane 1997; Hampton 1997; Taylor 1997). When the initial brining phase was complete, usually three-to-five days, the fish were removed from the brine vats and allowed to drain and dry.

The fish were then packed in smaller wooden barrels between fresh layers of salt. The fish were packed “belly up” to ensure that the salt entered the body cavity. The original brine was often boiled and strained of impurities (e.g., blood and visceral matter) or a fresh brine solution of salt and water was made. The ratio of salt to water was correct if the brine would float an egg. The prepared brine was then poured in, up to the top of the barrel, over the packed fish, and the barrel was “headed” or sealed for storage and shipping (Hampton 1997; Lane 1997; Taylor 1997). At the family level, open barrels of river herring in salt brine were often covered with burlap sacks (Fenner 1995) or stored in large stoneware crocks and glass jars (L. Gardner 1997). Variations on the process, thus described, were utilized from the colonial period on through the mid-twentieth century.

In the late nineteenth and early twentieth century, Boyce (1959 [1917]) observed that pickled river herring were prepared, first by soaking to remove excess salt, and then by one of three procedures: (1) split, coated with corn meal, and fried in grease, (2) dried on the side of the smoke house after soaking and fried in grease, (3) dried and broiled. Modern informants indicated that pickled river herring were consumed after being prepared in fashions similar to those described by

Boyce (1959 [1917]). The most common manner was the soak and fry method (1). Smoked river herring, however, were eaten “as is” in most cases or the meat was torn into small pieces and mixed with diced potatoes and onions to make fried potato fritters (T. Gardner 1997). Shad were often baked whole or filleted and fried.

Smoke drying was accomplished in a different manner than pickling. In the 1880s, one observer noted: “Great numbers (of herring) are smoked in North Carolina for local consumption; in fact, almost all which are used in the vicinity of the fisheries are taken out of the brine and hung up for a few days in the smoke houses belonging to the purchasers who intend them for their own use” (McDonald 1884:587). Boyce (1959 [1917]) indicated that many people put up smoke-dried river herring, because they could be boiled (to leach out excess salt) and then boiled or fried in a manner that required less grease than what a pickled river herring would require after soaking if it was not first dried out. Although there are no historical records from the early period that described the smoking process, modern ethnographic accounts (T. Gardner 1997; Lane 1997; Spruill 1997) likely describe a process that has also been used for generations. Unlike the native Indians’ smoking methods, colonial and modern period fishermen generally brined the fish in salt before smoking. The basic procedure was a modified version of that employed by the English sea herring fisheries in the processing of “kippered” sea herring (Samuel 1918). Some people left the body and head of the fish intact and “gibbed” or pulled the entrails from the body after cutting a slit in the body below the gill area (Lane 1997). Others cut and headed the fish as in the normal salt curing process (T. Gardner 1997). After the fish were cleaned they were brined for a period between twenty-four and thirty-two hours. The fish were then removed from the brine and rinsed with fresh water. Borax was sometimes added to the rinse water to drive flies away during the processing (T. Gardner 1997).

After rinsing, the fish were strung on reeds, either through the eyes or through the belly, with about two dozen on each reed. The reeds were then hung on tiers in a smoke house and smoked over a wood fire made from hickory, apple or persimmon tree wood. When the outer portion of the fish turned a golden brown, they were ready to be eaten or packaged for storage. Most people did not leave the smoked fish in the smokehouse for storage because the odor would taint pork hams and other cuts of meat that had to be stored in the smoke house. Unless they were stored in the smokehouse, however, the smoked fish would only last three-to-four months before they became too hard and dry to eat (Fenner 1995; T. Gardner 1997; Lane 1997). As one subsistence level fisherman recalled, “(smoked river herring) was some good eat’n...God knows that (smoking) gives a flavor to him” (Fenner 1995).

River herring roe was another consumable product of the fisheries in the region. Before the introduction of canneries in the region, just before the turn of the twentieth century (Leary 1915), river herring roe was eaten fresh or discarded along with the rest of the offal for fertilizer. One late nineteenth century source indicated that fisheries in the region commonly salted river herring with the roe left inside (McDonald 1884). Packed “roe herring” was, however, not as popular in North Carolina during the early-to-mid twentieth century (Hampton 1997; Lane 1997; Smithwyck 1997; Spruill 1997; Taylor 1997). The salting of river herring with the roe for market resale largely ceased with the general introduction of the canning of river herring roe in the early twentieth century. In 1934 over 5,000,000 river herring were salted in the standard fashion, while approximately 100,000 were cured with the roe (Johnson 1936:203). Some individuals, however, dried roe with salt for short-term storage (Hampton 1997). Roe was generally eaten fresh and often cooked with eggs (Hampton 1997).

American shad roe was commonly baked in with the fish, but not normally canned in the twentieth century, as it is a coarser variety than river herring (Spruill 1997). In the early nineteenth century, however, shad, river herring and sturgeon roe was salt-cured, while in the later part of the century it was packed on ice and shipped out to northern markets (SHC: Hayes Collection (Wood Family Series), Vols. S-2 and 4; SHC: Gray Family Papers). During the early twentieth century, river herring processing plants and fisheries shipped the roe, acquired during the splitting and gutting process, to canneries in the Albemarle-Pamlico region (BLA [anonymous] 1972; Taylor 1997). In 1929, the Perry-Belch fishery, located at Colerain, alone shipped over 6,000 gallons of roe, the product from 125 pound nets, for canning alone (BLA [anonymous] 1972:C7). By the 1930s, some of the large-scale fisheries on the Roanoke and Chowan Rivers added their own canning plants (BLA [anonymous] 1972; Hampton 1997). The Perry-Wynns Fish Company in Colerain is the only river herring roe cannery and pickled river herring processor left in North Carolina today.

